

APRIL final WSF sets BiOp actions as defined in table below.

Other projects provided for informational purposes only.

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 – 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 through June Final	Manage for reservoir FRM and refill

April 2, 2015

Hungry Horse Dam

Here are the volumes for the April final forecast for Hungry Horse Inflow:

Apr - Jul: 1,653 kaf (88%)

Apr - Aug: 1,704 kaf (88%)

May-Sep: 1,490 kaf (88%)

The minimum flows for Columbia Falls and below Hungry Horse for the rest of the calendar year remain at:

Columbia Falls: 3,500 cfs

Hungry Horse: 900 cfs

Mary Mellema

River and Reservoir Operations

U.S. Bureau of Reclamation

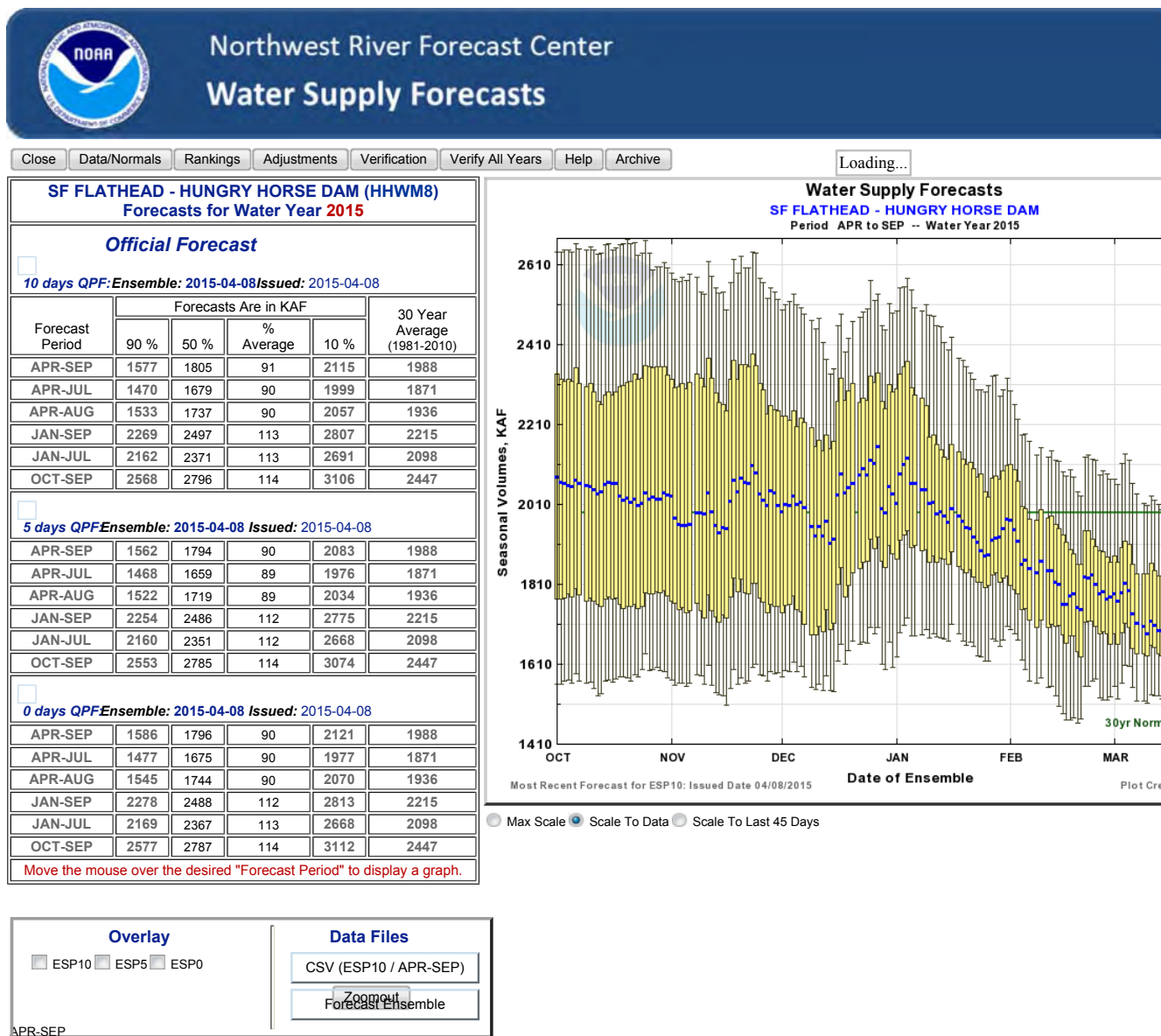
PN Regional Office

Boise, ID 83706

*Hungry Horse Dam official water supply forecasts computed by the Bureau of Reclamation (on previous page).

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Water Year 2015 - Official APRIL Final WSF

April final forecast for The Dalles Dam Apr-Aug runoff volume determines spring flow objective at McNary, as follows:

- TDA Apr-Aug <80 maf = MCN spring flow objective 220 kcfs (average MCN discharge April 10-June 30).



