

The MARCH Final WSF sets BiOp actions as defined in the table below where highlighted.

Other projects are provided for informational purposes only.

For flood control requirements, see: <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, 2016

**Hungry Horse Dam – Official Water Supply Forecast
March 2016**

Here are the forecast volumes from the March final forecast for Hungry Horse inflow:

Mar-Jul: 1831.6 kaf (93%)

Jan-Jul: 1969.1 kaf (94%)

Apr-Aug: 1800.7 kaf (93%)

May-Sep: 1574.2 kaf (93%)

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

Columbia Falls: 3500 cfs

Hungry Horse: 900 cfs

Mary Mellema
River and Reservoir Operations
U.S. Bureau of Reclamation
PN Regional Office
Boise, ID 83706



Northwest River Forecast Center Water Supply Forecasts

Close Data/Normals Rankings **ENSO / Runoff** Adjustments Verification Verify All Years Archive Monthly Water Supply Forecasts

COLUMBIA - THE DALLES DAM (TDAO3) Forecasts for Water Year 2016

Official Forecast

10 days QPF: Ensemble: 2016-03-07 Issued: 2016-03-07

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	Average	10 %	
APR-SEP	84743	92678	100	101740	92704
APR-JUL	71403	78659	99	89666	79855
APR-AUG	78960	86469	99	96643	87532
JAN-SEP	109408	117424	103	127226	114216
JAN-JUL	96063	103656	102	115575	101368
OCT-SEP	124923	132938	102	142740	130518

5 days QPF: Ensemble: 2016-03-07 Issued: 2016-03-07

APR-SEP	83718	91957	99	101900	92704
APR-JUL	70713	78308	98	88615	79855
APR-AUG	78650	86527	99	95691	87532
JAN-SEP	108118	116665	102	127898	114216
JAN-JUL	95584	102918	102	114103	101368
OCT-SEP	123633	132179	101	143412	130518

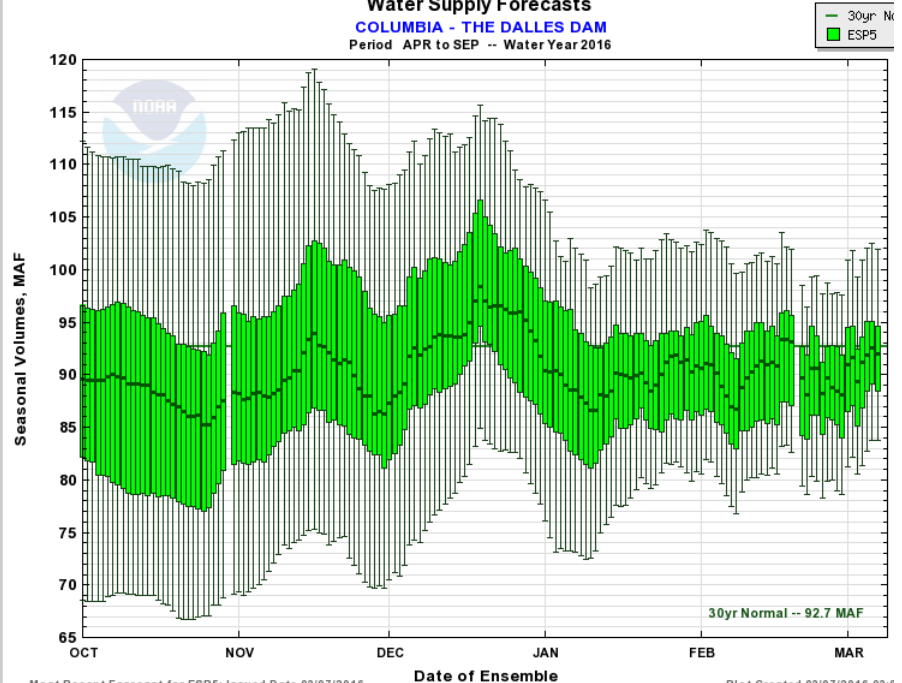
0 days QPF: Ensemble: 2016-03-07 Issued: 2016-03-07

