

The official MARCH final water supply forecast sets BiOp actions at **HGH, LIB, DWR** (see table below). Other projects are provided for informational purposes.

Table 4. Water Supply Forecasts Used to Implement BiOp Actions. See Table 5 for project-specific operations.

Forecast Point	Forecast Period	Forecast	BiOp Actions to be Determined
Hungry Horse (Provided by Reclamation)	April – August	January, February, March Final	Sets min. flows at Hungry Horse and Columbia Falls
	May – September	January, February, March Final	Sets VARQ flood control targets
		April Final	Sets VARQ flood control targets and VARQ refill flows
		May, June Final	Sets VARQ refill flows
The Dalles (Provided by NWRFC)	April – August	April Final	Sets spring flow objective at McNary Dam and informs decision on juvenile fish transportation operations at McNary
		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 (Provided by NWRFC)	April – July	April Final	Sets spring flow objective at Lower Granite and informs decision on juvenile fish transportation operations at Lower Snake projects
		June Final	Sets summer flow objective at Lower Granite
Libby (Provided by Corps Seattle District)	April – August	December Final	Sets end of December variable draft target
		January, February, March Final	Sets VARQ flood control targets
		April Final	Sets VARQ flood control 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 refill flows
		June Final	VARQ refill flows
Dworshak (Provided by Corps Walla Walla District)	April – July	October through June	Manage for reservoir refill

The official MARCH final water supply forecast sets BiOp actions at **DWR, LIB, HGH**.
Other projects are provided for informational purposes.

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COLUMBIA - THE DALLES DAM (TDAO3) Forecasts for Water Year 2014					
Official Forecast					
-10 days QPF: Ensemble: 2014-03-06 Issued: 2014-03-07Hide Forecast					
Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	85647	93447	101	104144	92704
APR-JUL	71662	79802	100	90628	79855
APR-AUG	80150	88089	101	98303	87532
JAN-JUL	92582	100970	100	112136	101368
-5 days QPF: Ensemble: 2014-03-06 Issued: 2014-03-07Hide Forecast					
APR-SEP	86141	94759	102	106015	92704
APR-JUL	73049	80897	101	90886	79855
APR-AUG	80933	88832	101	99422	87532
JAN-JUL	93976	102148	101	112615	101368
-0 days QPF: Ensemble: 2014-03-06 Issued: 2014-03-07Hide Forecast					
APR-SEP	82793	91819	99	102474	92704
APR-JUL	70207	77452	97	89262	79855
APR-AUG	77684	85176	97	96920	87532
JAN-JUL	87847	96070	95	108858	101368
Move the mouse over the desired "Forecast Period" to display a graph.					

☒ Link to image of plot

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Note: Compatible with the latest browsers (Chrome, Firefox, Safari, and Internet Explorer (ie9+)).

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The official MARCH final water supply forecast sets BiOp actions at **DWR, LIB, HGH**.
Other projects are provided for informational purposes.

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SNAKE - LOWER GRANITE DAM (LGDW1)
Forecasts for Water Year 2014

Official Forecast
-10 days QPF: Ensemble: 2014-03-06Issued: 2014-03-07Hide
Forecast

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	20651	23541	106	27735	22279
APR-JUL	18163	21042	106	25030	19848
APR-AUG	19382	22321	106	26440	21091
JAN-JUL	26221	29021	106	33171	27440

-5 days QPF: Ensemble: 2014-03-06 Issued: 2014-03-07Hide
Forecast

APR-SEP	20906	23945	107	28397	22279
APR-JUL	18521	21496	108	25585	19848
APR-AUG	19728	22686	108	27037	21091
JAN-JUL	26605	29359	107	33851	27440

-0 days QPF: Ensemble: 2014-03-06 Issued: 2014-03-07Hide
Forecast

APR-SEP	20209	23940	107	27964	22279
APR-JUL	17883	21092	106	25013	19848
APR-AUG	19062	22629	107	26602	21091
JAN-JUL	24741	27991	102	31825	27440