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COLUMBIA - THE DALLES DAM (TDAO3) Forecasts for Water Year 2015

Official Forecast

☐ 10 days QPF Ensemble: 2015-04-08 Issued: 2015-04-08

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	72405	76064	82	84595	92704
APR-JUL	59887	63851	80	71769	79855
APR-AUG	67582	71253	81	79110	87532
JAN-SEP	102974	106633	93	115164	114216
JAN-JUL	90456	94420	93	102338	101368
OCT-SEP	121477	125136	96	133667	130518

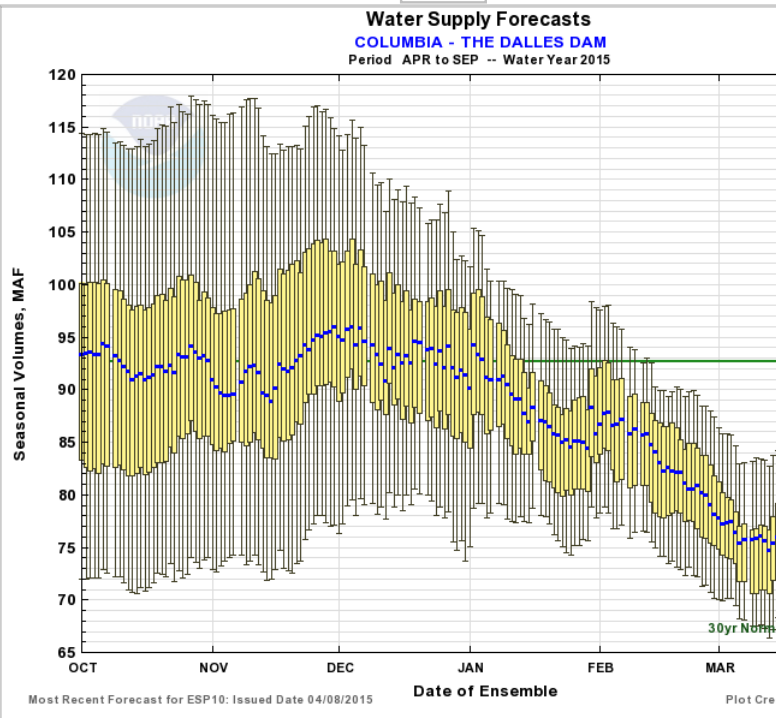
☐ 5 days QPF Ensemble: 2015-04-08 Issued: 2015-04-08

APR-SEP	72760	77308	83	85464	92704
APR-JUL	60408	65436	82	73799	79855
APR-AUG	67986	72233	83	80168	87532
JAN-SEP	103329	107877	94	116033	114216
JAN-JUL	90977	96005	95	104368	101368
OCT-SEP	121832	126380	97	134536	130518

☐ 0 days QPF Ensemble: 2015-04-08 Issued: 2015-04-08

APR-SEP	73155	79048	85	85899	92704
APR-JUL	61020	66027	83	74649	79855
APR-AUG	68102	73462	84	81063	87532
JAN-SEP	103725	109617	96	116469	114216
JAN-JUL	91590	96596	95	105219	101368
OCT-SEP	122227	128120	98	134971	130518

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


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

Overlay

☐ ESP10 ☐ ESP5 ☐ ESP0

Data Files

APR-SEP


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Water Year 2015 - Official APRIL Final WSF

April final forecast for LWG Apr-Jul runoff volume determines LWG spring flow objective, as follows:

- LWG Apr-Jul <16 maf = LWG spring flow objective 85 kcfs (average Lower Granite discharge April 3-June 20).



Northwest River Forecast Center Water Supply Forecasts

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SNAKE - LOWER GRANITE DAM (LGDW1) Forecasts for Water Year 2015

Official Forecast

10 days QPF Ensemble: 2015-04-08 Issued: 2015-04-08

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	13648	15848	71	18141	22279
APR-JUL	11594	13564	68	15796	19848
APR-AUG	12638	14647	69	16969	21091
JAN-SEP	21962	24161	81	26455	29872
JAN-JUL	19907	21878	80	24110	27440
OCT-SEP	26678	28878	83	31171	34667

5 days QPF Ensemble: 2015-04-08 Issued: 2015-04-08

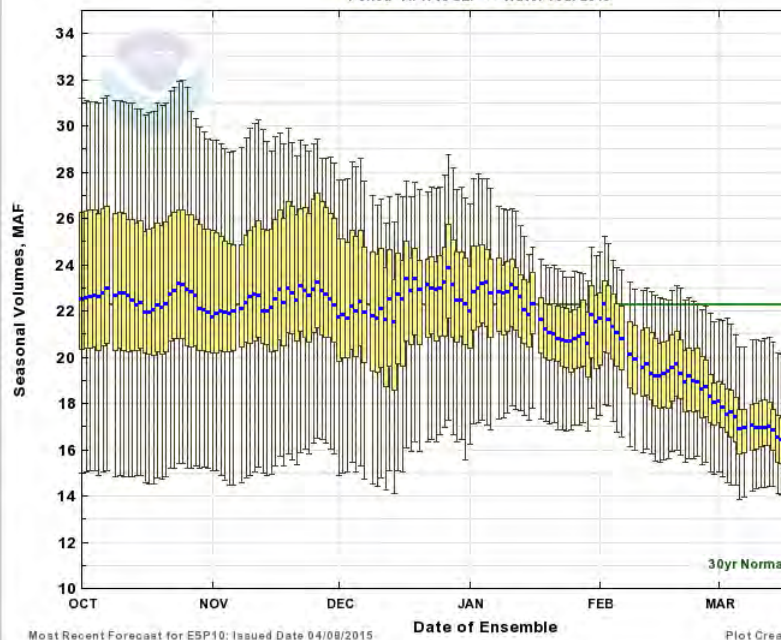
APR-SEP	14232	15822	71	18437	22279
APR-JUL	12158	13593	68	16166	19848
APR-AUG	13179	14692	70	17323	21091
JAN-SEP	22546	24136	81	26751	29872
JAN-JUL	20471	21906	80	24480	27440
OCT-SEP	27263	28852	83	31468	34667

