



FISH PASSAGE CENTER

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MEMORANDUM

To: Fish Passage Advisory Committee (FPAC)

From: FPC Staff

Date: March 2, 2017

Subject: Action Notes from March 2, 2017, FPAC special meeting

On March 2, 2017, FPAC met for a special conference call to discuss Dworshak Operations. The following people participated in the meeting:

Paul Wagner (FPAC Co-Chair NOAA)
Michele DeHart (FPC)
Margaret Filardo (FPC)
Brandon Chockley (FPC)
Dave Benner (FPC)
Erick Van Dyke (ODFW)

Dave Swank (USFWS)
Jay Hesse (Nez Perce Tribe)
Dave Statler (Nez Perce Tribe)
Charlie Morrill (WDFW)
Tom Iverson (Yakama Nation)
Sheri Sears (Colville Tribe)

AGENDA ITEMS

COE Forecast and Current Conditions

- COE forecast at DWOR has increased to 2.87 MAF. This equates to a March 31st Flood Control (FC) elevation of 1493.1' and April 15th FC elevation of ~1471'.
- Currently, outflows at DWOR are ~12.5 Kcfs. TDG in tailrace is ~118.5% and 109-110% at Peck gauge downstream.

FPC Memo

- Based on discussions at TMT on March 1st, FPC distributed memo to FPAC with modeled DWOR operations. These operations address criticisms that COE had of FPC analyses

prior to March 1st TMT call. The COE had stated that the FPC had modeled an average runoff shape, while the COE believes this will be an early runoff year. Therefore, the FPC added an early runoff shape to their models.

- COE presentation at TMT on March 1st only went through April 15th and used two years with high April runoff (ranked 6th and 7th highest since 1973). By limiting to April 15th, can't see what happened beyond that point, which will likely be decreases in outflows.
- Date Statler (Nez Perce) stated that the USGS gauge at North Fork showing decrease in flows. Likely a response to temperatures. Perhaps Steve Hall's assumptions of high runoff very early may not be the case.
- FPC modeled operations assumed the COE's updated 2.87 MAF forecast and flows through March 31st under current STP (Feb. 28). Assumed April 15th FC elevation of 1473.5' (did not have COE's estimated 1571' elevation at time of modeling) and April 30th FC elevation of 1502.2'. Two modeled scenarios differed in April runoff pattern of 1) average April runoff pattern and 2) early April runoff pattern.
- Scenario 1 (Graphs 1 & 2) uses 1984 (2.85 MAF) runoff with average April runoff pattern.
 - **Meeting April 15 FC (Plot 1)** – In order to meet assumed April 15 FC target of 1473.5', DWOR outflows would be 15.3 Kcfs through April 15th. Outflows would then drop to 4.5 Kcfs in order to refill to April 30th FC elevation. Outflows of 4.5 Kcfs continue through end of May when they are decreased to minimums (~1.6 Kcfs) through the end of June to accomplish refill by June 30th.
 - **Deviation from April 15 FC (Plot 2)** – Scenario deviates ~29' from April 15 FC elevation to target April 30th FC elevation of 1502.2'. Objective is to meet 1502.2' elevation on both April 15th and April 30th. Targeted elevations required outflows of 12.0 Kcfs through April 15th and then 12.8 Kcfs through end of April. Outflows then dropped to 4.5 Kcfs through early June and then dropped to 1.6 Kcfs through end of June to accomplish refill by June 30th.
- Paul Wagner (NOAA) reiterated that Plot 2 is not consistent with COE's flood control protocol. Margaret Filardo (FPC) clarified that Plot 1 is consistent with COE's protocol, plot 2 is a "deviation" from protocol. Paul reminded FPAC that COE has been clear that there is no option for shift at Grand Coulee (GCL) this year.
- Jay Hesse (Nez Perce Tribe) reminded everyone that Plot 2 was in response to COE's request to "think outside of the box" and hopes that the COE is doing the same kind of thinking when considering operational scenarios. Paul relays that the COE and Walla Walla is not "out of the box". Margaret Filardo (FPC) reminded everyone that the job of the fisheries managers is to figure out if there's any way to protect fish and offer potential solutions. If COE chooses not to implement these recommendations, that's their call. Fisheries managers do not need to endorse an operation that has no flexibility.
- Scenario 2 (Graphs 3 & 4) uses 1985 (2.91 MAF) runoff with high April runoff pattern.
 - **Meeting April 15 FC (Plot 3)** – In order to meet assumed April 15 FC target of 1473.5', DWOR outflows would be 17.3 Kcfs through April 15th. Outflows would then drop to 4.5 Kcfs in order to refill to April 30th FC elevation and continue

through late June when they are decreased to minimums (~1.6 Kcfs) for last 7-10 days to accomplish refill by June 30th.

