FISH PASSAGE CENTER

847 NE 19th Avenue, #250, Portland, OR 97232
Phone: (503) 833-3900 Fax: (503) 232-1259
www.fpc.org/
e-mail us at fpcstaff@fpc.org

MEMORANDUM

TO: FPAC

FROM: David Benner, FPC

DATE: June 30th, 2016

RE: Update to June 28th, 2016 Memo: Analysis of Addional Draft at Dworshak to Elevations 1515, 1510, and 1500 ft. end of September

Discussions are ongoing of the operation of Dworshak Dam to moderate temperatures at Lower Granite Dam to a 65-66 ºF temperature during the majority of the sockeye run passing Lower Granite Dam. With the traditional volume of flow/temperature augmentation volume (1.2 Maf) by mid-September from Dworshak, moderating Lower Granite temperatures during the sockeye migration would come at cost to migrants later in the summer. This analysis explores potentially drafting Dworshak to a deeper elevation by mid-September, and using the addional draft primarily during the sockeye migration period at Lower Granite Dam. With the Unit #3 outage at Dworshak this winter, it is likely that Dworshak may need to drafted deeper than ordinary to avoid excessive spill levels during the spring period as the powerhouse capacity will be limited to 5 Kcfs. This outage makes this year a very good trial year for a deeper draft operation.

Currently, Dworshak refills (1600 ft.) in June/early July and drafts over the summer period to 1535 feet by the end of August and further to 1520 feet by mid-September. This analysis explores a draft to 1515, 1510, and 1500 feet by mid-September. The current draft of Dworshak from 1600 feet to 1520 feet, releases approximately 1230 Kaf (1.23 Maf). By increasing the Dworshak draft to 1515 feet by mid-September, an additional 64 Kaf would be released (1294 total Kaf from 1600 to 1515 feet). If the Dworshak draft were increased to 1510 feet by mid-September, an additional 126 Kaf would be released (1356 total Kaf from 1600 to 1510 feet). If the draft at Dworshak were to increase further to 1500 feet by mid-September, an additional 244 Kaf would be released (1474 total Kaf from 1600 to 1500 feet).

Figure 1 displays the 6-27-16 STP flows at both Dworshak and Lower Granite as well as the same flows if the additional draft water from Dworshak (64 Kaf to 1515 feet, 126 Kaf to 1510 feet and 244 kaf to 1500 feet) were used from 6/27/16 to 7/25/16 (shaded area in Figure representing the 10yr 90% passage date for adult sockeye passage at Lower Granite).