0 days QPF Ensemble: 2015-04-08 Issued: 2015-04-08

APR-SEP	14324	15950	72	18844	22279
APR-JUL	12240	13808	70	16572	19848
APR-AUG	13278	14882	71	17731	21091
JAN-SEP	22638	24263	81	27158	29872
JAN-JUL	20553	22121	81	24885	27440
OCT-SEP	27354	28980	84	31875	34667

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

Water Supply Forecasts SNAKE - LOWER GRANITE DAM Period APR to SEP -- Water Year 2015



Max Scale Scale To Data Scale To Last 45 Days

Overlay

ESP10 ESP5 ESP0

Data Files

CSV (ESP10 / APR-SEP)

Forecast Ensemble

APR-SEP



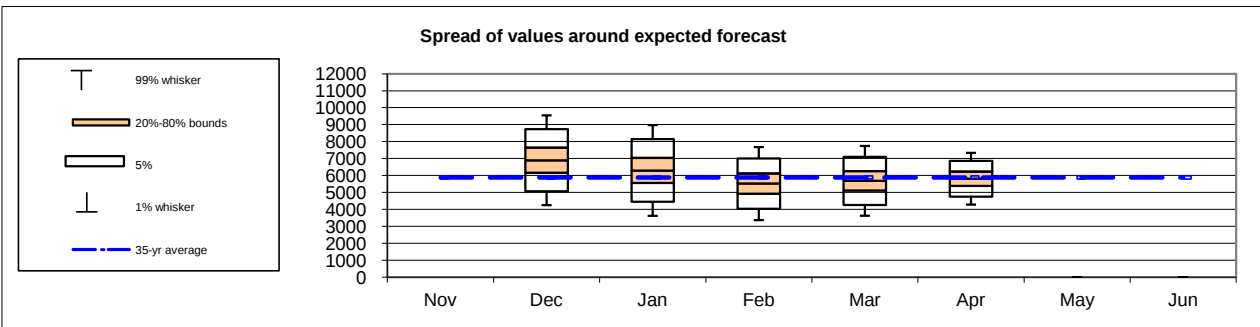
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Libby : April Runoff Forecast & Flood Control Calculation

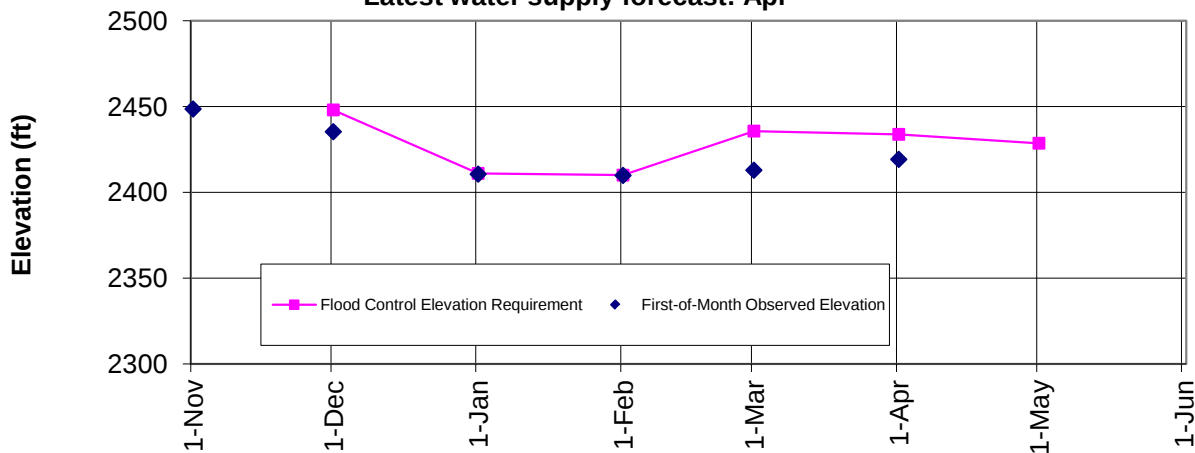
WY 2015

Runoff Forecast and Flood Control						1981-2010 Average	Percent of Average	1929-2008 Average	Percent of Average
Most Probable Runoff Volume:		Apr-Aug	5808	KAF		5885	99%	6282	92%
		Apr-Jul	5272	KAF		5342	99%	5720	92%
		May-Jul	4758	KAF		4821	99%	5199	92%
30-Apr Flood Control Space				1324	KAF				
30-Apr Flood Control Elevation				2428.6	ft				
Seasonal Flood Control									
VARQ Flood Control Implemented									
Forecast Date >>	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Apr-Aug Runoff Forecast		6899	6297	5523	5683	5808			
First-of-Month Elev	2448.5	2435.3	2410.6	2409.8	2412.9	2419.2			
Date >>	30-Nov	31-Dec	31-Jan	28/29-Feb	31-Mar	30-Apr			
Flood Control Space	500	2000	2037	1032	1112	1324			
Flood Control Elevation	2448.0	2411.0	2410.0	2435.7	2433.8	2428.6			



Libby Flood Control Elevations - 2015

Latest water supply forecast: Apr



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 or Kevin Shaffer (206) 764-3660.
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.

