



# FISH PASSAGE CENTER

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## MEMORANDUM

TO: FPAC

FROM: David Benner, FPC

DATE: June 28<sup>th</sup>, 2016

RE: Analysis of Additional Draft at Dworshak to Elevations 1510 or 1500 ft end of September

Over the last week, several agencies have begun discussing the operation of Dworshak Dam to moderate temperatures at Lower Granite Dam to a 65-66 °F 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 additional 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 be 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 trail 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 either 1510 or 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 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 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 6-20-16 STP flows at both Dworshak and Lower Granite as well as the same flows if the additional draft water from Dworshak (126 Kaf to 1510 feet and 244 kaf to 1500 feet) were used from 6/27/16 to 7/18/16 (shaded area in Figure representing the 10yr 70% passage date for adult sockeye passage at Lower Granite).



Figure 1. 6-20-16 STP flows at both Dworshak and Lower Granite as well as flows if the additional draft water from Dworshak (126 Kaf to 1510 feet and 244 kaf to 1500 feet) were used from 6/27/16 to 7/18/16 (shaded area in Figure representing the 10yr 70% passage date for adult sockeye passage at Lower Granite).

Table 1 displays the potential risk to either meeting the April 10<sup>th</sup> Flood Control Elevation or refilling at Dworshak, if Dworshak were drafted to either 1510 feet or 1500 feet by the end of September. Using the inflow record that was available (2001 to 2012<sup>1</sup>), a calculation of the volume additional to meeting minimum flows was estimated for the period October 1 to April 10<sup>th</sup> and October 1 to June 30 for the years 2001-2012. Additionally, the volumes of water needed to refill from 1510 feet and 1500 feet at Dworshak to the Actual April 10<sup>th</sup> Elevation and to full (1600 feet) were estimated for each year.

The overall result of Table 1 was:

1. If DWR was drafted to 1510 by the end of September, in 9 of 12 years (2001-2012), Dworshak would be able to meet minimum outflows and refill to its April 10<sup>th</sup> FC Elevation. In two of the three years that Dworshak missed its April 10<sup>th</sup> elevation (2001 and 2010), Dworshak would have missed the April 10<sup>th</sup> FC target by 990 Kaf (2001) and 1100 kaf (2010) with no additional draft in September.

<sup>1</sup> The COE Data Query website at <http://www.nwd-wc.usace.army.mil/cgi-bin/dataquery.pl>, recent years had formatting errors. The timeframe for this memo prevented their use in this document. However, ways to address the format errors are being explored so the analysis can be updated to include recent years.

The additional draft of Dworshak to 1510 feet caused these misses to increase to 1117 Kaf (2001) and 1246 Kaf (2010). Further drafts to 1500 feet caused these misses to be 1234 Kaf (2001) and 1364 Kaf (2010). In 2005, Dworshak would have misses April 10<sup>th</sup> by 45 Kaf with no additional draft in September. The additional draft to 1510 feet caused this draft to increase by 126 kaf (total of 171 Kaf). The additional 126 Kaf corresponds to a spring flow loss of 0.8 Kcfs per day over the Spring Flow period. In 2005, if the September draft were to increase to 1500 feet, the April 10<sup>th</sup> miss would increase by 244 Kaf (in addition to the 45 Kaf miss under normal September draft), 244 Kaf over the spring flow period corresponds to 1.6 Kcfs of flow.

2. If DWR was drafted to 1500 by the end of September, in 8 of 12 years (2001-2012), Dworshak would be able to meet minimum outflows and refill to its April 10<sup>th</sup> FC Elevation.
3. Dworshak was able to refill to 1600 feet by June 30<sup>th</sup> in 11 of 12 years (2001-2012) when Dworshak was drafted to either 1510 or 1500 feet, as well as meet minimum outflows.

**Table 1. Potential risk to either meeting the April 10<sup>th</sup> Flood Control Elevation or refilling at Dworshak, if Dworshak were drafted to either 1510 feet or 1500 feet by the end of September.**

Year	Using Actual Inflows Oct 1-June 30		Actual April 10 FC (feet)	Storage Needed to Meet	Storage Needed to Meet	Storage Needed	Storage Needed
	Storage above 1.5 Kcfs	Storage above 1.5 kcfcs		April 10 FC, if DWR drafted	April 10, if DWR drafted	to refill if DWR at	to refill if DWR at
	(Oct 1-April 10), Kaf	(Oct 1-June 30), Kaf		to 1510 end of Sept (Kaf)	to 1500 end of Sept	1510 ft end of Sept	1500 ft end of Sept
2001	127	1185	1587	1117	1234	1356	1474
2002	634	3522	1495	0	0	1356	1474
2003	1150	2848	1583	1054	1172	1356	1474
2004	595	2403	1536	334	452	1356	1474
2005	1075	2214	1594	1246	1364	1356	1474
2006	866	2926	1538	372	490	1356	1474
2007	1198	2498	1568	801	918	1356	1474
2008	180	2893	1511	7	125	1356	1474
2009	768	2798	1549	527	645	1356	1474
2010	146	1568	1594	1246	1364	1356	1474
2011	1319	4068	1445	0	0	1356	1474
2012	724	3338	1516	72	190	1356	1474