APR-SEP	81380	90676	98	100285	92704
APR-JUL	69492	77023	96	85690	79855
APR-AUG	75687	84879	97	94451	87532
JAN-SEP	104417	113610	99	124509	114216
JAN-JUL	92212	99827	98	109868	101368
OCT-SEP	119932	129124	99	140023	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 2016



Most Recent Forecast for ESP5: Issued Date 03/07/2016

Plot Created 03/07/2016 03:0

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

Overlay

ESP10 ESP5 ESP0

Data Files

CSV (ESP5 / APR-SEP)

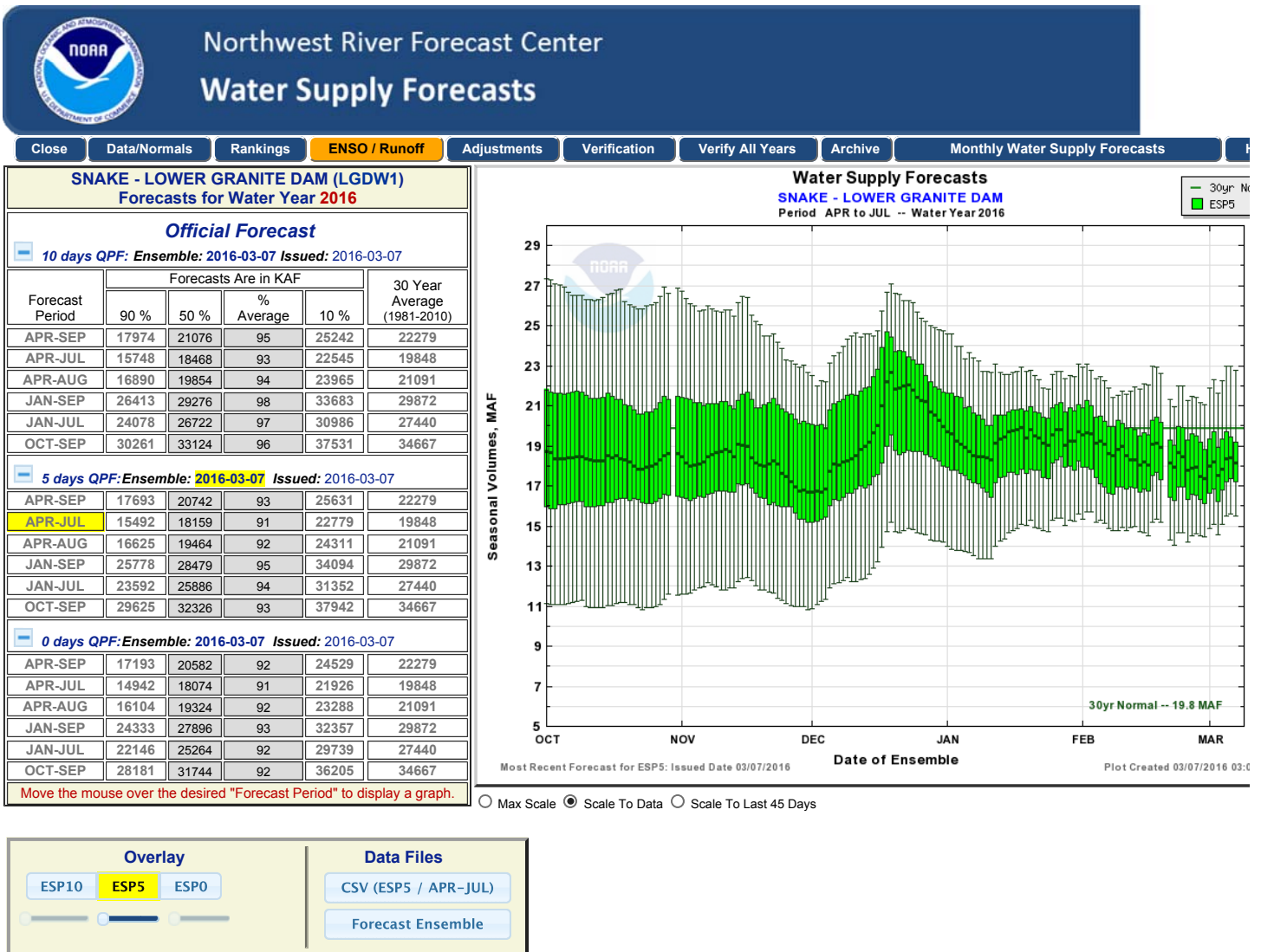
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Lower Granite MARCH WSF is not used for implementation of BiOp actions.
This forecast from NWRFC is provided for informational purposes only.