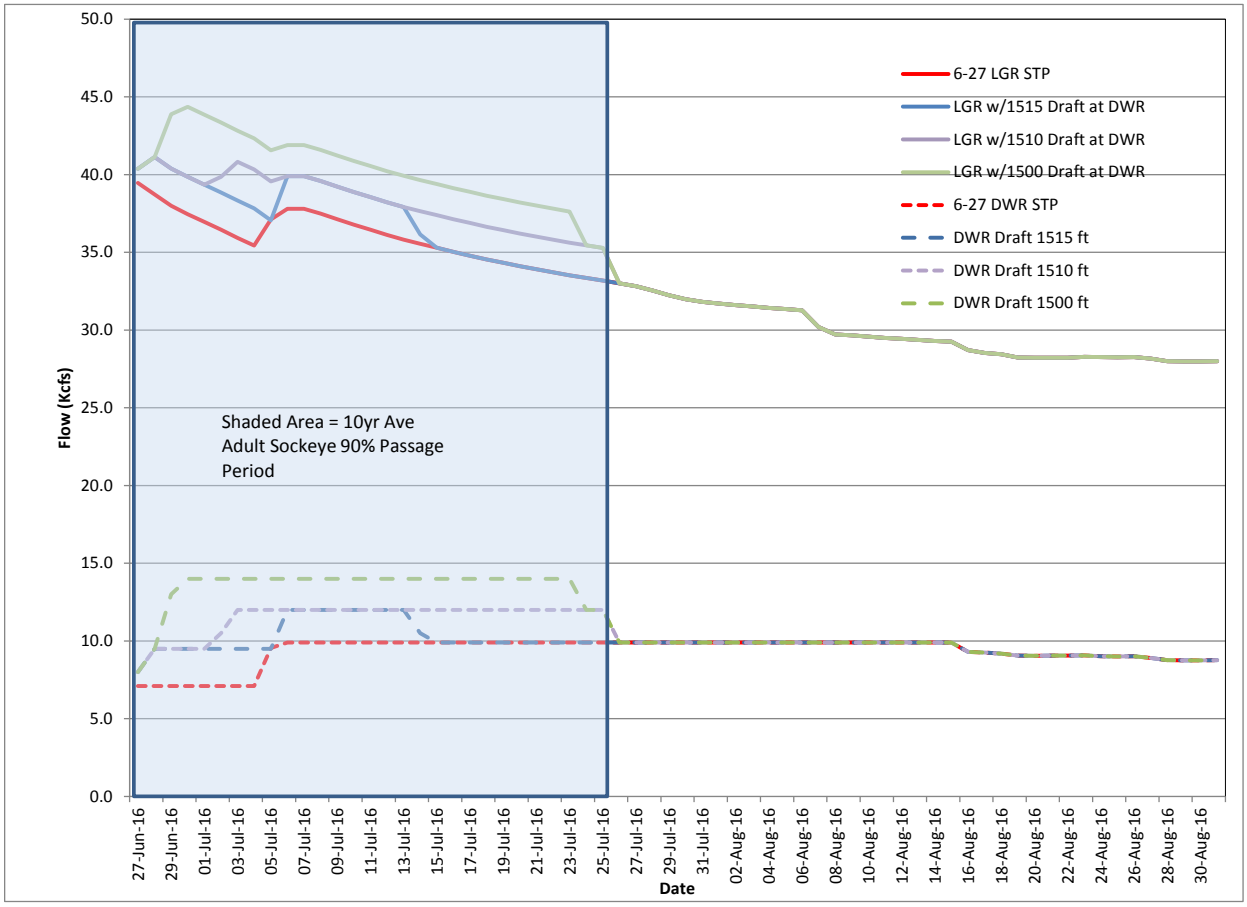

Figure 1. 6-27-16 STP flows at both Dworshak and Lower Granite as well as flows if the additional draft water from Dworshak (64 Kaf to 1515 feet, 126 Kaf to 1510 feet and 244 kaf to 1500 feet) were used from 6/27/16 to 7/25/16 (shaded area in Figure representing the 10yr 90% passage date for adult sockeye passage at Lower Granite).

Table 1 displays the potential risk to either meeting the April 10th Flood Control Elevation or refilling at Dworshak, if Dworshak were drafted to 1515 feet, 1510 feet, or 1500 feet by the end of September. Using the inflow record that was available (2001 to 2015[1]), a calculation of the volume addional to meeting minimum flows was estimated for the period October 1 to April 10th and October 1 to June 30 for the years 2001-2015. Additionally, the volumes of water needed to refill from 1515, 1510 feet, and 1500 feet at Dworshak to the Actual April 10th Elevation and to full (1600 feet) were estimated for each year.

[1] The inflow record from October through December of 2012 was not available at Dworshak at the COE Data Query website at http://www.nwd-wc.usace.army.mil/cgi-bin/dataquery.pl. This caused the inflow from October 1 2012 through either April 10 2013 or June 30 2013 to be an underestimation.

The overall result of Table 1 was:

1. If DWR was drafted to 1515 by the end of September, in 11 of 15 years (2001-2015), Dworshak would be able to meet minimum outflows and refill to its April 10th FC Elevation. It should be pointed out that the inflow record between October and December of 2012 was missing, causing the estimate of inflow volume at Dworshak between October 2012 and April 10th (or June 30th) 2013 to be underestimated. With a full inflow record, the inflow from October 2012 through April 10th 2013 would have likely been sufficient to meet the 2013 April 10th elevation (only missed April 10th by 13 Kaf in Table 1). In two of the four years that Dworshak missed its April 10th elevation (2001and 2010), Dworshak would have missed the April 10th FC target by 863 Kaf (2001) and 974 Kaf (2010) with no additional draft in September. The additional draft of Dworshak to 1515 feet caused the April 10th target to be missed by 927 Kaf (2001) and 1038 Kaf (2010). In 2005, Dworshak would have missed April 10th by 45 Kaf with no additional draft in September. The addional draft to 1515 feet caused this draft to increase by 64 kaf (total of 109 Kaf). The addional 64 Kaf corresponds to a spring flow loss of 0.4 Kcfs per day over the Spring Flow period.