- **Deviation from April 15 FC (Plot 4)** – Scenario deviates ~29' from April 15 FC elevation to target April 30th FC elevation of 1502.2'. Objective is to meet 1502.2' elevation on both April 15th and April 30th. Targeted elevations required outflows of 14.0 Kcfs through April 30th. Outflows then dropped to 4.5 Kcfs through late June and are dropped to 1.6 Kcfs for last 5 days to accomplish refill by June 30th.
- Jay Hesse (Nez Perce Tribe) suggests that FPAC emphasize Scenario 2 (Plots 3 & 4) for discussion at tomorrow's TMT call. Uses high water year (2.91 MAF) than current forecast and incorporates possibility for higher April runoff.
- Outflows of 14 Kcfs, as modeled in Plot 4, would equate to ~120-122% TDG
- Paul Wagner (NOAA) pointed out that 10-day flow forecast for DWOR calls for inflows of 12 Kcfs by March 6th and then increasing to 18 Kcfs by March 12th. Trajectory only goes up after March 12th.
- Margaret Filardo (FPC) clarified that intention of FPC memo was not to provide a preferred scenario other another. Intention was to provide a range of operations that could be considered, under both an average and high April runoff year. Discussions are not to implement a plan and "walk away", would require constant monitoring and future discussions.
- Paul Wagner (NOAA) asked, is there a desire to take more risk and have much higher discharge later than a flatter discharge now, or reverse? Notion is, so far this year, inflow to DWOR has been above expectations. What is modeled under 1984 is a decrease in discharge in April, which has not been the trend this year. Trend this year is more similar to 1985. Should consider that increased inflows may happen now (March) and, perhaps, should not assume going to happen in April.
- Margaret Filardo (FPC) reminded FPAC that, if only objective is to meet flood control, path would be much easier. Difficulty is that record number of fall Chinook redds below DWOR and concerns with hatchery means that we have to look at things differently to protect fish in this environment. FPAC can recognize flood control concerns but FPAC's job is to consider impacts to fish.

Hatchery Update

- USFWS and Nez Perce Tribe had a conference call earlier this morning to discuss possible impacts of increased TDG, cohort by cohort, and options. Dave Swank (USFWS) and Jay Hesse (Nez Perce Tribe) provided an update based on this call.
- Hatchery decided they will continue to hold fish on-station and monitor regularly for Gas Bubble Trauma (GBT). Degassers will be in operation.
 - TDG at hatchery currently ~103%. TDG of 105% at hatchery is considered maximum threshold.
 - At this time, early release and/or transport to other facilities not possible. Early release is a last resort.

- Hatchery will continue to hold spring Chinook and coho fry on incubation system until April 15th and likely through May 1st. Incubation system runs off of reservoir water. Chillers have been turned up to slow incubation to extend to May 1st.
- Hatchery recommends incremental increases in outflows from DWOR. Would like to see flows increased in increments of 500 cfs (restricted to weekdays for monitoring purposes). Time between increases will allow for monitoring of degassers and fish conditions and reconvene discussions. Under this proposal, wouldn't get to 15 Kcfs outflows until ~March 9th. Regardless of what operation is, hatchery would like increases to be incremental (in 500 cfs increments), to allow for evaluation.
- Hatchery will hold fish as long as possible, until see signs on GBT and/or survival issues. If this occurs, hatchery will release fish if have to.
 - Fish are tagged in a way that will allow for evaluation of juvenile survival and SARs.
 - Margaret Filardo (FPC) reminded FPAC members that early releases from hatchery have not done well, in terms of SARs.
- When Clearwater Hatchery moves fish off station (~March 15), will route some water (taken from DWOR reservoir) to Dworshak Hatchery for steelhead. This will benefit ~40% of steelhead on-station at Dworshak Hatchery. Steelhead are planned for release ~April 11th.

