

The March WSF sets BiOp actions as highlighted in the table below.

Other projects are provided for informational purposes only.

In 2017, the official WSF will be computed on the 3rd work day of the month, January through July, using the 5-day QPF 50% exceedance value. FRM will be computed at the same intervals as before, available online at: <http://www.nwd.usace.army.mil/Missions/Water/Columbia/FloodControl>

Forecast Point	Forecast period	Forecast	BiOp Actions to be Determined
Hungry Horse	April – August Provided by Reclamation	January, February, March Final	Sets min. flows at Hungry Horse and Columbia Falls
	May – September Provided by Reclamation	January, February, March Final	Sets VARQ FRM targets
		April Final	Sets VARQ FRM targets and VARQ refill flows
		May, June Final	Sets VARQ refill flows
The Dalles	April – September Provided by NWRFC	March Final	Sets CRWMP adjustments at Grand Coulee
	April – August Provided by NWRFC	April Final	Sets spring flow objective at McNary Dam
		May Final	Sets end of September draft limits at Hungry Horse and Libby
		July Final	Sets end of August draft limit at Grand Coulee
Lower Granite	April – July Provided by NWRFC	April Final	Sets spring flow objective at Lower Granite
		June Final	Sets summer flow objective at Lower Granite
Libby	April – August Provided by Corps Seattle District	December Final	Sets end of December variable draft target
		January, February, March Final	Sets VARQ FRM targets
		April Final	Sets VARQ FRM targets and VARQ refill flows
		May Final	Sets Libby min. sturgeon flow volume and min. bull trout flows for after sturgeon pulse through Sept. Sets VARQ FRM targets and VARQ refill flows
		June Final	VARQ refill flows
Dworshak	April – July Provided by Corps Walla Walla District	January to June Final	Manage for reservoir FRM and refill

March 2, 2017

**Hungry Horse Dam – Official Water Supply Forecast
MARCH 2017**

The volumes for the March final forecast for Hungry Horse Inflows are:

Mar-Jul: 1,969 kaf (100%)

Jan-Jul: 2,114 kaf (101%)

Apr-Aug: 1,936 kaf (100%)

May-Sep: 1,693 kaf (100%)

The minimum flows downstream of Hungry Horse for the rest of the calendar year are as follows:

Columbia Falls: 3,500 cfs

Hungry Horse: 900 cfs

Mary Mellema

River and Reservoir Operations

U.S. Bureau of Reclamation

PN Regional Office

Boise, ID 83706



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COLUMBIA - THE DALLES DAM (TDAO3) Forecasts for Water Year 2017

Official Forecast

10 days QPF: Ensemble: 2017-03-03 Issued: 2017-03-03

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	Average	10 %	
APR-SEP	92636	100711	109	111056	92704
APR-JUL	78595	86616	108	98175	79855
APR-AUG	86834	94899	108	105448	87532
JAN-SEP	116388	125349	110	137057	114216
JAN-JUL	103211	110705	109	123378	101368
OCT-SEP	138798	147758	113	159466	130518

5 days QPF: Ensemble: 2017-03-03 Issued: 2017-03-03

APR-SEP	89502	98236	106	108792	92704
APR-JUL	76797	84532	106	93856	79855
APR-AUG	83287	92337	105	101458	87532
JAN-SEP	113209	122797	108	134461	114216
JAN-JUL	99582	108782	107	119780	101368
OCT-SEP	135618	145207	111	156871	130518