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

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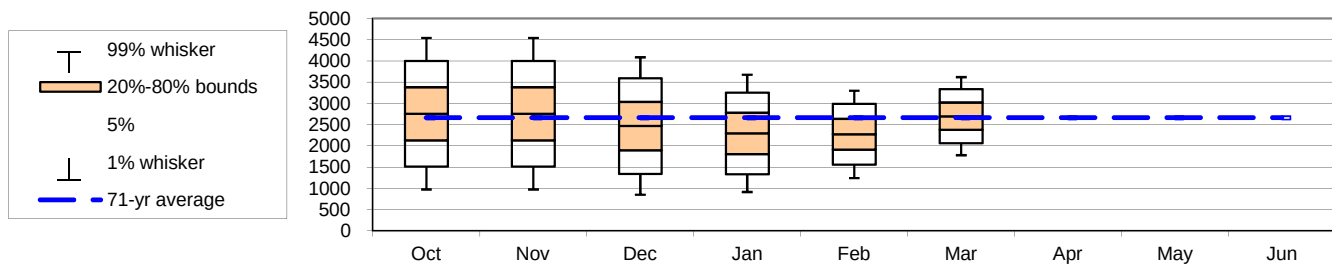
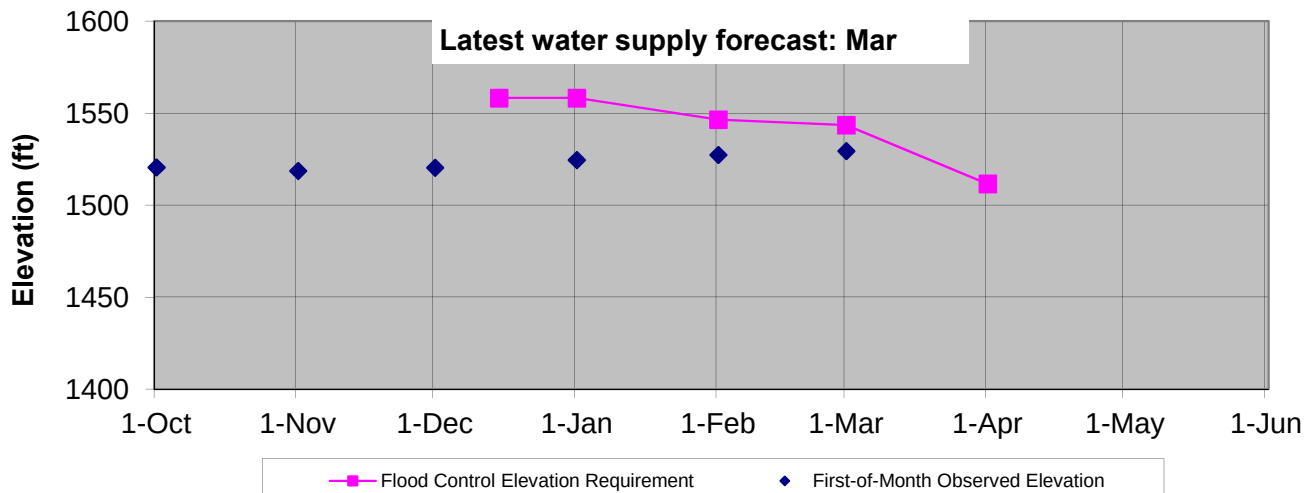
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3/10/2014