Further Discussions

- Paul Wagner (NOAA) asked whether there is a desire to increase outflows earlier or later. What would impacts of earlier or later releases be? Moving releases of water later would affect both in-river (fall Chinook) and hatchery fish. Erick Van Dyke (ODFW) stated response of in-river vs. hatchery fish will be different. Fish in a raceway will definitely be impacted because cannot compensate (i.e., depth). Less certain what impacts would be for natural population but potential for more relief in population that is more mobile.
- Drawback to hatchery plan is that it might shift more risk to wild fish. Paul Wagner (NOAA) estimates that emergence timing of fall Chinook will likely be later than mid-March. This is based on estimation of cumulative temperature units (TU) and cool temperatures (at Peck gauge) this year but is dependent on timing of spawning.
 - Jay Hesse (Nez Perce Tribe) reminded Paul and FPAC of report indicating that 50% emergence occurs between middle and end of March.
 - *Later in the conversation* – Jay reiterates concern that Paul (NOAA) is basing emergence timing on his own calculations of TU and not the recommendation of the issue paper by Nez Perce/USFWS that was circulated to FPAC at an earlier meeting. Cautioned Paul about presenting his estimates of emergence timing at TMT tomorrow. If want to estimate emergence timing, should request Billy Arnsberg and Billy Conner (authors of issues paper) to estimate timing, based on this year's temperatures and redd distributions. Paul stated that he had not planned on presenting his estimates of emergence timing at TMT tomorrow.

- Margaret Filardo (FPC) reiterated a question that she asked during TMT call on March 1st, why is COE so adamant that they meet the April 15 FC elevation? The COE has not defined the specific flood control risk, given how low the reservoir is?
- Dave Statler (Nez Perce Tribe) asked, if flood damage appears imminent, is system flood control shift (GCL) still off the table? COE response has always been, as long as you can get it back by the end of the month. Drum gate elevation is 1255' by March 15th. Current runoff volume forecast for The Dalles, April FC for GCL will be 1245-1246'. Do not have new flood control elevations for GCL yet.
- Erick Van Dyke (ODFW) asked, what is NOAA's criteria for fish here? Paul Wagner (NOAA) clarified that the BiOp accepts the COE's current flood control operations.
- Dave Swank (USFWS) asked Paul Wagner (NOAA), what's your sense of the likelihood that the COE will accept some degree of a step-wise increase in outflows? Paul Wagner (NOAA) stated that the COE was receptive to operations at the hatchery to accommodate this change but does not know how far that goes. Example, may suggest 1 Kcfs instead of 500 cfs but does not know for sure.
- Dave Statler (Nez Perce Tribe) stated if the COE is going to hold fast to FC elevations with no flexibility, there is virtually no place to go outside of drastic measures if warranted (e.g., like early hatchery release). Early fish release only partially solves concerns, does not address concerns with impacts to in-river fish. Where can fish managers go with this to protect the fish?
- Jay Hesse (Nez Perce Tribe) suggested that FPAC should present FPC analysis and demonstrate changes at hatchery to accommodate operational scenarios. If COE does not agree with deviation of April 15th FC elevation and stays with higher outflows (as currently recommended by COE) so be it. Will deal with increased mortality risks at the hatchery and see where discussion goes. Fish managers have demonstrated accommodations and are thinking of solutions but wants FPAC to be on same page going in to discussion tomorrow.
 - Michele DeHart (FPC) reminded everyone that FPAC has been making proposals to the COE since 1978, often times these recommendations are for things that the COE would never consider. Over time, things have changed. Still worthwhile to recommend something, even if they won't consider it.
 - Paul Wagner (NOAA) reminds FPAC that COE not amenable to changes in FC protocol because could cost jobs, if there is a problem. Paul cited the firing of Cindy Henrickson as proof that making a "small" mistake in flood control can cost a COE employee their job.
 - COE should be obligated to aid in assessing impact of operations on fish, if occur. Impacts assessed should be to both listed fall Chinook and hatchery spring Chinook and steelhead.
- Jay Hesse (Nez Perce Tribe) or Dave Benner (FPC) will present Scenario 2 (Plots 3 and 4) at TMT tomorrow.
 - Paul Wagner (NOAA) will forward FPC memo to Doug Baus (COE) for TMT tomorrow. Dave Benner (FPC) will discuss Scenario 2 (Plots 3 and 4).