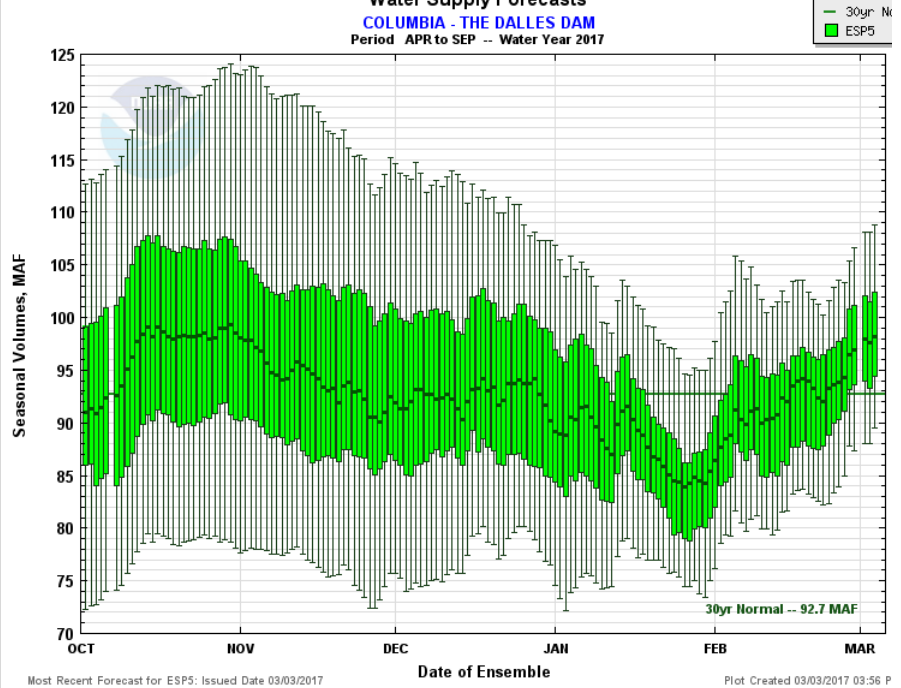
0 days QPF: Ensemble: 2017-03-03 Issued: 2017-03-03

APR-SEP	85891	95203	103	104515	92704
APR-JUL	72470	81196	102	90533	79855
APR-AUG	80564	88775	101	98303	87532
JAN-SEP	109789	119436	105	130636	114216
JAN-JUL	96917	105417	104	116507	101368
OCT-SEP	132198	141846	109	153046	130518

Move the mouse over the desired "Forecast Period" to display a graph.

Water Supply Forecasts

COLUMBIA - THE DALLES DAM
Period: APR to SEP -- Water Year 2017



☐ Max Scale ☒ Scale To Data ☐ Scale To Last 45 Days

Overlay

[ESP10](#)[ESP5](#)[ESP0](#)

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SNAKE - LOWER GRANITE DAM (LGDW1) Forecasts for Water Year 2017

Official Forecast

10 days QPF: Ensemble: 2017-03-03 Issued: 2017-03-03

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	25217	28586	128	34165	22279
APR-JUL	22240	25229	127	30376	19848
APR-AUG	23785	26979	128	32466	21091
JAN-SEP	35349	38241	128	44299	29872
JAN-JUL	32372	34920	127	40788	27440
OCT-SEP	39779	42670	123	48728	34667

5 days QPF: Ensemble: 2017-03-03 Issued: 2017-03-03

APR-SEP	24385	28050	126	32978	22279
APR-JUL	21261	24729	125	29411	19848
APR-AUG	22902	26479	126	31392	21091
JAN-SEP	33774	37961	127	43153	29872
JAN-JUL	30794	34589	126	39693	27440
OCT-SEP	38203	42391	122	47582	34667

0 days QPF: Ensemble: 2017-03-03 Issued: 2017-03-03

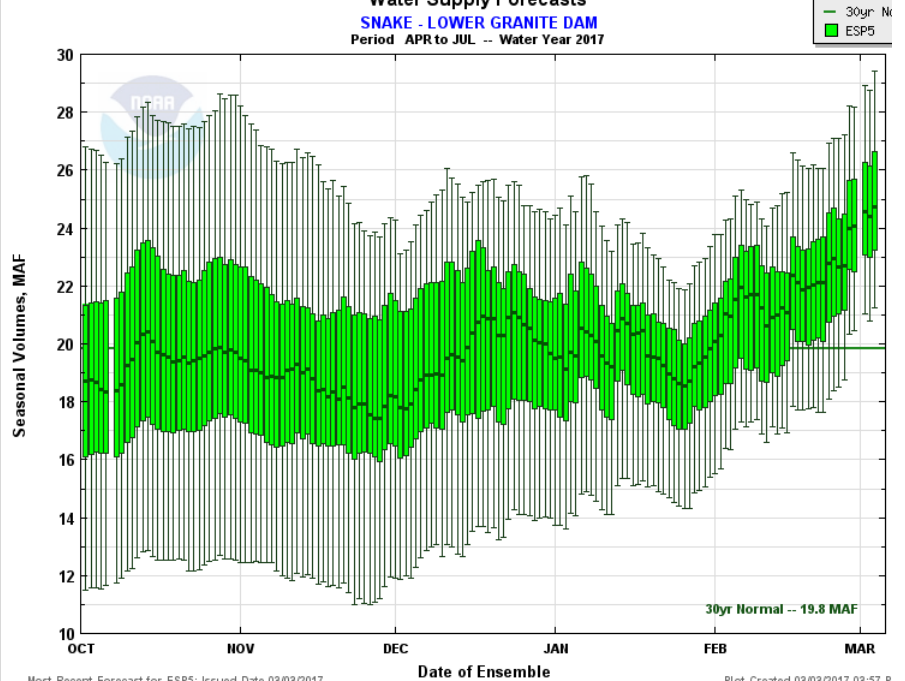
APR-SEP	23122	27292	122	31636	22279
APR-JUL	20235	23929	121	28200	19848
APR-AUG	21731	25748	122	30020	21091
JAN-SEP	32481	36858	123	41413	29872
JAN-JUL	29604	33399	122	37948	27440
OCT-SEP	36910	41287	119	45843	34667