Dworshak : March Runoff Forecast & Flood Control Calculation**WY 2014**

Runoff Forecast and Flood Control						1981-2010 Average	Percent of Average	1929-2010 Average	Percent of Average
Most Probable Runoff Volume		Apr-Jul	2701	KAF		2438	111%	2663	101%
		May-Jul	1981	KAF		1784	111%	1953	101%
31-Mar Flood Control Space			1336	KAF					
31-Mar Flood Control Elevation			1511.6	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	2758	2758	2470	2296	2274	2701			
First-of-Month Elev	1520.6	1518.7	1520.4	1524.6	1527.3	1529.5			
Date >>	15-Dec	31-Dec	31-Jan	28-Feb	31-Mar	15-Apr	30-Apr		
Flood Control Space	--	700	700	869	912	1336			
Flood Control Elevation	--	1558.2	1558.2	1546.5	1543.5	1511.6			

Spread of values around expected forecast

**Dworshak Flood Control Elevations - 2014****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.

Dworshak : March 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	0.30		220.73	66.2
HQSI Cumulative Precip	Oct-Date	20.30	93%	23.39	474.8
Elk Butte SWE	1-Mar	32.2	93%	10.16	327.2
Hoodoo Basin SWE	1-Mar	37.3	97%	10.01	373.4
Sherwin SWE	1-Mar	9.3	86%	25.42	236.4
Lost Lake SWE	1-Mar	44.9	89%	6.99	313.9
Crater meadows SWE	1-Mar	46.9	121%	13.06	612.5
Intercept		1		296.75	296.8
1-Mar Forecast (KAF)				Σ	2701.1

Data Station	Sept	Nov	Dec	1-Jan	1-Feb	1-Mar	1-Apr	1-May	1-Jun	1-Jul
Climate (Stdzd SOI)										
September SOI	0.30									
Precipitation (in)										
Oct										
Headquarters, ID	0.40	4.20	4.90	5.00	5.80	--	--			
Cumulative HQSI Data	0.40	4.60	9.50	14.50	20.30	--	--			
Snow Water Equiv (First of Month values) (in)										
Elk Butte, ID				12.8	21.4	32.2	--			
Cool Creek, ID				16.6	28.6					
Hoodoo Basin, MT				13.3	22.2	37.3	--	--	--	
Sherwin, ID				2.7	6.0	9.3	--			
Shanghi Summit, ID								--	--	
Lost Lake, ID				19.8	30.0	44.9	--	--	--	
Hemlock, ID								--	--	
Crater Meadows Mar						46.9	--			
Streamflow (End of Month) (kaf)				Jan	Feb	Mar	Apr	May	Jun	Jul
Dworshak Inflow				132	143	--	--	--	--	--

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

*The official Dworshak Dam forecast is computed by the Corps Walla Walla District (provided on previous pages).
This forecast from NWRFC is provided for informational purposes only. *



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NF CLEARWATER - DWORSHAK DAM (DWRI1) Forecasts for Water Year 2014

Official Forecast

10 days QPF: Ensemble: 2014-03-04 Issued: 2014-03-05

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	2836	3222	125	3657	2575
APR-JUL	2706	3056	126	3465	2419
JAN-JUL	3490	3817	116	4258	3289

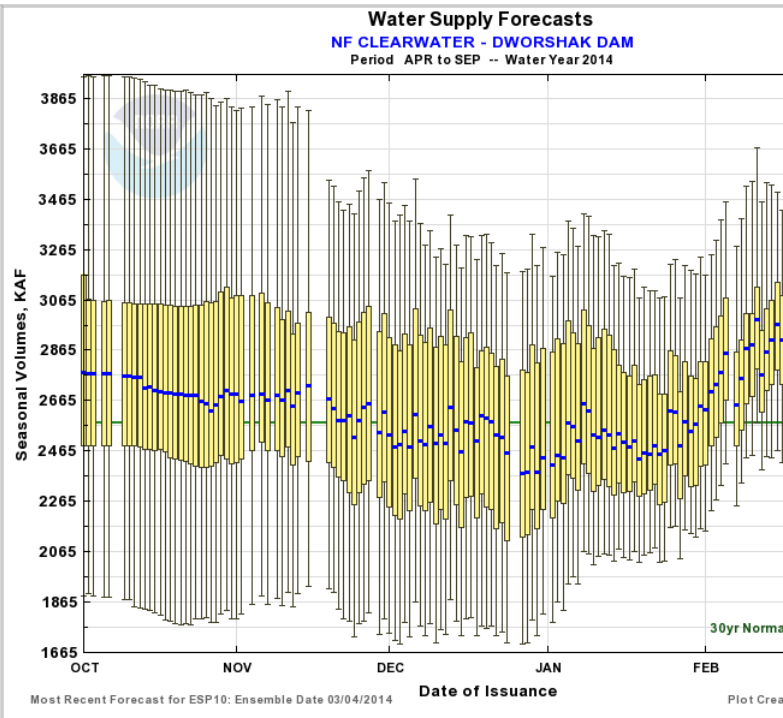
5 days QPF Ensemble: 2014-03-04 Issued: 2014-03-05