- Dave Benner (FPC) asked FPAC if it would be useful to modify plots during May-June period to show risk associated if forecast does increase to show how much additional water could be released during refill period to accommodate this risk. Dave estimates ~600 Kaf cushion during this period. Will update memo and send to Paul for distribution by end of the day today.

DRAFT



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MEMORANDUM

TO: FPAC

FROM: Dave Benner, FPC

DATE: March 2, 2017

SUBJECT: Dworshak Modeled Operations

1. The COE at TMT presented their modeling through April 15th, with the primary objective of meeting the Apr 15 upper rule curve. The COE model runs used the STP output for Dworshak inflow and developed three scenarios for Dworshak outflows with the objective of meeting the April 15 flood control elevation (FCE). They then looked at two alternative scenarios (1989 and 1990) to describe what would happen under an early runoff situation. The table at the end of this document shows the actual monthly volumes that occurred in each of the years used. As can be observed 1989 and 1990 are the 6th and 7th highest April runoff volumes observed since the reservoir started operating in 1973. The COE's model are limited in that they only show operations through April 15 and don't consider outflows from Dworshak over the whole spring time period.
2. Prior to the TMT, the FPC provided modeling scenarios to describe a possible alternative to the COE's operation by targeting the end of April FCE elevation rather than the April 15 elevation. Operating to an April 15 FCE as the COE proposed caused the project to draft and then refill over the same month. The high outflows caused by the drafting to April 15th resulted in very high TDG levels (potentially in the range of 125 -130%) that could be detrimental to fish both in the river and at the Dworshak Hatchery. The modeling also showed that after the April 15 operation it is likely Dworshak outflow will drop significantly as the project intersects the rule curve and begins refilling. At the TMT meeting the COE pointed out that the modeling the FPC had done prior to the TMT meeting was for a more average inflow shape and did not address the potential for an early runoff. Much discussion centered on the risk for flood control that could occur under the suggested deviation from the April 15 FCE. When asked to define or quantify

that risk, the COE did not have specifics. The risk of floods would be relevant to April with an early runoff, but with the significant amount of space in the reservoir (at least 100 feet) – and the ability to catch and subsequently release water – it seems that the risk of flooding this year may be less than in a water year when the FCE are at elevations closer to a full reservoir.