Move the mouse over the desired "Forecast Period" to display a graph.

Water Supply Forecasts

SNAKE - LOWER GRANITE DAM

Period APR to JUL -- Water Year 2017



Most Recent Forecast for ESP5: Issued Date 03/03/2017

Plot Created 03/03/2017 03:57 P

☐ Max Scale ☒ Scale To Data ☐ Scale To Last 45 Days

Overlay

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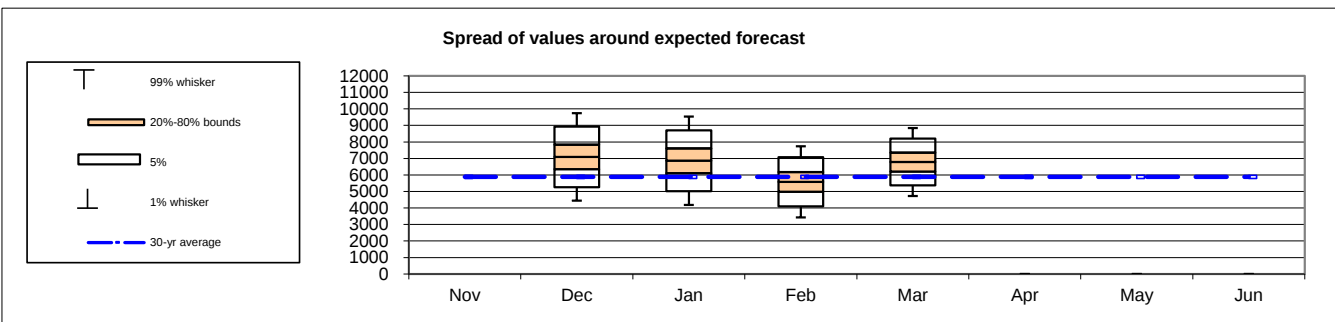
Libby : March Runoff Forecast & Flood Risk Management Calculation

WY 2017

Runoff Forecast and Flood Risk Management			
Most Probable Runoff Volume:	Apr-Aug	6783	KAF
	Apr-Jul	6158	KAF
	May-Jul	5557	KAF
31-Mar Flood Risk Management Space		2924	KAF
31-Mar Flood Risk Management Elevation		2382.1	ft

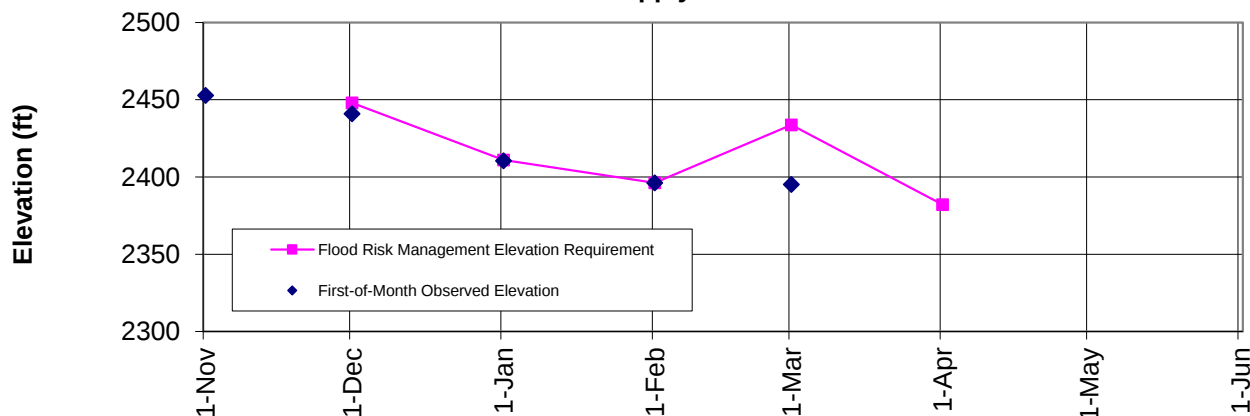
1981-2010 Average	Percent of Average	1929-2008 Average	Percent of Average
5885	115%	6282	108%
5342	115%	5720	108%
4821	115%	5199	107%

