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MEMORANDUM

TO: Ed Bowles and Ron Boyce, ODFW

FROM: David A. Benner

DATE: August 11th, 2008

RE: Upper Snake Flow Augmentation and Irrigation

At your request, the Fish Passage Center staff has investigated the accounting of water released by the US Bureau of Reclamation (USBR) for flow augmentation from the Upper Snake River. Specifically, it was our goal to discern how the Idaho Department of Water Resources (IDWR) differentiates between irrigation water and salmon flow augmentation released by the USBR. In this process, the FPC staff reviewed the term sheet of the Snake River Basin Adjudication Agreement (SRBA) and conferred with USBR, NOAA Fisheries (NOAA), and IDWR technical staff. Ted Day (USBR), Liz Cresto (IDWR), and Rich Domingue (NOAA) were very helpful in providing data and information regarding the flow augmentation releases and the accounting of these releases relative to base irrigation flows. From our conversations and review it was clear that:

- Accounting for the water released from the Upper Snake for flow augmentation was very important to both the USBR and the IDWR and a significant effort is put into properly accounting for Snake River flow augmentation water.
- The BOR and the IDWR communicate regularly concerning flow augmentation/irrigation and the USBR develops an annual summary of Upper Snake flow augmentation as part of the 2005 Upper Snake Biological Opinion and submits these to NOAA Fisheries. These reports are available from 2005-2007.
- The SRBA term sheet incorporates the Swan Falls Agreement but does not specifically identify a minimum flow at Swan Falls.

- Salmon flow augmentation releases can be monitored by observing three separate gauges for releases from the Upper Snake, the Payette River, and the Boise River. The Snake River at Milner Combined or the Snake River near Murphy, Id gauge flow data is used for Upper Snake flow augmentation, the Payette River near Letha, Id gauge is used to determine flow augmentation from the Payette River, and the Boise River near Middleton gauge is used to determine flow augmentation releases from the Boise River.
- Based on what we have learned to date, so far in 2008 it does not appear that salmon flow augmentation has been used to meet the Swan Falls minimum flow or other irrigation needs.

The volume of water released by the USBR in the Upper Snake River depends on water year but typically is approximately 487 Kaf. This total is divided into four sub-categories: the Upper Snake, the Payette River, the Boise River, and natural flows. For flow augmentation in 2008, the BOR expects to release 185.7 Kaf from the Upper Snake, 175 Kaf from the Payette River, and 48.7 Kaf from the Boise River. The remaining 77.6 Kaf to make up the full volume of 487 Kaf is expected to come from natural flows. The following discussions describe the flow augmentation release volumes from the Upper Snake, the Payette River, and the Boise River and the explanation provided by USBR and IDWR regarding how salmon flow augmentation releases are accounted for in addition to irrigation base flows.

Upper Snake River Flow Augmentation (projected 185.7 Kaf in 2008)

The simplest way to evaluate the USBR flow augmentation coming from the Upper Snake river is by looking at a stream gauge named Snake River at Milner Combined. This stream gauge can be found at:

<http://www.idahopower.com/riversrec/waterlevels/streamflow/basinstationList.cfm?selectS=2#>.

According to staff at USBR and the IDWR this gauge includes approximately 230 cfs of natural flows and the rest of the flow at this gauge is considered Upper Snake flow augmentation. According to this gauge, flows began to exceed 230 cfs on 7-6-2008 and therefore flow augmentation from the Upper Snake began. Between July 6th, 2008 and August 6th, 2008, slightly more than 140 Kaf of water has passed the Snake River at Milner Combined gauge that would be considered flow augmentation from the upper Snake River. According to the IDWR personnel, a second stream gauge is also used to ensure that that flow augmentation water passing Milner also passes Swan Falls. This gauge is called: the Snake River near Murphy, Id and can also be found at:

<http://www.idahopower.com/riversrec/waterlevels/streamflow/basinstationList.cfm?selectS=2#>.

It is important to note that the Snake River near Murphy, Id gauge is located 4.2 miles downstream of the Swan Falls power plant. Also, it was stated by IDWR personnel that

an approximate three days lag time exists between flows at Milner and flows at the Murphy Gauge. The following plot was provided by IDWR personnel.