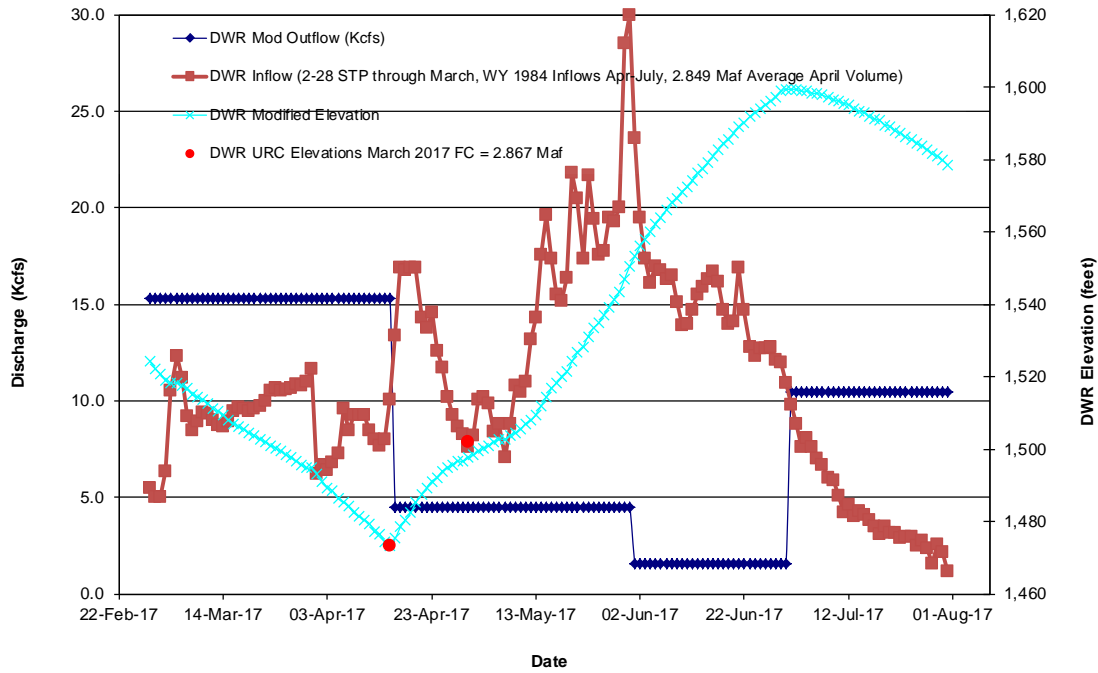
3. The COE has issued a new final runoff volume forecast for March. The new forecast is for 2.87 MAF, with an end of March FCE of 1493.1 feet. The FPC modeled the new runoff volume under two scenarios - one with an average April runoff pattern and one with an early April runoff pattern. The 1984 water year was characterized as having an April –July runoff volume of 2.85 MAF, with a moderate April runoff (21% of the runoff occurred in April). The 1985 water year was characterized as having an April –July runoff volume of 2.9 MAF, with an early April runoff (30% of the runoff occurred in April).
4. The first two graphs show the 1984 (2.85 MAF) runoff scenario with an average runoff into the project during April. The first graph shows the objective of meeting the April 15th FCE. The project would operate at the 15.3 Kcfs outflow until April 15 and then outflows would have to drop to 4.5 Kcfs in order to refill to the April 30th FCE. From there the project would continue to put out low discharge until the summer period. In the second graph the project is operated to the April 30 FCE at both the April 15th and April 30th points. Here it is shown that the outflow is 12 Kcfs until Apr 15 and then increases to 12.8 Kcfs from April 15 to 30 to address the increases of inflow. In real time implementation this could probably be smoothed out. After April 30 the discharge from Dworshak decreases to 4.8 Kcfs, and then 1.6 Kcfs during refill.
5. The third and fourth graphs present the same two alternatives (operating to April 15th FCE and operating to the April 30th FCE) using 1985 with an early April runoff (30% of Apr-Jul runoff) and a similar Dworshak inflow (2.9 MAF). From the graph it is observed that a 17.4 Kcfs outflow would be needed between now and April 15th with a discharge of 4.8Kcfs decreasing to 1.6 Kcfs from April 16th through the refill period. If the project is operated to the April 30th FCE then the discharge between now and the end of April would decrease to 14 Kcfs. Discharge during refill is similar.
6. This is not an easy recommendation to make. Any operation implemented is going to have some risk associated with it. The COE's operation places most risk on fish at the present time – and if the conditions they suggest don't materialize then you imposed the risk on fish too early. However, the opportunity to recover from that decision may be lost. On the other hand, you may delay the operation and there is always the possibility that the April runoff is historically high breaking records, or it rains from now until the end of June and inflow to the project overwhelms any operation we would deem compatible with fish survival.
7. However, what is being shown here is an attempt to bridge the competing needs by suggesting a deviation from the April 15th to April 30 FCE to try and **minimize** the impact to fish now. This deviation is suggested because of the significant amount of

space available in reservoir that could possibly be managed to address competing needs. It is a question of whether you wish to take the risk to fish immediately or to manage as we go along and respond to the developing information.