Libby : April Runoff Forecast & Flood Control 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:Mar Prcp	inches	8.18	140%	68.5	560.5
West Glacier, MT	ΣOct:Mar Prcp	inches	21.45	130%	29.5	632.1
Cranbrook A, BC	ΣOct:Mar Prcp	millimeters	198.70	125%	3.0	594.1
Fernie, BC	ΣOct:Mar Prcp	millimeters	863.50	128%	0.7	613.1
Hawkins Lake, MT	1-Apr SWE	inches	21.10	84%	22.4	473.3
Stahl Peak, MT	1-Apr SWE	inches	27.90	80%	19.7	549.6
East Creek, BC	1-Apr SWE	millimeters	872.00	101%	0.7	636.6
Moyie Mountain, BC	1-Apr SWE	millimeters	265.00	62%	1.2	320.7
Sunshine Village, AB	1-Apr SWE	millimeters	447.00	79%	1.4	639.2
Akamina Pass, AB	1-Apr SWE	millimeters	293.00	63%	0.7	211.0
South Racehorse Creek, AB	1-Apr SWE	millimeters	376.00	88%	1.4	507.6
Intercept			1		70.5	70.5
1-Feb Forecast (KAF)					Σ	5808.2

Data used in Libby Water Supply Forecast

WY 2015

Climate Data	Jan-14	Feb-14	Mar-14	Jun-14	Jul-14	Oct-14	Nov-14	Dec-14	Jan-15	
SOI				0.20	-0.20					
Precipitation Data	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Units	
Eureka RS, MT	0.55	2.42	1.22	1.21	0.65	2.13			inch	
West Glacier, MT	2.64	5.77	4.07	3.08	2.58	3.31			inch	
Cranbrook A, BC	29.40	53.60	25.50	22.90	20.20	47.10			mm	
Fernie, BC	126.90	273.00	95.00	93.00	81.00	194.60			mm	
Snow Water Equiv	1-Jan			1-Feb	1-Mar	1-Apr	1-May	1-Jun	Units	
Hawkins Lake, MT				12	16	21			inch	
Stahl Peak, MT				15	19	24	28			inch
East Creek, BC				537	706	872				mm
Moyie Mountain, BC				131	193	228	265			mm
Sunshine Village, AB				200	266	372	447			mm
Akamina Pass, AB				230	290	293				mm
South Racehorse Creek, AB				234	303	376				mm
Streamflow				Jan	Feb	Mar	Apr	May	Units	
Libby Inflow Volume				220.6	335.4	485.2			KAF	
Reservoir Elevation	1-Nov	1-Dec	1-Jan	1-Feb	1-Mar	1-Apr	1-May	1-Jun	Units	
Libby FOM Elev	2448.5	2435.3	2410.6	2409.8	2412.9	2419.2			feet	

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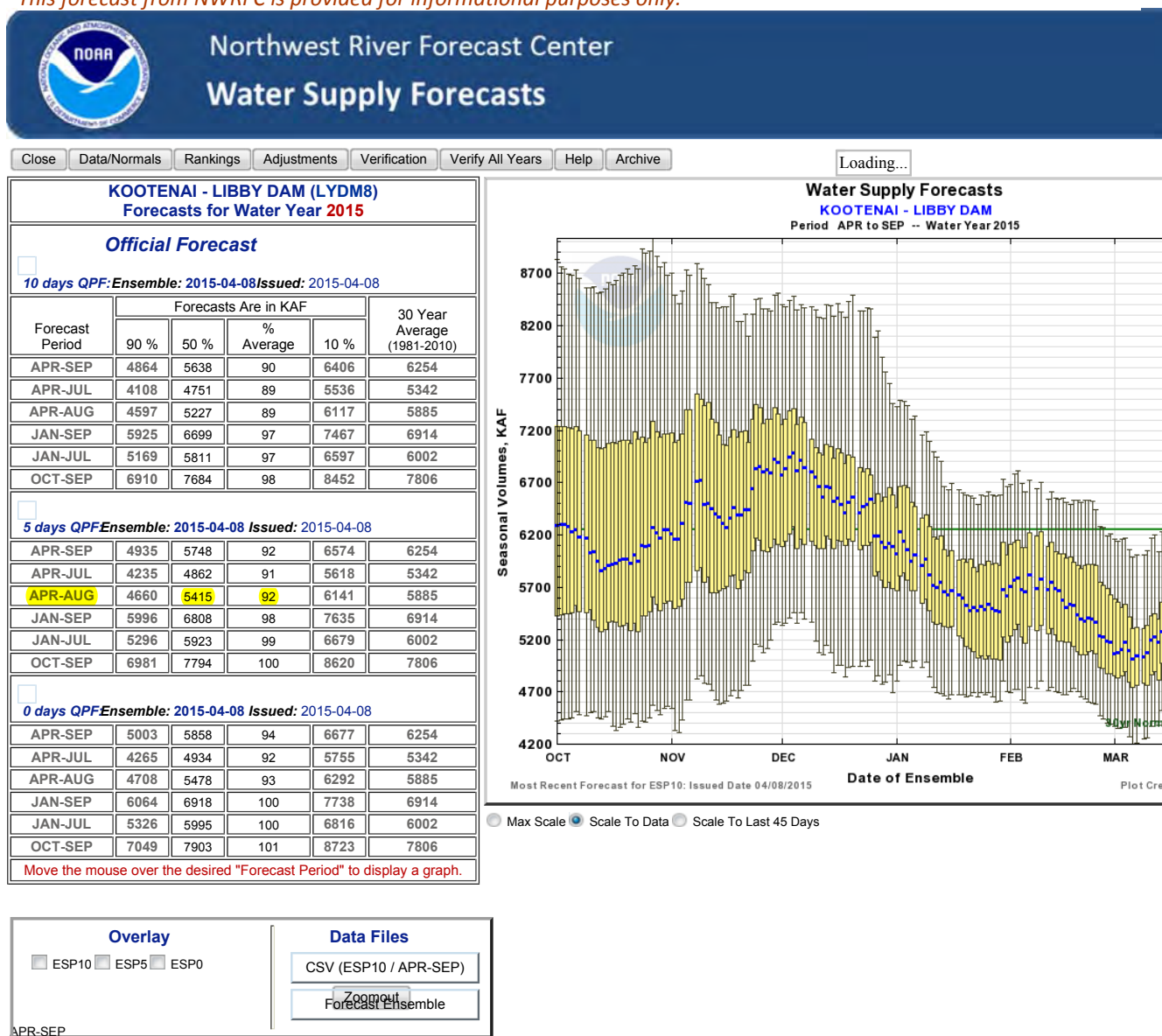
Barbara Miller
 Approving Official
 Act. Ch., Hydrologic Engineering and Power Branch
 Northwestern Division