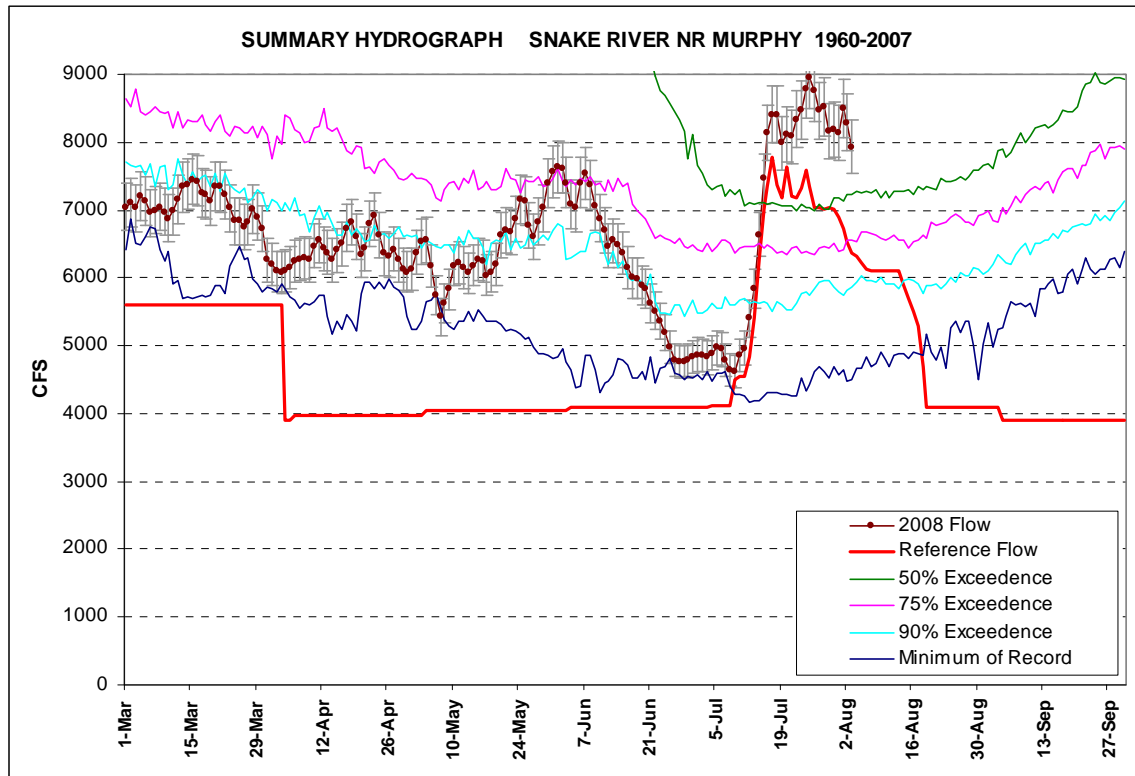


Figure 1. Actual 2008 flows at the Snake River near Murphy, Id gauge (brown line), the reference flow (see below for description, bold red line), and different exceedence flows and minimum flows that have occurred at this gauge over the historic record between 1960 and 2007.

Several points are important from Figure 1. First, the reference flow (bold red line) is the flow that is needed to meet both the Swan Falls minimum of 3900 cfs and the upper Snake flow augmentation. According to IDWR, one way to ensure that flow augmentation from Milner is passing the Swan Falls project is to make sure actual flows (brown line) are equal to or greater than the reference flow (bold red line). From Figure 1, it can be seen that in 2008, the actual flows at the Murphy gauge have been greater than the reference flow. Also, the volume of water between the reference flow and the Swan Falls minimum of 3900 cfs (estimate of flow augmentation from the Upper Snake) is also currently approximately 140 Kaf. The second important point from Figure 1 is that the minimum flow between 1960 and 2007 is always several hundred cfs higher than the Swan Falls minimum, therefore it is unlikely that flows at the Murphy gauge will be lower than the 3900 cfs Swan Falls minimum.

Payette River Flow Augmentation (projected 175 Kaf in 2008)

To determine the volume of USBR flow augmentation that comes from the Payette River the IDWR stated that this location is the most difficult to determine. The IDWR stated that the most accurate method is to use their model to account for the impact of the Seven Mile Flue on river flows at USGS 13250000 Payette River near Letha, Id. Because this model information is not available online, the IDWR did state that a rough estimate of flow augmentation water could be obtained by summing flows above 135 cfs (irrigation demand) at the Payette River near Letha, Id; however this method could only be used after stored flow from upstream projects began passing the Letha gauge. According to the IDWR, an estimated 114 Kaf of the projected 175 Kaf flow augmentation volume from the Payette River has been released and accounted for as of August 4th, 2008.

Boise River Flow Augmentation (projected 48.7 Kaf in 2008)

To determine the volume of USBR flow augmentation that comes from the Boise River the IDWR stated that an estimate of flow augmentation water could be obtained by summing flows above 250 cfs at the Boise River near Middleton gauge, this gauge can be located at:

<http://www.idahopower.com/riversrec/waterlevels/streamflow/basinstationList.cfm?selectS=2>.

The 250 cfs value at the Middleton gauge is an operational flow that is needed to keep the irrigation canal head up to where it need to be for irrigation demands. It should be pointed out that a small amount of flow augmentation water from the Payette system gets removed above the Middleton gauge. The IDWR calls this water “United Water”, and it has been explained that this water is part of an irrigation buyout. That is, water is taken out by United above Middleton (between 10 and 18 cfs), but the same amount of water is added back into the Snake River below the Murphy gauge (below Swan Falls) by United as part of an irrigation buyout. There is essentially no way of knowing how much water is United Water unless IDWR is contacted. At any rate, this small portion of water is included in the Payette River flow augmentation accounting.

According to the IDWR, an estimated 26 Kaf of the projected 48.7 Kaf flow augmentation volume from the Payette River has been released and accounted for as of July 28th, 2008.