Seasonal Flood Risk Management VARQ Flood Risk Management Implemented								
Forecast Date >>	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Apr-Aug Runoff Forecast		7093	6861	5583	6783			
First-of-Month Elev	2452.9	2440.9	2410.5	2396.2	2395.2			
Date >>	30-Nov	31-Dec	31-Jan	28-Feb	31-Mar	30-Apr		
Flood Risk Management Space	500	2000	2083	2145	2453			
Flood Risk Management Elevation	2448.0	2411.0	2396.2	2433.7	2382.1			



Libby Flood Risk Management Elevations - 2017

Latest water supply forecast: Mar



Notes:

1. The given forecast is the official Corps of Engineers forecast for Libby. If you have any questions please contact Joel Fenolio (206) 764-6683, Kristy Riley (206) 316-3947, Kevin Shaffer (206) 764-3660, Logan Osgood-Jacobs (206) 764-6928, or Kristian Mickelson (206) 764-6927.
2. If a prior month's forecast as published in this document is different than what was originally published in the issue month, then the earlier forecast has been adjusted to reflect updated values for precipitation or streamflow.
3. October Precip capped at Mean plus 2 standard deviations. A memo to NWD summarizes the methodology used.
4. Due to missing data, South Racehorse Creek SWE was estimated using a principal components regression with surrounding gages that are not already in the forecast.

Libby : March Runoff Forecast & Flood Risk Management Calculation

Apr-Aug Runoff Forecast Calculation:

Variable	Month(s)	Units	Observed Value	Percent of Average	Regression Coefficient	Marginal Runoff (KAF)
			A		B	=A*B
SOI	ΣJun:Jul					
Eureka RS, MT	ΣOct:Feb Prcp	inches	8.63	174%	65.9	568.3
West Glacier, MT	ΣOct:Feb Prcp	inches	15.74	111%	28.5	448.7
Cranbrook A, BC	ΣOct:Feb Prcp	millimeters	222.33	165%	2.7	607.0
Fernie, BC	ΣOct:Feb Prcp	millimeters	672.07	117%	0.6	423.4
Hawkins Lake, MT	1-Mar SWE	inches	21.50	106%	24.3	523.1
Stahl Creek, MT	1-Mar SWE	inches	32.70	114%	19.1	624.9
East Creek, BC	1-Mar SWE	millimeters	711.00	100%	0.7	462.2
Moyie Mountain, BC	1-Mar SWE	millimeters	376.00	106%	1.3	477.5
Sunshine Village, AB	1-Mar SWE	millimeters	514.00	110%	1.3	647.6
Akamina Pass, AB	1-Mar SWE	millimeters	368.00	94%	1.0	382.7
South Racehorse Creek, AB	1-Mar SWE	millimeters	339.90	98%	1.4	475.9
Intercept			1		1142.0	1142.0
1-Mar Forecast (KAF)					Σ	6783.2