APR-SEP	2768	3220	125	3679	2575
APR-JUL	2631	3041	126	3491	2419
JAN-JUL	3405	3745	114	4256	3289

0 days QPF Ensemble: 2014-03-04 Issued: 2014-03-05

APR-SEP	2619	3117	121	3570	2575
APR-JUL	2495	2921	121	3400	2419
JAN-JUL	3143	3512	107	4000	3289

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



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Note: Compatible with the latest browsers (Chrome, Firefox, Safari, and Internet Explorer (ie9+)).

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The Grand Coulee Dam water supply forecast is not used for implementation of any BiOp actions.
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COLUMBIA - GRAND COULEE DAM (GCDW1)
Forecasts for Water Year 2014

Official Forecast
-10 days QPF: Ensemble: 2014-03-06Issued: 2014-03-07Hide
Forecast

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	54818	61671	103	67953	60110
APR-JUL	46071	50876	100	57287	51015
APR-AUG	51532	57413	101	63742	56763
JAN-JUL	53235	58394	98	65092	59599

-5 days QPF: Ensemble: 2014-03-06 Issued: 2014-03-07Hide
Forecast

APR-SEP	54989	61688	103	68003	60110
APR-JUL	46460	51264	100	58185	51015
APR-AUG	52252	57818	102	64461	56763
JAN-JUL	53533	58637	98	65964	59599

-0 days QPF: Ensemble: 2014-03-06 Issued: 2014-03-07Hide
Forecast

APR-SEP	52729	58854	98	66109	60110
APR-JUL	44141	49236	97	56893	51015
APR-AUG	49769	55568	98	62651	56763
JAN-JUL	50419	55991	94	64126	59599

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

☒ Link to image of plot

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

Note: Compatible with the latest browsers (Chrome, Firefox, Safari, and Internet Explorer (ie9+)).

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3/10/2014

Libby : March Runoff Forecast & Flood Control Calculation**WY 2014****Runoff Forecast and Flood Control**

Most Probable Runoff Volume:	Apr-Aug	5505	KAF
	Apr-Jul	4997	KAF
	May-Jul	4510	KAF