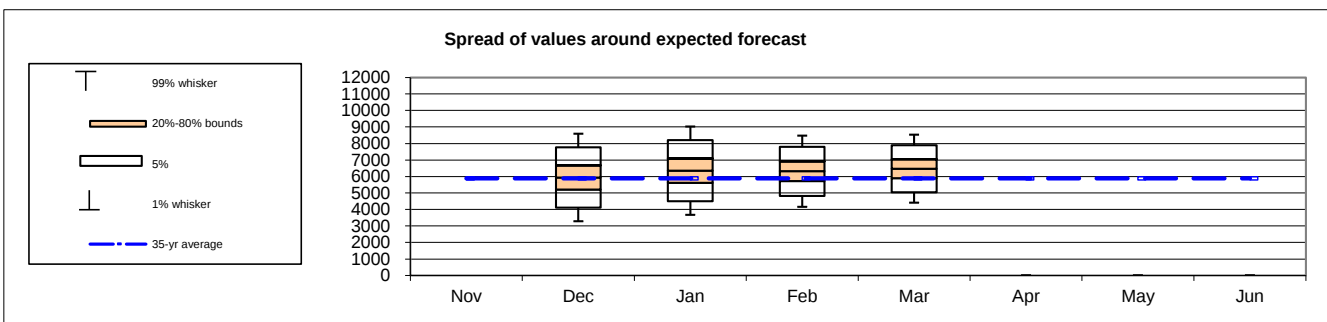
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Libby : March Runoff Forecast & Flood Risk Management Calculation