2. If DWR was drafted to 1510 by the end of September, in 11 of 15 years (2001-2015), Dworshak would be able to meet minimum outflows and refill to its April 10th FC Elevation. Again, it should be pointed out that the inflow record between October and December of 2012 was missing, causing the estimate of inflow volume at Dworshak between October 2012 and April 10th (or June 30th) 2013 to be underestimated. With a full inflow record, the inflow from October 2012 through April 10th 2013 would have likely been sufficient to meet the 2013 April 10th elevation (only missed April 10th by 75 Kaf in Table 1). In two of the four years that Dworshak missed its April 10th elevation (2001and 2010), Dworshak would have missed the April 10th FC target by 863 Kaf (2001) and 974 kaf (2010) with no additional draft in September. The additional draft of Dworshak to 1510 feet caused these missed to increase to 990 Kaf (2001) and 1100 Kaf (2010). In 2005, Dworshak would have misses April 10th by 45 Kaf with no additional draft in September. The addional draft to 1510 feet caused this draft to increase by 126 kaf (total of 171 Kaf). The addional 126 Kaf corresponds to a spring flow loss of 0.8 Kcfs per day over the Spring Flow period.

3. If DWR was drafted to 1500 by the end of September, in 10 of 15 years (2001-2015), Dworshak would be able to meet minimum outflows and refill to its April 10th FC Elevation.

4. Dworshak was able to refill to 1600 feet by June 30th in 14 of 15 years (2001-2015) when Dworshak was drafted to 151 feet, 1510 feet, or 1500 feet, as well as meet minimum outflows.

Table 1. Potential risk to either meeting the April 10th Flood Control Elevation or refilling at Dworshak, if Dworshak were drafted to1515 feet, 1510 feet or 1500 feet by the end of September. Shading indicates inflows over period were adequate to meet April 10th Flood Control Elevation or refill.

	Using Actual Inflows Oct 1-June 30			Storage Needed to Meet	Storage Needed to Meet	Storage Needed to Meet	Storage needed	Storage Needed	Storage Needed
	Storage above 1.5 Kcfs	Storage above 1.5 kcfs	Actual April	April 10, if DWR drafted	April 10 FC, if DWR drafted	April 10, if DWR drafted	to refill if DWR at	to refill if DWR at	to refill if DWR at
Year	(Oct 1-April 10), Kaf	(Oct 1-June 30), Kaf	10 FC (feet)	to 1515 end of Sept	to 1510 end of Sept (Kaf)	to 1500 end of Sept	1515 ft end of Sept	1510 ft end of Sept	1500 ft end of Sept
2001	127	1185	1587	1054	1117	1234	1294	1356	1474
2002	634	3522	1495	-236	0	0	1294	1356	1474
2003	1150	2848	1583	992	1054	1172	1294	1356	1474
2004	595	2403	1536	272	334	452	1294	1356	1474
2005	1075	2214	1594	1184	1246	1364	1294	1356	1474
2006	866	2926	1538	310	372	490	1294	1356	1474
2007	1198	2498	1568	738	801	918	1294	1356	1474
2008	180	2893	1511	-55	7	125	1294	1356	1474
2009	768	2798	1549	465	527	645	1294	1356	1474
2010	146	1568	1594	1184	1246	1364	1294	1356	1474
2011	1319	4068	1445	-722	0	0	1294	1356	1474
2012	724	3338	1516	10	72	190	1294	1356	1474
2013	616	2116	1561	629	691	809	1294	1356	1474
2014	958	3196	1506	-114	-52	66	1294	1356	1474
2015	1536	2157	1582	966	1028	1146	1294	1356	1474