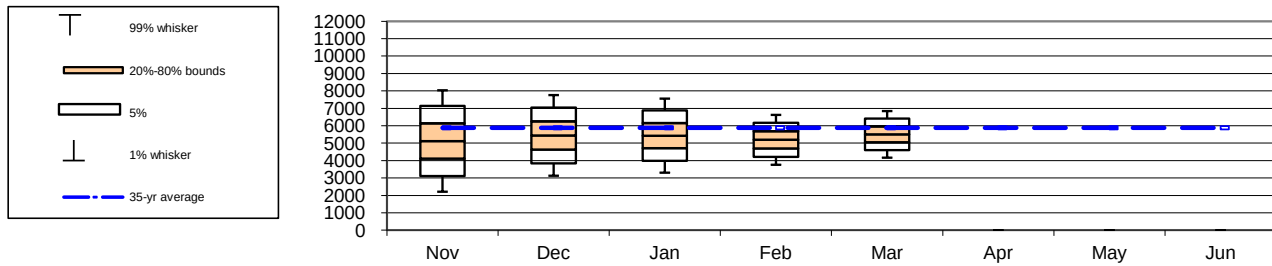
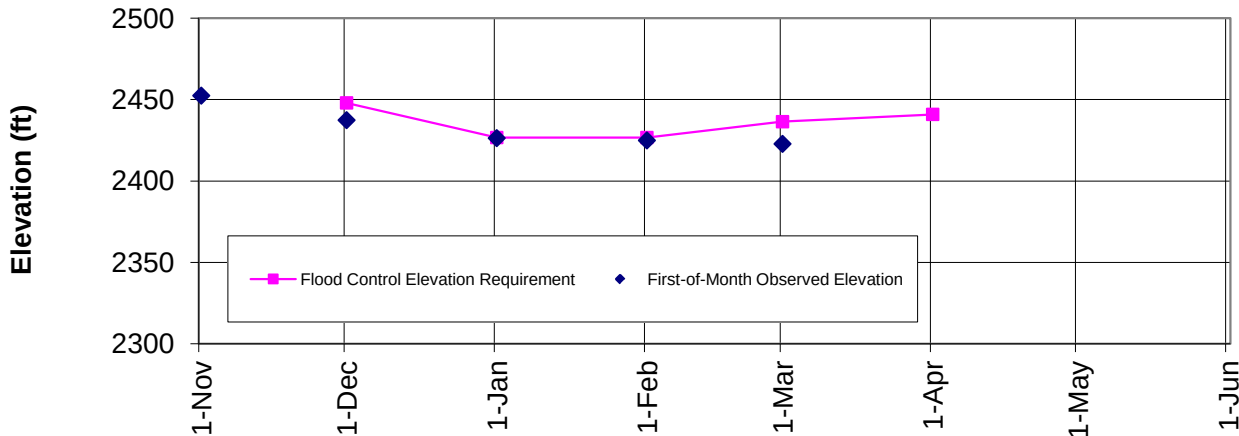
31-Mar Flood Control Space	809	KAF
31-Mar Flood Control Elevation	2440.9	ft

1981-2010 Average	Percent of Average	1929-2008 Average	Percent of Average
5885	94%	6282	88%
5342	94%	5720	87%
4821	94%	5199	87%

Seasonal Flood Control**VARQ Flood Control Implemented**

Forecast Date >>	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Apr-Aug Runoff Forecast	5125	5446	5432	5192	5505			
First-of-Month Elev	2452.5	2437.4	2426.3	2424.9	2422.8			

Date >>	30-Nov	31-Dec	31-Jan	28-Feb	31-Mar	30-Apr
Flood Control Space	500	1400	1400	1000	809	
Flood Control Elevation	2448.0	2426.7	2426.7	2436.4	2440.9	

Spread of values around expected forecast**Libby Flood Control Elevations - 2014****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, Kevin Shaffer (206) 764-3660, Adam Price (206) 764-3604, 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. Fernie precipitation values were not collected for 11 days during February. Fernie precipitation was scaled up using the ratio of Total February precipitation at Sparwood to precipitation at Sparwood on the days Fernie reported precip.