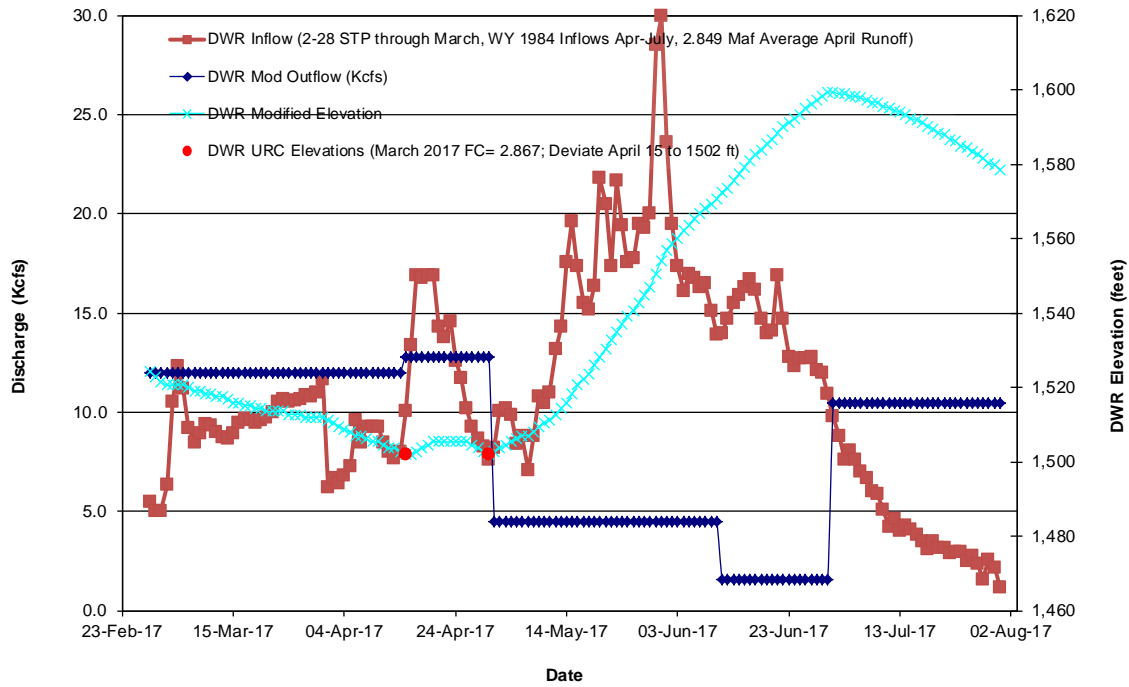
Dworshak Scenarios FPAC 3-2-17--- Using Water years 1984 and 1985 (Average and High April Runoff Years): 1984 = 2.849 Maf Apr-July at DWR, 1985 =2.91 Maf Apr-July at DWR.

Plot 1: Flood Control Elevations were taken from March of Water Year 2017 (DWR had 2.867 Maf Apr-July Forecast), Plot uses 2-28-17 STP Inflows for Dworshak from February through March, from April through July, actual Inflows from WY 1984 were used (2.849 Apr-July Runoff Volume, Average April Runoff Year). The April 15th FC Elevation targeted was 1473.5 ft. Dworshak outflows were 15.3 Kcfs through April 15th (to meet April 15th FC), then drop to 4.5 Kcfs for a period of six weeks then dropped to 1.6 Kcfs over approx. last month of refill period.

Plot 2: Alternative Operation (Same inputs as Plot 1): Flood Control Elevations were taken from March of Water Year 2017 (DWR had 2.867 Maf Apr-July Forecast; however, instead of targeting 1473.5 ft on April 15th, this scenario deviates approx. 29 ft. from April 15th FC and operates to 1502.2 ft (April 30th FC Elevation in March 2017) on both April 15th and April 30th. Plot uses 2-28-17 STP inflows for Dworshak from February through March, from April through July, actual Inflows from WY 1984 were used (2.849 Apr-July Runoff Volume, Average April Runoff). Both the The April 15th and April 30th FC Elevations targeted were 1502.2 ft. Dworshak outflows were 12.0 Kcfs through April 15th (to meet deviated April 15th FC), then 12.8 Kcfs to maintain elevation 1502.2 through April 30th, drop to 4.5 Kcfs for a period of approx. five weeks then 1.6 Kcfs through the remainder of the refill period.