Joel Fenolio
 Upper Columbia Senior Water Manager
 Seattle District

*Libby Dam official water supply forecasts computed by the Corps Seattle District (on previous pages).

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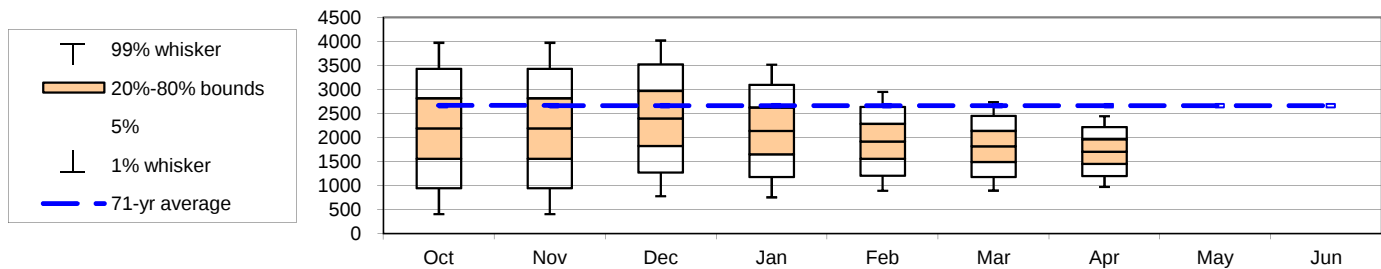
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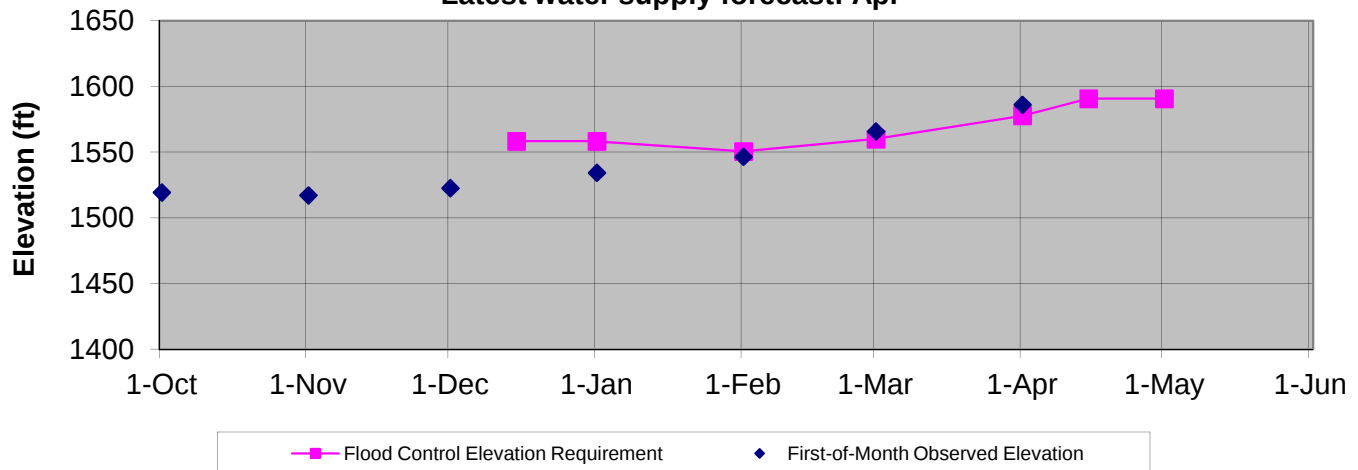
Dworshak : April Runoff Forecast & Flood Control Calculation**WY 2015**