Libby : March 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
QBO	Σ Jan:Mar		-4.45		-10.2	45.4
Eureka, MT	Σ Oct:Feb Prcp	inches	4.09	82%	68.6	280.8
Libby 1 NE RS, MT	Σ Oct:Feb Prcp	inches	7.05	78%	51.5	363.2
West Glacier, MT	Σ Oct:Feb Prcp	inches	12.27	85%	33.7	413.7
Fernie, BC	Σ Oct:Feb Prcp	inches	20.53	81%	11.5	236.0
Floe Lake, BC	1-Mar SWE	inches	20.43	88%	6.4	130.4
Sunshine Village, AB	1-Mar SWE	inches	16.10	87%	17.8	286.8
East Creek, BC	1-Mar SWE	inches	22.87	80%	4.8	108.9
Stahl Peak, MT	1-Mar SWE	inches	26.20	90%	15.2	399.2
Gardiner Creek, AB	1-Mar SWE	inches	19.21	106%	13.2	252.8
Three Isle Lake, AB	1-Mar SWE	inches	13.86	90%	26.1	362.0
Lost Creek South, AB	1-Mar SWE	inches	21.06	109%	14.7	309.5
Morrissey Ridge, BC	1-Mar SWE	inches	21.14	93%	18.6	393.3
Hawkins Lake, MT	1-Mar SWE	inches	19.70	97%	22.8	449.8
Intercept			1		1473.3	1473.3
1-Mar Forecast (KAF)					Σ	5505.1

Data used in Libby Water Supply Forecast**WY 2014**

Climate Data	Jan-13	Feb-13	Mar-13	Jun-13	Jul-13	Oct-13	Nov-13	Dec-13	Jan-14
SOI				1.20	0.80				
QBO	-6.07	-1.23	2.85						
PNA						-0.21	-1.14	-1.16	0.59
Precipitation Data	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Units
Eureka, MT	0.37	1.16	0.77	1.06	0.73				inch
Libby 1 NE RS, MT	0.59	2.22	1.20	1.08	1.96				inch
West Glacier, MT	0.55	4.31	2.66	2.70	2.05				inch
Fernie, BC	27.50	128.50	210.00	91.50	64.00				mm
Snow Water Equiv	1-Jan			1-Feb	1-Mar	1-Apr	1-May	1-Jun	Units
Floe Lake, BC			274	408	519				mm
Sunshine Village, AB			236	329	409				mm
East Creek, BC			335	471	581				mm
Stahl Peak, MT			15	21	26				inch
Gardiner Creek, AB			257	352	488				mm
Three Isle Lake, AB			213	279	352				mm
Lost Creek South, AB			273	408	535				mm
Morrissey Ridge, BC			286	401	537				mm
Hawkins Lake, MT			8	14	20				inch
Streamflow	Jan			Feb	Mar	Apr	May	Jun	Units
Libby Inflow Volume			190.4	134.1					KAF
Reservoir Elevation	1-Nov	1-Dec	1-Jan	1-Feb	1-Mar	1-Apr	1-May	1-Jun	Units
Libby FOM Elev	2452.5	2437.4	2426.3	2424.9	2422.8				feet

for:

Peter F. Brooks, P.E., D. WRE
 Approving Official
 Ch., Hydrologic Engineering and Power Branch
 Northwestern Division

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

*The official Libby Dam forecast is computed by the Corps Seattle District (provided on previous pages).
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KOOTENAI - LIBBY DAM (LYDM8) Forecasts for Water Year 2014

Official Forecast

10 days QPF: Ensemble: 2014-03-04 Issued: 2014-03-05

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	5130	6067	97	7330	6254
APR-JUL	4404	5126	96	6322	5342
APR-AUG	4838	5739	98	6900	5885
JAN-JUL	4908	5632	94	6837	6002