Data used in Libby Water Supply Forecast

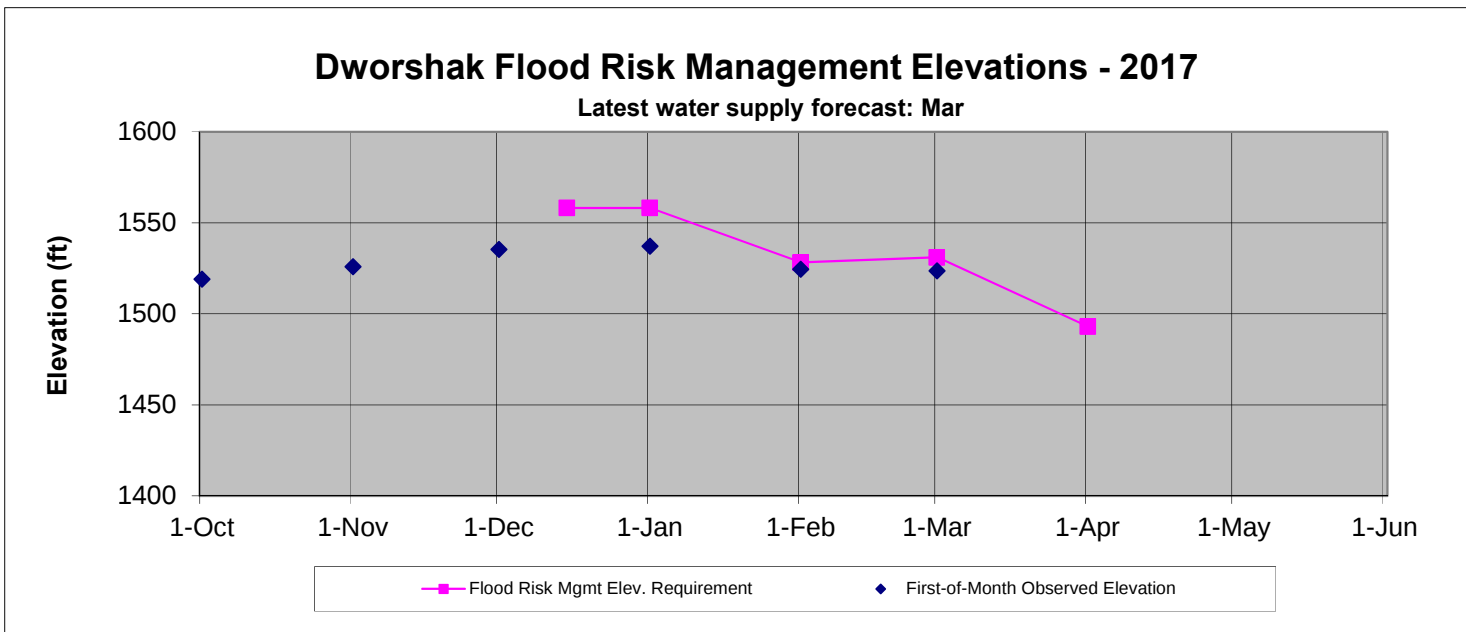
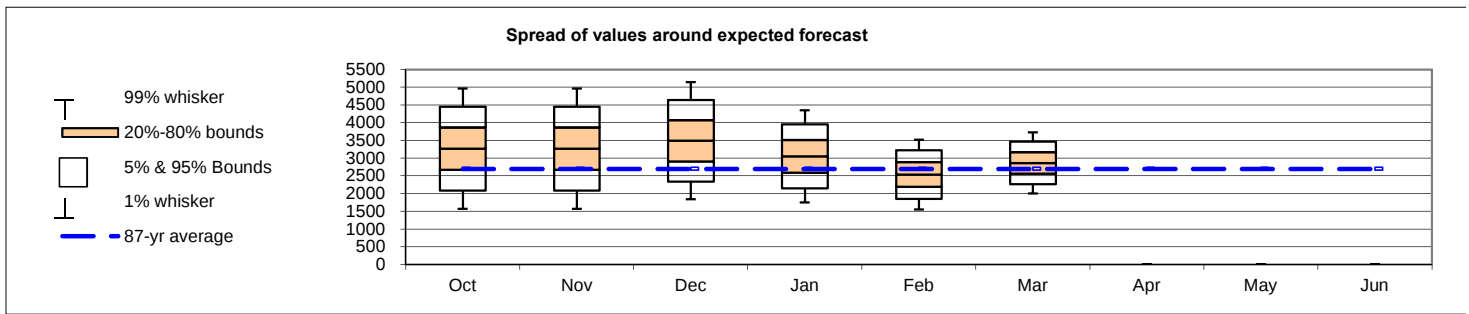
WY 2017