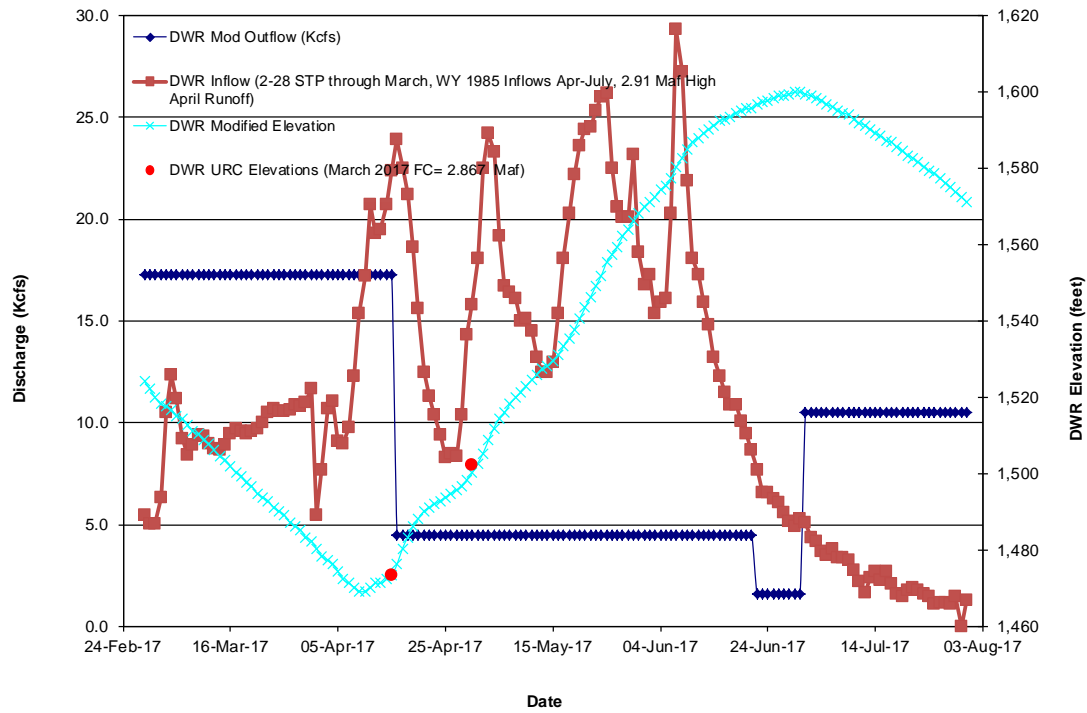
Plot 1.



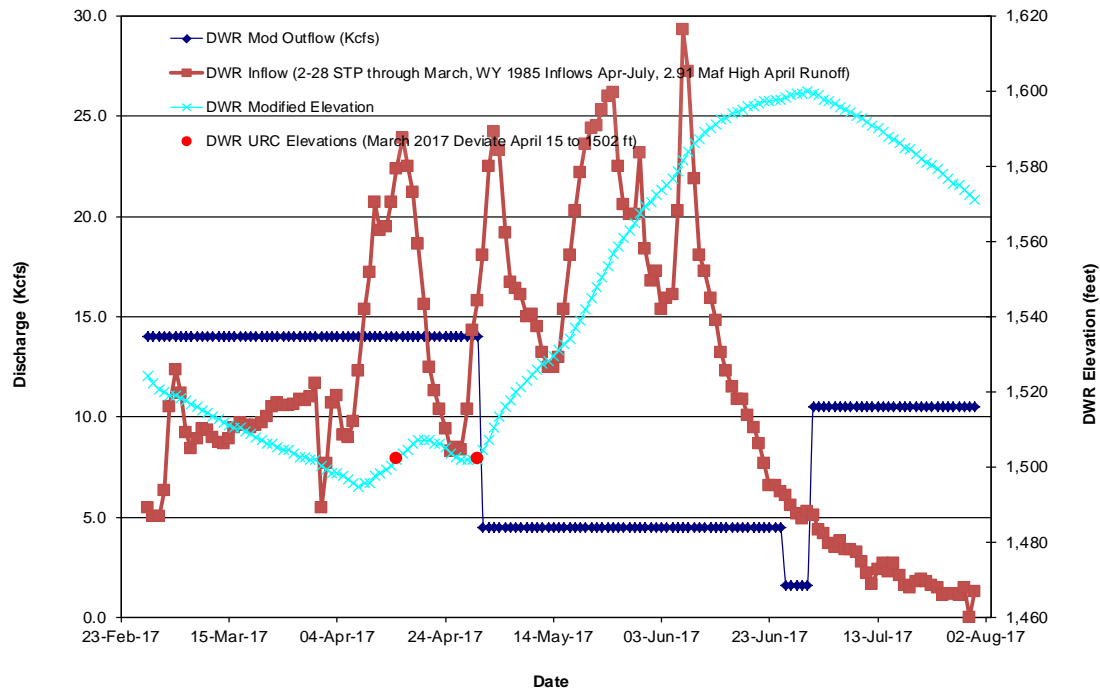
Plot 2.