Runoff Forecast and Non-Shifted Flood Control						1981-2010 Average	Percent of 30yr Average	1929-2010 Average	Percent of Average
Most Probable Runoff Volume		Apr-Jul	1709	KAF		2438	70%	2663	64%
		May-Jul	1253	KAF		1784	70%	1953	64%
30-Apr Flood Control Space			172	KAF					
30-Apr Flood Control Elevation			1590.7074	ft					
Seasonal Flood Control (assumes no shift of flood control space to Grand Coulee)									
Forecast Date>>	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Apr-Jul Runoff Forecast	2189	2189	2398	2136	1922	1815	1709		
First-of-Month Elev	1519.4	1517.2	1522.7	1534.4	1546.5	1565.7	1586.1		
Date >>		15-Dec	31-Dec	31-Jan	28-Feb	31-Mar	15-Apr	30-Apr	
Flood Control Space	--	700	700	811	674	397	172	172	
Flood Control Elevation	--	1558.2	1558.2	1550.6	1560.0	1577.7	1590.7	1590.7	

Spread of values around expected forecast

**Dworshak Flood Control Elevations - 2015**

Latest water supply forecast: Apr



- Notes:
1. The given forecast is the official Corps of Engineers forecast for Dworshak. If you have any questions please contact Jeremy Giovando (509 527 7053), or Steve Hall (509 527 7550).
 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 control space is fixed at 700 KAF.
 4. 15-Apr target elevation does not reflect flood control shift operation between Dworshak and Grand Coulee.
 5. 30-Apr target elevation may vary as runoff occurs throughout the month of April.

Dworshak : April Runoff Forecast & Flood Control Calculation**Apr-Jul Runoff Forecast Calculation:**

Variable	Month	Observed Value	% of Average	Regression Coefficient	Marginal Runoff (KAF)
		A		B	=A*B
SOI	Sep	-0.70		171.32	-119.9
HQSI Cumulative Precip	Oct-Date	29.70	118%	22.32	662.9
Elk Butte SWE	1-Apr	17.9	45%	11.61	207.8
Hoodoo Basin SWE	1-Apr	25.8	57%	10.27	265.0
Sherwin SWE	1-Apr	0.0	0%	19.49	0.0
Lost Lake SWE	1-Apr	30.2	50%	7.91	238.9
Crater meadows SWE	1-Apr	35.1	77%	13.37	469.3
Intercept		1		-15.43	-15.4

1-Apr Forecast (KAF)

Σ 1708.5

Data Station	Sept	Nov	Dec	1-Jan	1-Feb	1-Mar	1-Apr	1-May	1-Jun
Climate (Stdzd SOI)									
September SOI	-0.70								
Precipitation (in)									
Oct									
Headquarters, ID	2.60	7.10	5.50	5.30	4.40	4.80	--		
Cumulative HQSI Data	2.60	9.70	15.20	20.50	24.90	29.70	--		
Snow Water Equiv (First of Month values) (in)									
Elk Butte, ID				10.5	17.3	18.5	17.9		
Cool Creek, ID				16.7	23.5				
Hoodoo Basin, MT				14.0	20.2	24.2	25.8	--	--
Sherwin, ID				1.4	3.4	0.3	0.0		
Shanghi Summit, ID								--	--
Lost Lake, ID				16.1	24.1	28.2	30.2	--	--
Hemlock, ID								--	--
Crater Meadows Mar						34.9	35.1		
Streamflow (End of Month) (kaf)				Jan	Feb	Mar	Apr	May	Jun
Dworshak Inflow				260	584	569	--	--	--

Approval:

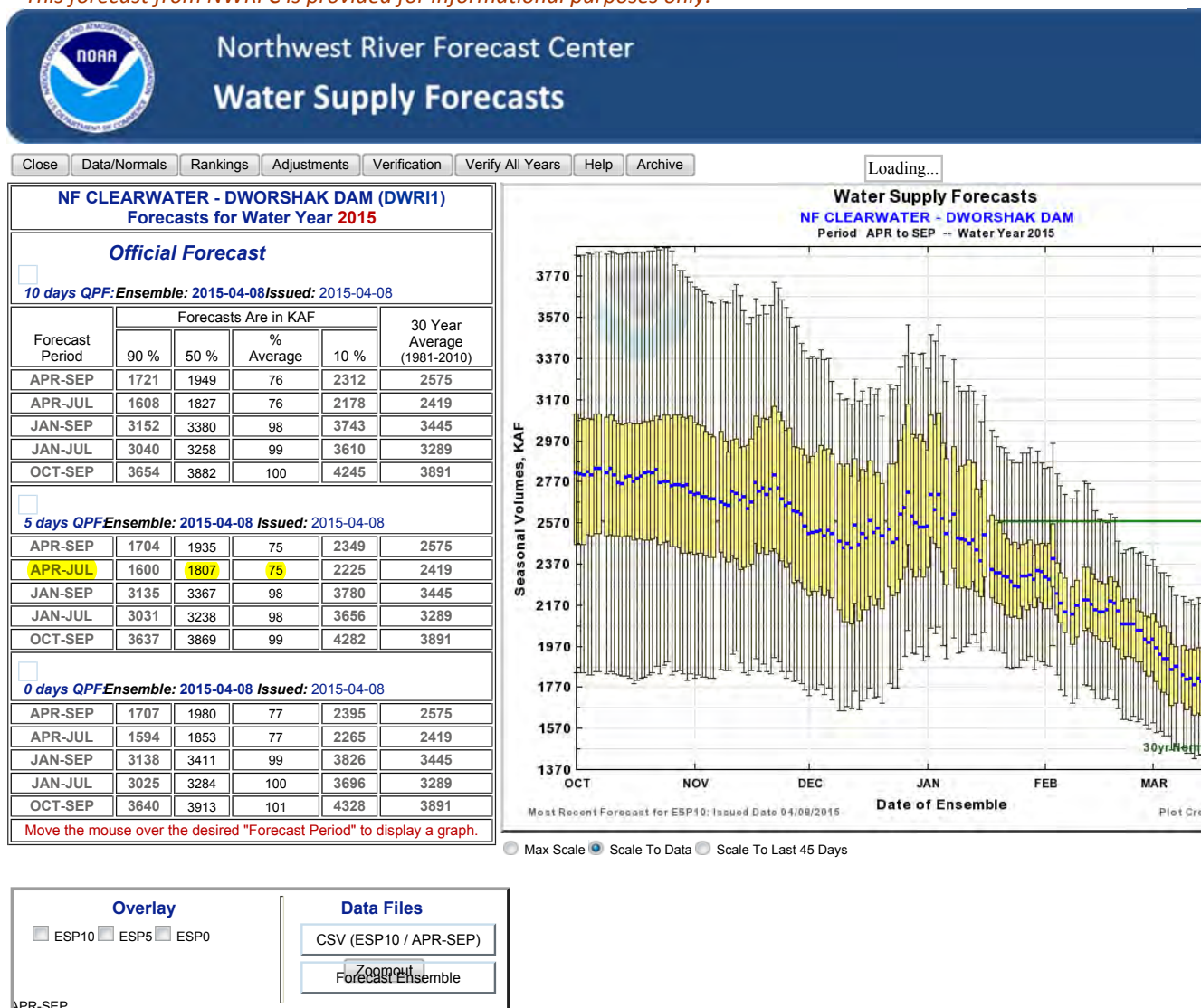
John J. Heitstuman P.E.
Chief Hydrology Section
Walla Walla District USACE

Peter Brooks, P.E., D. WRE
Ch., Hydrologic Engineering and Power Branch
Columbia Basin Water Management Division

* Dworshak Dam official water supply forecasts computed by the Corps Walla Walla District (on previous pages).

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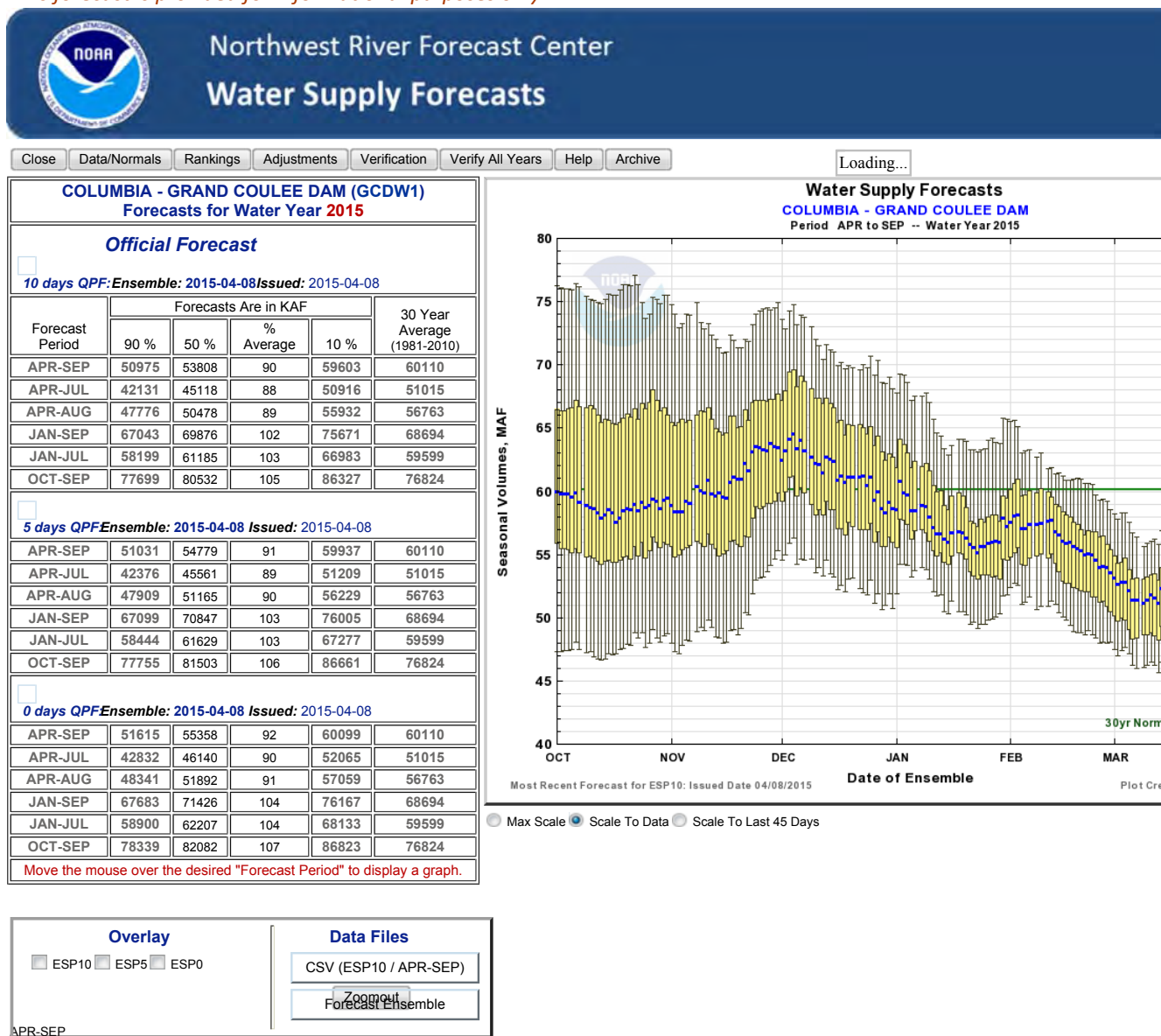
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* Grand Coulee Dam water supply forecasts are not used for implementation of BiOp actions.