Climate Data				Jun-16	Jul-16				
SOI				0.60	0.40				
Precipitation Data	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Units
Eureka RS, MT	2.34	1.07	1.53	0.57	3.12				inch
West Glacier, MT	5.91	2.71	2.27	1.32	3.53				inch
Cranbrook A, BC	54.93	20.20	46.60	16.80	83.80				mm
Fernie, BC	238.07	157.00	76.00	33.00	168.00				mm
Snow Water Equiv			1-Jan	1-Feb	1-Mar	1-Apr	1-May	1-Jun	Units
Hawkins Lake, MT				12	22				inch
Stahl Creek, MT			21	22	33				inch
East Creek, BC				527	711				mm
Moyie Mountain, BC			171	221	376				mm
Sunshine Village, AB			281	388	514				mm
Akamina Pass, AB				188	368				mm
South Racehorse Creek, AB				206	340				mm
Streamflow			Jan	Feb	Mar	Apr	May	Jun	Units
Libby Inflow Volume			227.9	203.7					KAF
Reservoir Elevation	1-Nov	1-Dec	1-Jan	1-Feb	1-Mar	1-Apr	1-May	1-Jun	Units
Libby FOM Elev	2452.9	2440.9	2410.5	2396.2	2395.2				feet

William D. Proctor, P.E.
 Approving Official
 Ch., Hydrologic Engineering and Power Branch
 Northwestern Division

Joel Fenolio, P.E.
 Upper Columbia Senior Water Manager
 Seattle District

Runoff Forecast and Flood Risk Management (FRM)				1981-2010 Average	Percent of 30yr Average	1929-2008 Average	Percent of Average		
Most Probable Runoff Volume	Apr-Jul	2867	KAF	2438	118%	2696	106%		
	May-Jul	2096	KAF	1784	118%	1972	106%		
31-Mar Flood Risk Management Space		1551	KAF						
31-Mar Flood Risk Management Elevation		1493.1	ft						
Seasonal Flood Risk Management (assumes no shift of flood risk management space to Grand Coulee)									
Forecast Date>>	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Apr-Jul Runoff Forecast	3271	3271	3493	3055	2541	2867			
First-of-Month Elev	1519.1	1525.9	1535.4	1537.3	1524.5	1523.6			
Date >>	15-Dec		31-Dec	31-Jan	28-Feb	31-Mar	15-Apr	30-Apr	31-May
FRM Space	--	700	700	1120	1082	1551			
FRM Elevation	--	1558.2	1558.2	1528.3	1531.1	1493.1			



Dworshak : March Runoff Forecast & Flood Risk Management Calculation

Apr-Jul Runoff Forecast Calculation					
Variable	Month	Observed Value	% of Average	Regression Coefficient	Marginal Runoff (KAF)
		A		B	=A*B
SOI	Sep	1.20		220.73	264.9
HQSI Cumulative Precip	Oct-Date	28.40	126%	23.39	664.3
Elk Butte SWE	1-Mar	32.1	109%	10.16	326.1
Hoodoo Basin SWE	1-Mar	31.8	98%	10.01	318.3
Sherwin SWE	1-Mar	10.2	117%	25.42	259.3
Lost Lake SWE	1-Mar	39.0	91%	6.99	272.6
Crater meadows SWE	1-Mar	35.6	101%	13.06	464.9
Intercept		1		296.75	296.8
1-Mar Forecast (KAF)				Σ	2867.2

Data Station	Sept	Nov	Dec	1-Jan	1-Feb	1-Mar	1-Apr	1-May	1-Jun
Climate (Stdzd SOI)									
September SOI	1.20								
Precipitation (in)	Oct								
Headquarters, ID	7.90	3.90	3.70	4.70	8.20	--	--		
Cumulative HQSI Data	7.90	11.80	15.50	20.20	28.40	--	--		
Snow Water Equiv (First of Month values) (in)									
Elk Butte, ID				14.8	20.3	32.1	--		
Cool Creek, ID				15.9	20.8				
Hoodoo Basin, MT				11.9	17.2	31.8	--	--	--
Sherwin, ID				6.5	8.5	10.2	--		
Shanghi Summit, ID								--	--
Lost Lake, ID				17.8	24.6	39.0	--	--	--
Hemlock, ID								--	--
Crater Meadows Mar						35.6	--		
Streamflow (End of Month) (kaf)				Jan	Feb	Mar	Apr	May	Jun
Dworshak Inflow				127	471	--	--	--	--

Notes:

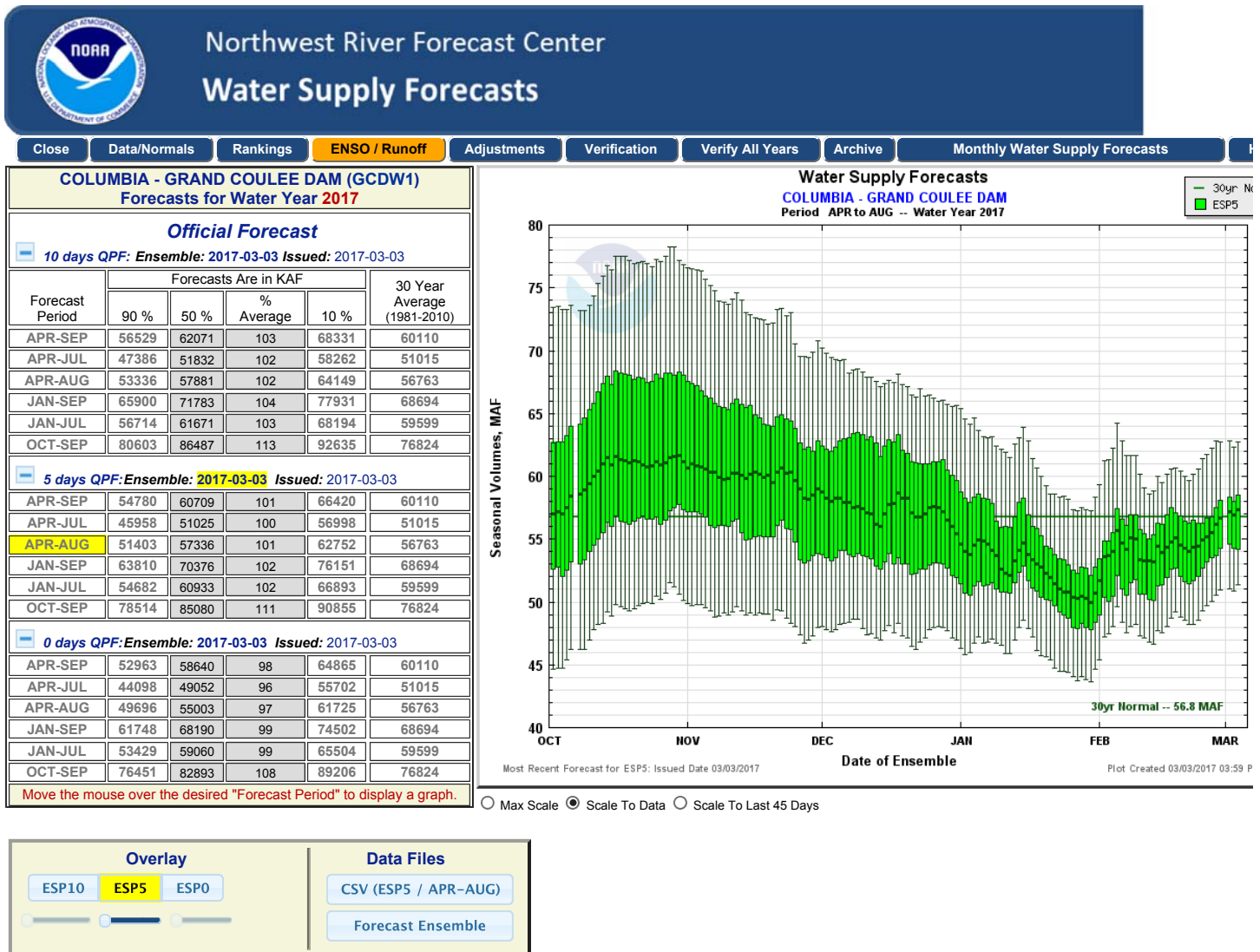
1. The given forecast is the official Corps of Engineers forecast for Dworshak. If you have any questions please contact Steve Hall (509 527 7550), Wayne Jousma (509-527-7606), Amanda Connell (509-527-7632), or Alfredo Rodriguez (509-527-7532).
2. Due to updated values for precipitation, snow or streamflow, subsequent forecasts may be different from the forecast published herein.
3. 15-Dec and 31-Dec Flood Management Space is fixed at 700 KAF.
4. Due to missing precipitation data on the HQSI gage, the Elk River precipitation was used to estimate missing values.
5. Elk Butte SNOTEL is still down, value estimated using average gain of Hemlock Butte and Lolo Pass (closest in elevation to EBNI) which was 11.8". This is consistent with other SNOTEL sites in the Basin under 5800'.