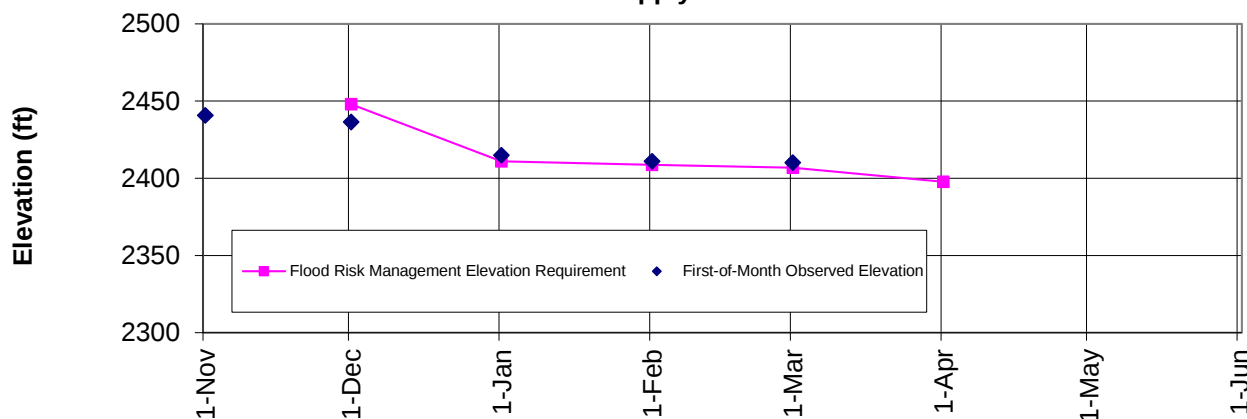
WY 2016

Runoff Forecast and Flood Risk Management					1981-2010 Average	Percent of Average	1929-2008 Average	Percent of Average
Most Probable Runoff Volume:								
Apr-Aug					6472	KAF	5885	110%
Apr-Jul					5875	KAF	5342	110%
May-Jul					5302	KAF	4821	110%
31-Mar Flood Risk Management Space					2453	KAF	6282	103%
31-Mar Flood Risk Management Elevation					2397.8	ft	5720	103%
31-Mar Flood Risk Management Elevation					2397.8	ft	5199	102%
Seasonal Flood Risk Management					VARQ Flood Risk Management Implemented			
Forecast Date >>	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Apr-Aug Runoff Forecast		5940	6354	6318	6472			
First-of-Month Elev	2440.7	2436.5	2415.0	2411.0	2410.1			
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	2408.7	2407.0	2397.8			



Libby Flood Risk Management Elevations - 2016

Latest water supply forecast: Mar



Notes:

- 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, Adam Price (206) 764-3604, or Kristian Mickelson (206) 764-6927.
- 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.

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	Σ Jun:Jul					
Eureka RS, MT	Σ Oct:Feb Prcp	inches	7.71	156%	65.9	507.9
West Glacier, MT	Σ Oct:Feb Prcp	inches	14.75	104%	28.5	420.5
Cranbrook A, BC	Σ Oct:Feb Prcp	inches	171.90	127%	2.7	469.3
Fernie, BC	Σ Oct:Feb Prcp	inches	663.40	116%	0.6	417.9
Hawkins Lake, MT	1-Mar SWE	inches	22.80	113%	24.3	554.7
Stahl Creek, MT	1-Mar SWE	inches	31.50	110%	19.1	602.0
East Creek, BC	1-Mar SWE	inches	846.00	119%	0.7	549.9
Moyie Mountain, BC	1-Mar SWE	inches	353.00	100%	1.3	448.3
Sunshine Village, AB	1-Mar SWE	inches	414.00	89%	1.3	521.6
Akamina Pass, AB	1-Mar SWE	inches	320.00	82%	1.0	332.8
South Racehorse Creek, AB	1-Mar SWE	inches	361.00	104%	1.4	505.4
Intercept			1		1142.0	1142.0
1-Mar Forecast (KAF)					Σ	6472.3

Climate Data		Jan-15	Feb-15	Mar-15	Jun-15	Jul-15	Oct-15	Nov-15	Dec-15	Jan-16	
SOI					-0.60	-1.10					
Precipitation Data		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Units	
Eureka RS, MT		1.37	1.73	2.69	1.33	0.59				inch	
West Glacier, MT		1.93	2.45	4.62	3.07	2.68				inch	
Cranbrook A, BC		16.60	49.30	50.80	38.00	17.20				mm	
Fernie, BC		104.00	198.40	172.00	104.00	85.00				mm	
Snow Water Equiv		1-Jan			1-Feb	1-Mar	1-Apr	1-May	1-Jun	Units	
Hawkins Lake, MT					17	23				inch	
Stahl Creek, MT					15	24	32				inch
East Creek, BC						691	846				mm
Moyie Mountain, BC						185	286	353			mm
Sunshine Village, AB						252	291	414			mm
Akamina Pass, AB							283	320			mm
South Racehorse Creek, AB							286	361			mm
Streamflow					Jan			Feb	Mar	Apr	May
Libby Inflow Volume		189.4			199.1					KAF	
Reservoir Elevation		1-Nov	1-Dec	1-Jan	1-Feb	1-Mar	1-Apr	1-May	1-Jun	Units	
Libby FOM Elev		2440.7	2436.5	2415.0	2411.0	2410.1				feet	