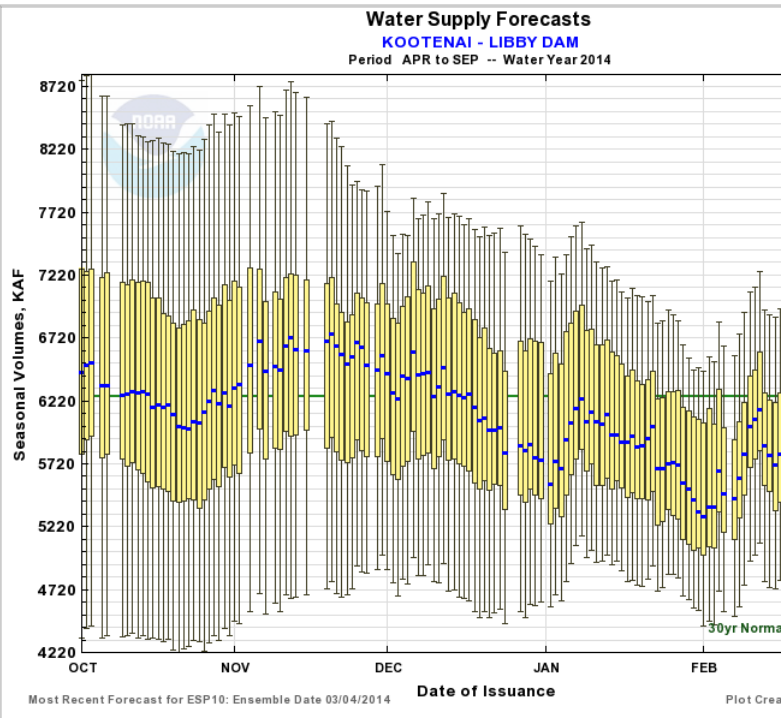
5 days QPF Ensemble: 2014-03-04 Issued: 2014-03-05

APR-SEP	5002	5945	95	7262	6254
APR-JUL	4280	5110	96	6315	5342
APR-AUG	4715	5611	95	6900	5885
JAN-JUL	4801	5610	93	6832	6002

0 days QPF Ensemble: 2014-03-04 Issued: 2014-03-05

APR-SEP	4754	5743	92	7017	6254
APR-JUL	4074	4915	92	6052	5342
APR-AUG	4475	5434	92	6683	5885
JAN-JUL	4581	5427	90	6574	6002

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Note: Compatible with the latest browsers (Chrome, Firefox, Safari, and Internet Explorer (ie9+)).

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March 4, 2014

Hungry Horse Dam

Volumes for the official MARCH final forecast for Hungry Horse inflow:

- Mar - Jul: 2,142 kaf (109%)
- Jan – Jul: 2,218 kaf (106%)
- Apr – Aug: 2,110 kaf (109%)
- May – Sep: 1,845 kaf (109%)