Approval:

John J. Heitstuman P.E.
Chief Hydrology Section
Walla Walla District USACE

William D. Proctor, P.E.
Ch., Hydrologic Engineering and Power Branch
Columbia Basin Water Management Division

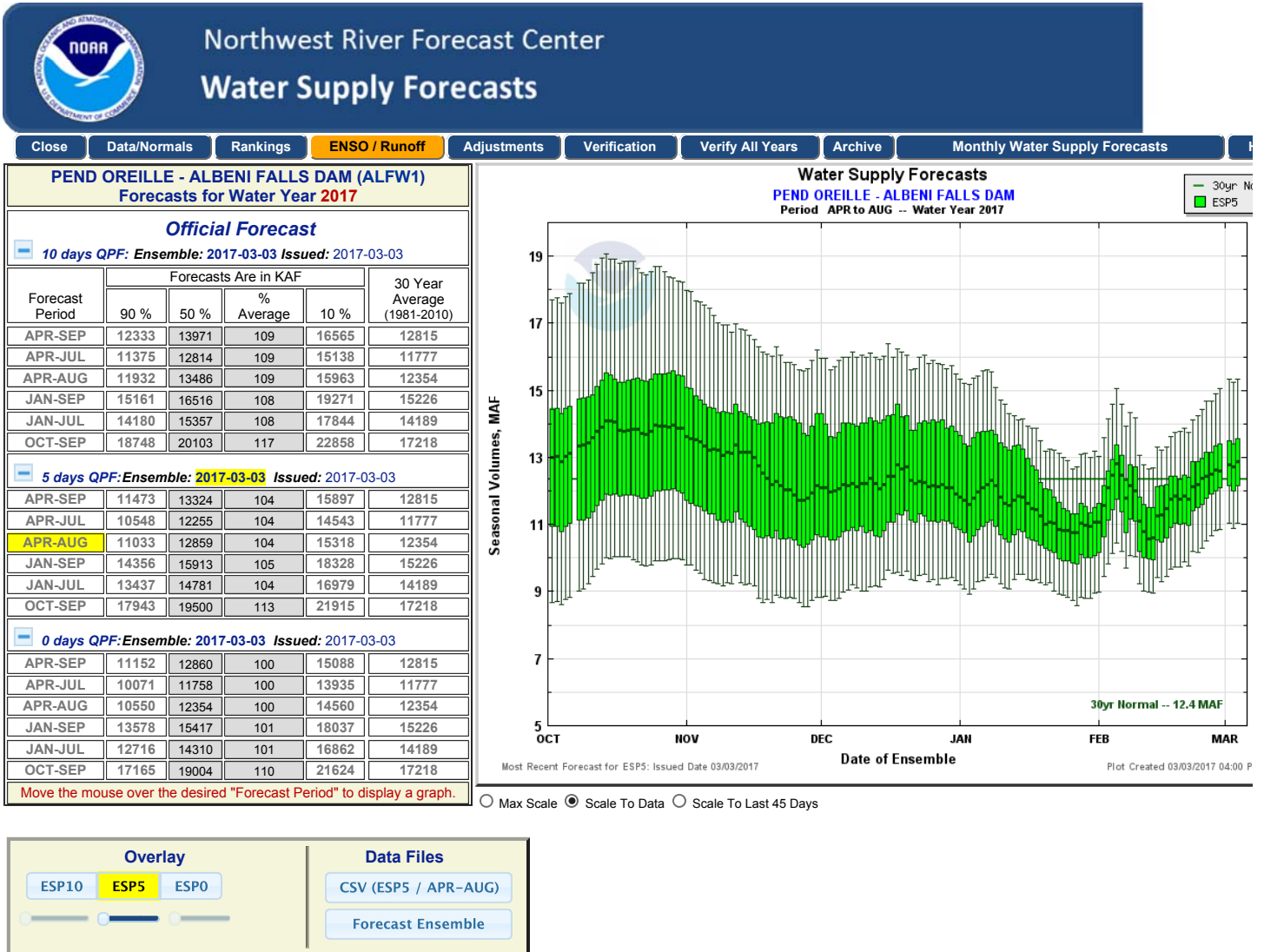
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