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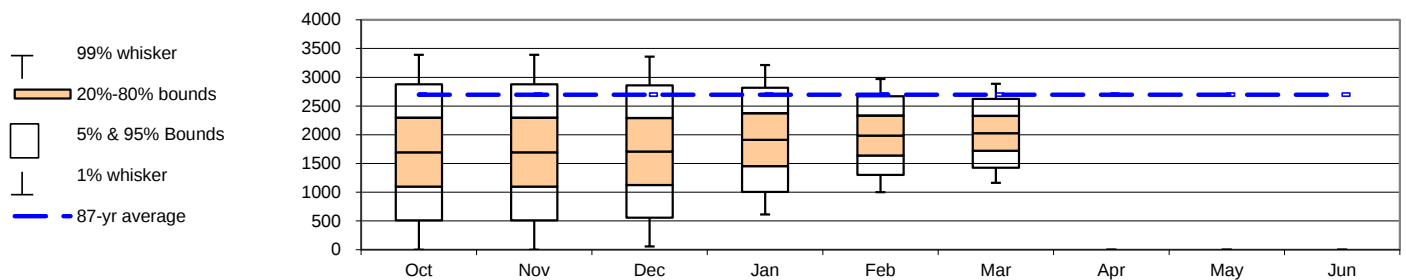
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William D. Proctor, P.E.
Approving Official
Ch., Hydrologic Engineering and Power Branch
Northwestern Division

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

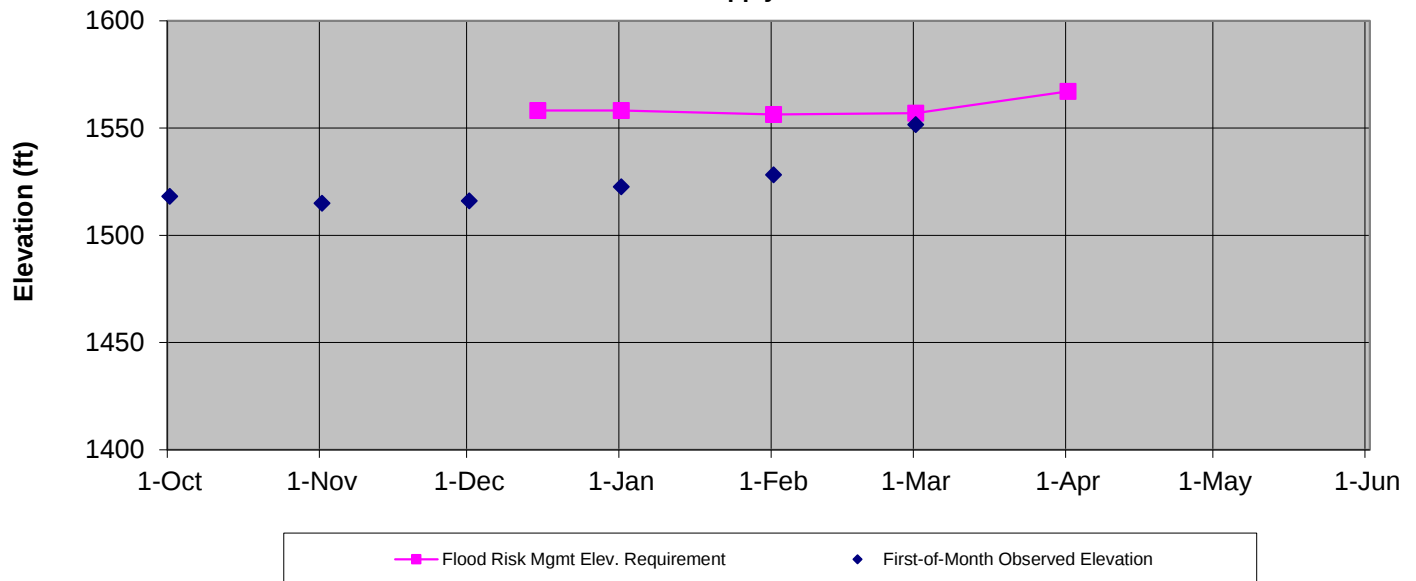
Runoff Forecast and Flood Risk Management (FRM)				1981-2010 Average	Percent of 30yr Average	1929-2008 Average	Percent of Average		
Most Probable Runoff Volume	Apr-Jul	2025	KAF	2418	84%	2696	75%		
	May-Jul	1481	KAF	1771	84%	1972	75%		
31-Mar Flood Risk Management Space			567	KAF					
31-Mar Flood Risk Management Elevation			1567.1	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	1676	1676	1708	1913	1986	2025			
First-of-Month Elev	1518.2	1515.0	1516.1	1522.7	1528.2	1551.6			
Date >>		15-Dec	31-Dec	31-Jan	29-Feb	31-Mar	15-Apr	30-Apr	31-May
FRM Space	--	700	700	727	718	567			
FRM Elevation	--	1558.2	1558.2	1556.4	1557.0	1567.1			