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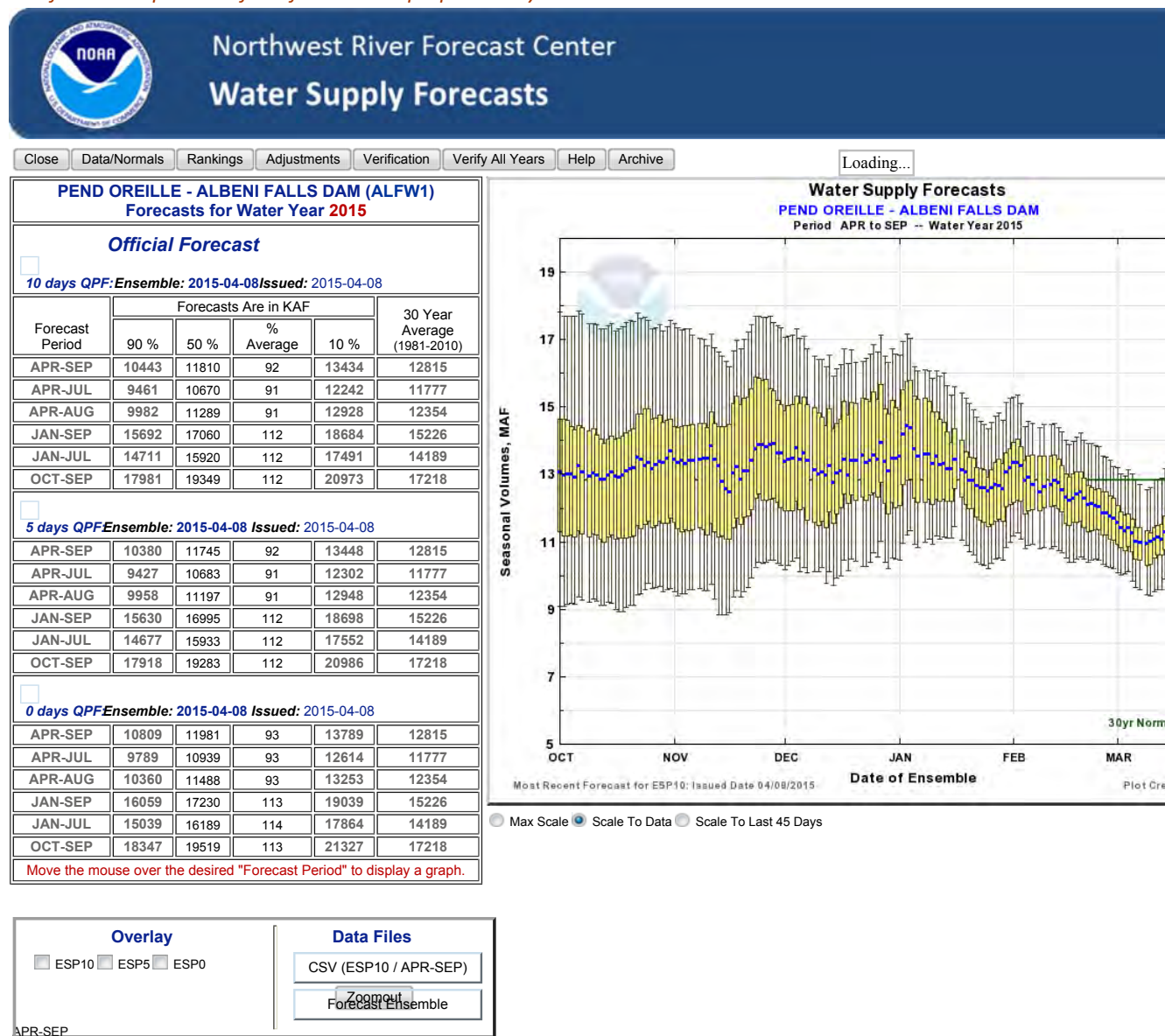
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* Albeni Falls Dam water supply forecasts are not used for implementation of BiOp actions.

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