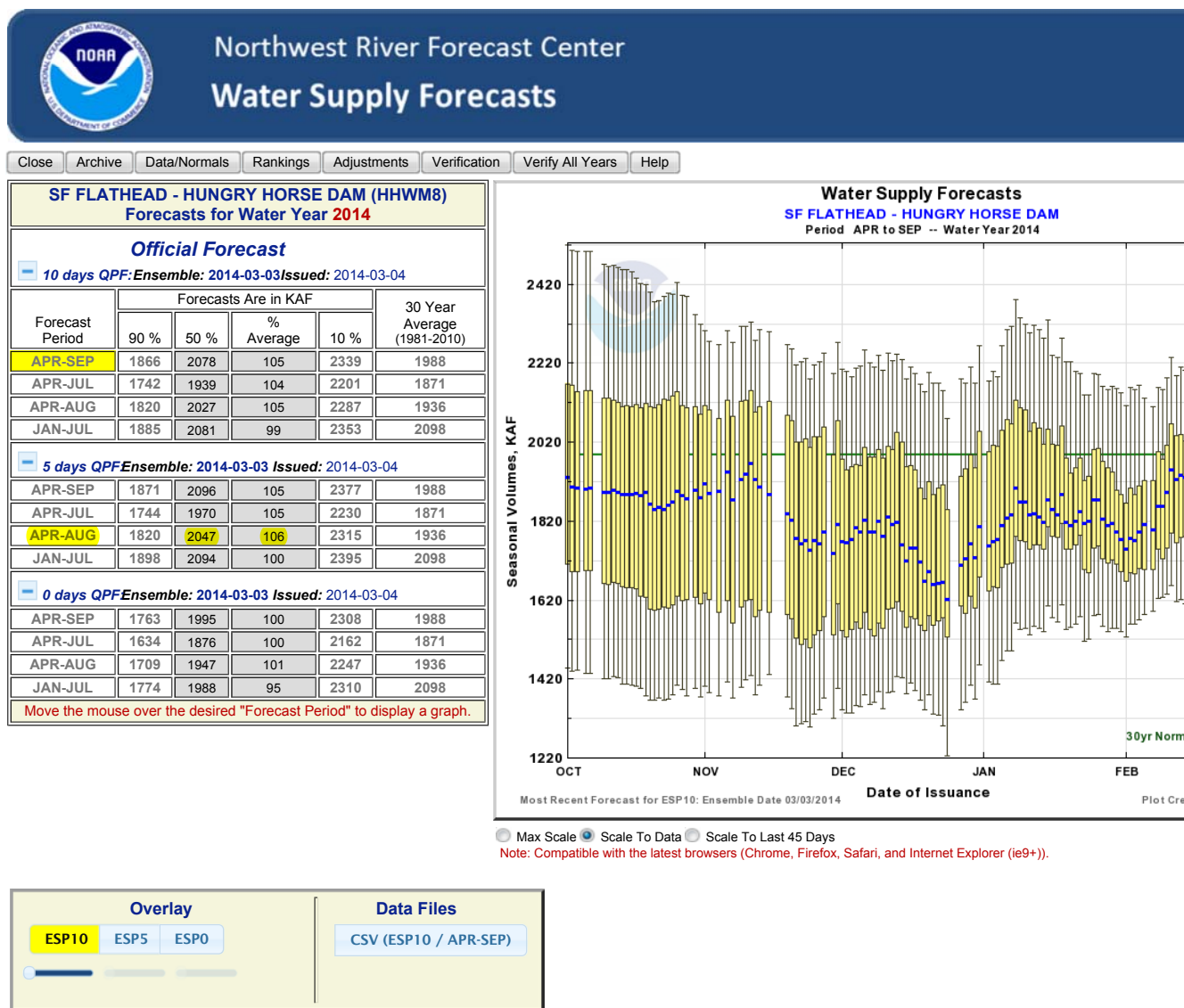
The March forecast sets minimum flows for Columbia Falls and below Hungry Horse for the rest of the calendar year. They are as follows:

- 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

*The official Hungry Horse Dam forecast is computed by the Bureau of Reclamation (provided on previous page).
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The Albeni Falls Dam water supply forecast is not used for the implementation of any BiOp actions.
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PEND OREILLE - ALBENI FALLS DAM (ALFW1) Forecasts for Water Year 2014					
Official Forecast -10 days QPF: Ensemble: 2014-03-06 Issued: 2014-03-07Hide Forecast					
Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	12643	14145	110	16081	12815
APR-JUL	11472	12970	110	14770	11777
APR-AUG	12143	13649	110	15514	12354
JAN-JUL	13620	15037	106	16852	14189
-5 days QPF: Ensemble: 2014-03-06 Issued: 2014-03-07Hide Forecast					
APR-SEP	12689	14323	112	16476	12815
APR-JUL	11573	13073	111	15056	11777
APR-AUG	12209	13807	112	15880	12354
JAN-JUL	13817	15238	107	17181	14189
-0 days QPF: Ensemble: 2014-03-06 Issued: 2014-03-07Hide Forecast					
APR-SEP	12149	13832	108	16176	12815
APR-JUL	10938	12629	107	14816	11777
APR-AUG	11551	13354	108	15619	12354
JAN-JUL	13033	14459	102	16758	14189
Move the mouse over the desired "Forecast Period" to display a graph.					

☒ Link to image of plot

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

Note: Compatible with the latest browsers (Chrome, Firefox, Safari, and Internet Explorer (ie9+)).

Overlay

☐ ESP10 ☐ ESP5 ☐ ESP0

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Data Files

[Zoomout](#)

[CSV \(ESP10 / APR-SEP\)](#)

APR-SEP

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ESP10,ESP5,ESP0
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