Spread of values around expected forecast



Dworshak Flood Risk Management Elevations - 2016

Latest water supply forecast: Mar



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	-1.60		220.73	-353.2
HQSI Cumulative Precip	Oct-Date	23.50	104%	23.39	549.7
Elk Butte SWE	1-Mar	30.8	105%	10.16	312.9
Hoodoo Basin SWE	1-Mar	29.6	91%	10.01	296.3
Sherwin SWE	1-Mar	5.5	63%	25.42	139.8
Lost Lake SWE	1-Mar	41.2	96%	6.99	288.0
Crater meadows SWE	1-Mar	37.9	107%	13.06	495.0
Intercept		1		296.75	296.8
1-Mar Forecast (KAF)				Σ	2025.2

Data Station	Sept	Nov	Dec	1-Jan	1-Feb	1-Mar	1-Apr	1-May	1-Jun
Climate (Stdzd SOI)									
September SOI	-1.60								
Precipitation (in)	Oct								
Headquarters, ID	2.80	3.80	6.40	6.30	4.20	0.00	0.00		
Cumulative HQSI Data	2.80	6.60	13.00	19.30	23.50	23.50	23.50		
Snow Water Equiv (First of Month values) (in)									
Elk Butte, ID				14.6	25.8	30.8	0.0		
Cool Creek, ID				17.2	26.5				
Hoodoo Basin, MT				15.1	22.6	29.6	0.0	0.0	0.0
Sherwin, ID				4.6	7.3	5.5	0.0		
Shanghi Summit, ID								0.0	0.0
Lost Lake, ID				19.9	31.7	41.2	0.0	0.0	0.0
Hemlock, ID								0.0	0.0
Crater Meadows Mar						37.9	0.0		
Streamflow (End of Month) (kaf)				Jan	Feb	Mar	Apr	May	Jun
Dworshak Inflow				171	415	--	--	--	--

Notes:

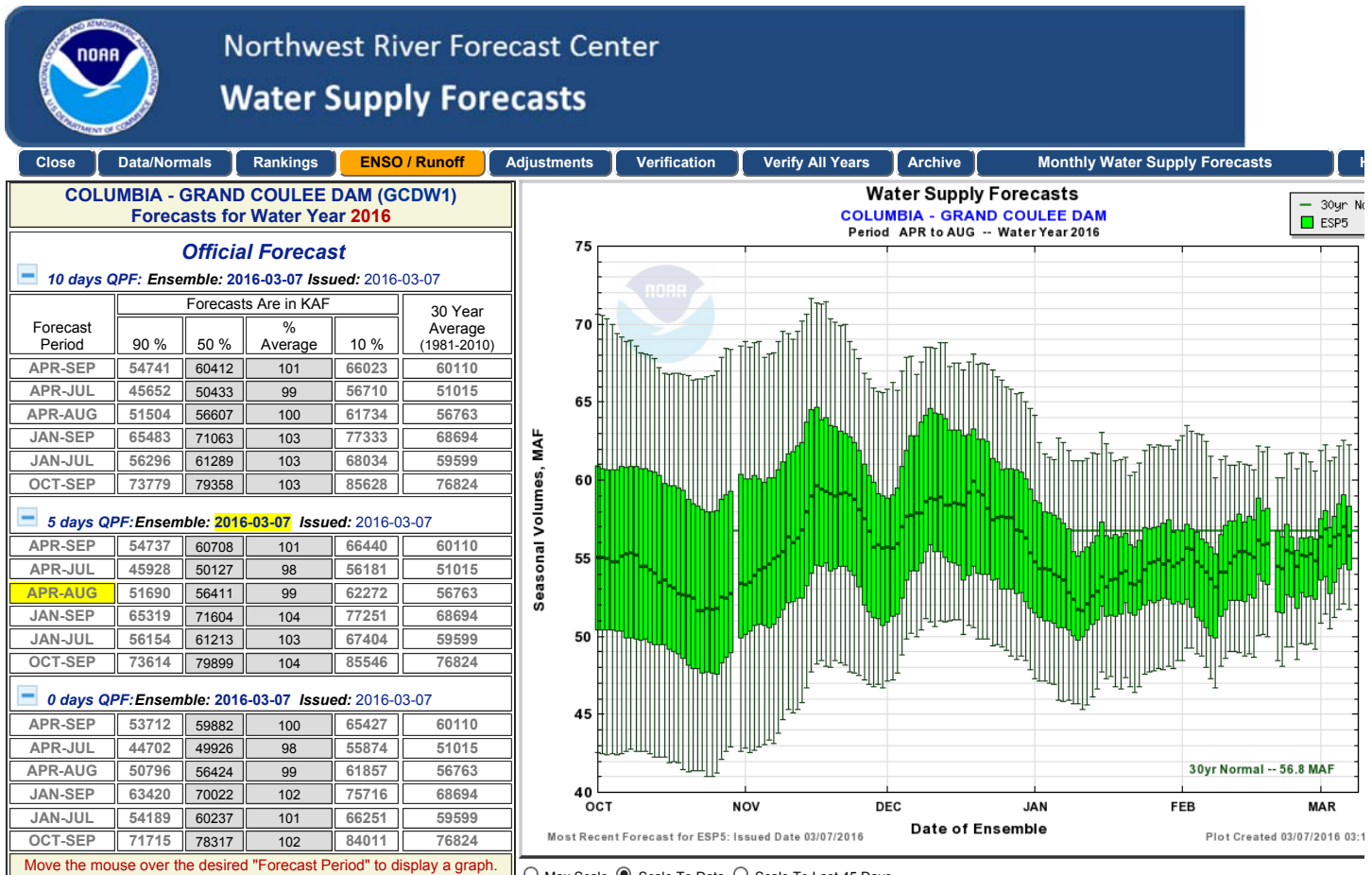
1. The given forecast is the official Corps of Engineers forecast for Dworshak. If you have any questions please contact Steve Hall (509 527 7550), Wayne Jousma (509-527-7606), or Alfredo Rodriguez (509-527-7532).
2. Due to updated values for precipitation, snow or streamflow, subsequent forecasts may be different from the forecast published herein.
3. 15-Dec and 31-Dec Flood Management Space is fixed at 700 KAF.