Plot 3: Flood Control Elevations were taken from March of Water Year 2017 (DWR had 2.867 Maf Apr-July Forecast), Plot uses 2-28-17 STP Inflows for Dworshak from February through March, from April through July, actual Inflows from WY 1985 were used (2.91 Apr-July Runoff Volume, High April Runoff Year). The April 15th FC Elevation targeted was 1473.5 ft. Dworshak outflows were 17.3 Kcfs through April 15th (to meet April 15th FC), then drop to 4.5 Kcfs for the majority of the refill period then dropped to 1.6 Kcfs over the last nine days of the refill period.

Plot 4: Alternative Operation (Same inputs as Plot 3): Flood Control Elevations were taken from March of Water Year 2017 (DWR had 2.867 Maf Apr-July Forecast; however, instead of targeting 1473.5 ft on April 15th, this scenario deviates approx. 29 ft. from April 15th FC and operates to 1502.2 ft (April 30th FC Elevation in March 2017) on both April 15th and April 30th. Plot uses 2-28-17 STP inflows for Dworshak from February through March, from April through July, actual Inflows from WY 1985 were used (2.91 Apr-July Runoff Volume, High April Runoff Year). The April 15th FC Elevation targeted was 1502.2 ft, as was the April 30th FC. Dworshak outflows were 14.0 Kcfs through April 30th (to meet deviated April 15th FC and April 30th FC), then drop to 4.5 Kcfs for majority of refill period then 1.6 Kcfs over the last five days of the refill period.



Plot 3.



Plot 4.

Appendices:

Year	Dworshak Monthly Inflow, All Monthly Volumes in Kaf								Rank of April Volume (44 yrs)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Apr-July	
1973	247	122	221	295	557	314	94	1260	44
1974	685	303	504	1000	1325	1959	476	4760	4
1975	139	109	260	418	1142	1307	475	3342	39
1976	368	260	302	822	1570	827	306	3525	11
1977	62	85	133	373	521	255	80	1229	41
1978	243	264	520	654	831	645	232	2362	17
1979	64	154	406	601	1345	583	162	2691	27
1980	111	192	275	635	834	517	190	2176	20
1981	315	409	313	530	752	731	263	2276	32
1982	148	601	596	641	1336	1173	349	3499	19
1983	232	331	548	451	842	622	285	2200	37
1984	270	245	468	615	992	966	276	2849	22
1985	62	90	184	856	1179	740	138	2913	10
1986	129	478	896	725	801	380	126	2032	15
1987	66	124	380	564	606	213	104	1487	29
1988	83	103	249	604	551	314	117	1586	26
1989	81	75	354	934	921	592	156	2603	7
1990	242	183	373	942	784	755	236	2717	6
1991	133	420	359	613	934	715	303	2565	24
1992	110	288	390	507	550	199	136	1392	35
1993	75	87	413	580	1066	398	183	2227	28
1994	139	82	264	557	486	270	73	1386	30
1995	203	639	544	421	679	481	153	1734	38
1996	416	962	474	1037	1078	769	215	3099	3
1997	359	296	612	1063	1965	1267	389	4684	2
1998	182	226	360	515	952	441	127	2035	33
1999	293	234	524	615	1020	1104	371	3110	22
2000	159	255	425	960	1003	619	150	2732	5
2001	79	88	219	342	713	328	110	1493	42
2002	218	153	319	865	1205	1227	312	3609	9
2003	276	415	616	635	776	608	115	2134	20
2004	117	176	405	666	939	632	139	2376	16
2005	308	214	314	509	701	324	94	1628	34
2006	349	190	338	811	1109	630	122	2672	12
2007	165	216	579	557	773	379	79	1788	30
2008	86	110	196	308	1305	1285	381	3279	43
2009	420	175	341	605	1063	701	162	2531	25
2010	155	119	189	396	625	737	164	1922	40
2011	431	225	423	780	1267	1351	644	4042	13
2012	125	178	449	1126	1072	896	249	3343	1
2013	156	161	337	644	913	448	100	2105	18
2014	133	144	674	729	1181	801	231	2942	14
2015	268	584	575	452	430	158	41	1081	36
2016	173	416	615	923	765	295	85	2068	8