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

Grand Coulee Dam forecasts are not used for implementation of BiOp actions.
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Overlay

ESP10
ESP5
ESP0

Data Files

CSV (ESP5 / APR-AUG)

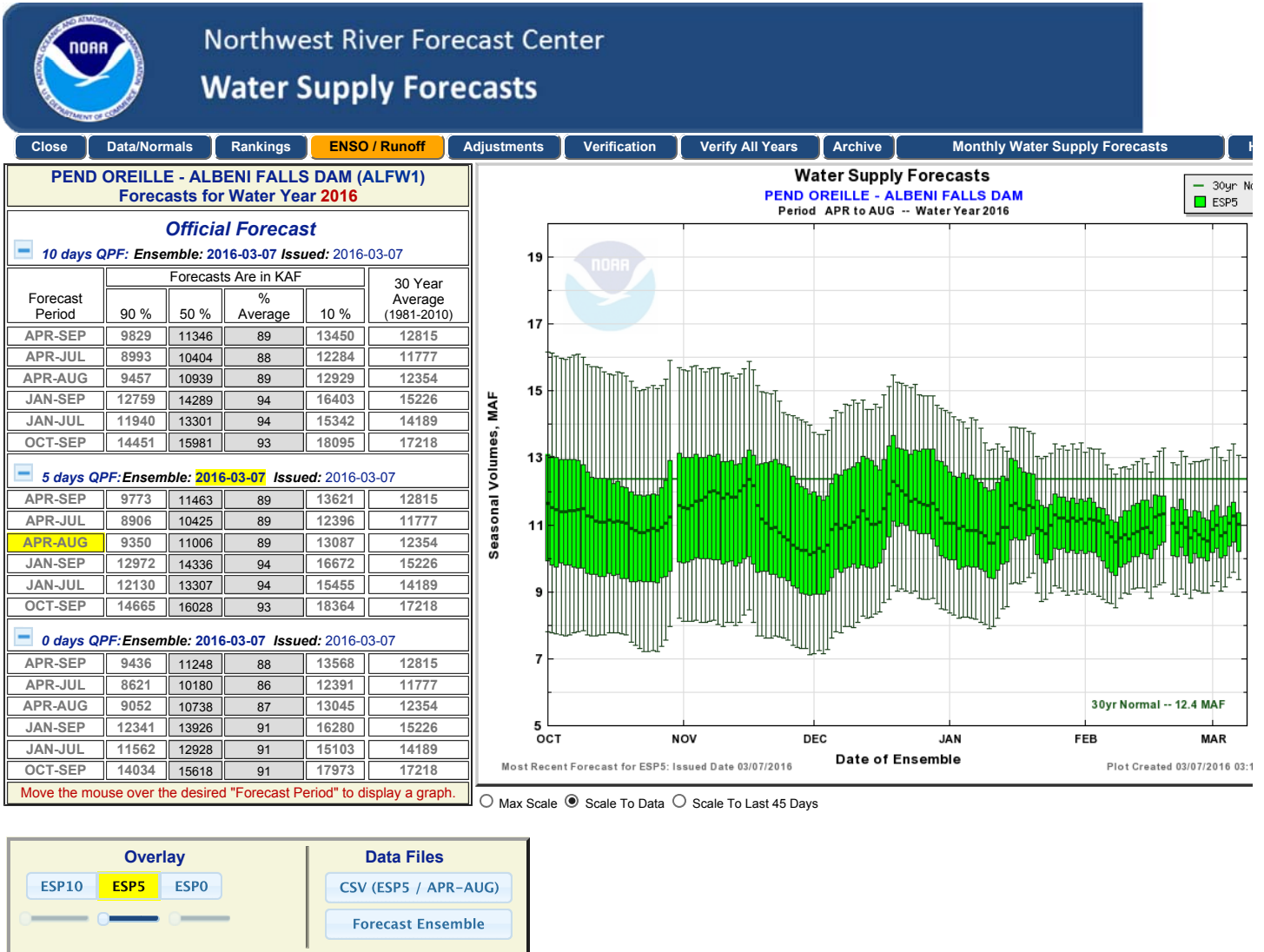
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