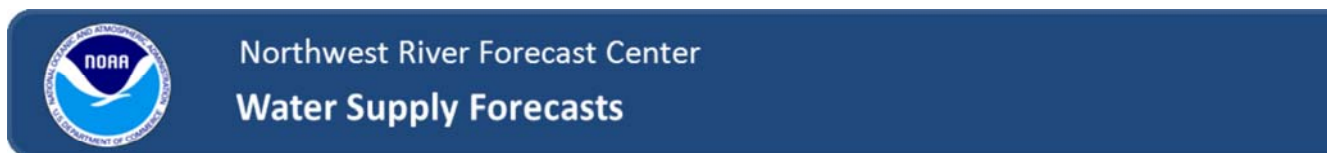


JANUARY Final WSF (1/8/2014) sets actions at **HGH, LIB** and **DWR** (see table below).
All other projects are provided for informational purposes only.

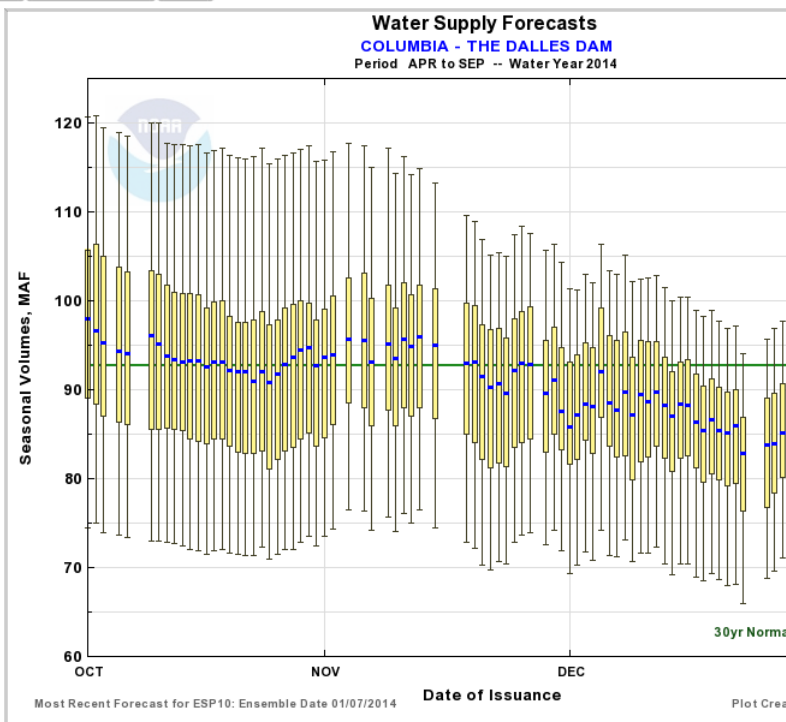
Table 4. Water Supply Forecasts Used to Implement BiOp Actions. See Table 5 for project-specific operations.

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

Water Year 2014 - JANUARY Official Final Water Supply Forecast (1/8/2014)

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COLUMBIA - THE DALLES DAM (TDAO3) Forecasts for Water Year 2014					
Official Forecast					
10 days QPF: Ensemble: 2014-01-07 Issued: 2014-01-08					
Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	Average	10 %	
APR-SEP	77439	89632	97	98043	92704
APR-JUL	65166	75130	94	85035	79855
APR-AUG	72036	84135	96	92706	87532
JAN-JUL	82252	94010	93	108988	101368
5 days QPF Ensemble: 2014-01-07 Issued: 2014-01-08					
APR-SEP	76437	90355	97	101862	92704
APR-JUL	63586	76177	95	86421	79855
APR-AUG	70491	84888	97	94991	87532
JAN-JUL	81356	96105	95	109926	101368
0 days QPF Ensemble: 2014-01-07 Issued: 2014-01-08					
APR-SEP	70370	84388	91	96936	92704
APR-JUL	59004	72331	91	82074	79855
APR-AUG	65928	79468	91	90320	87532
JAN-JUL	75004	88313	87	104676	101368
Move the mouse over the desired "Forecast Period" to display a graph.					

☐ 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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Water Year 2014 - JANUARY Official Final Water Supply Forecast (1/8/2014)



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

Official Forecast

☐ 10 days QPF: Ensemble: 2014-01-07 Issued: 2014-01-08

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	16102	21057	95	25022	22279
APR-JUL	13985	18488	93	22160	19848
APR-AUG	15009	19766	94	23596	21091
JAN-JUL	19832	24808	90	30158	27440

☐ 5 days QPF Ensemble: 2014-01-07 Issued: 2014-01-08

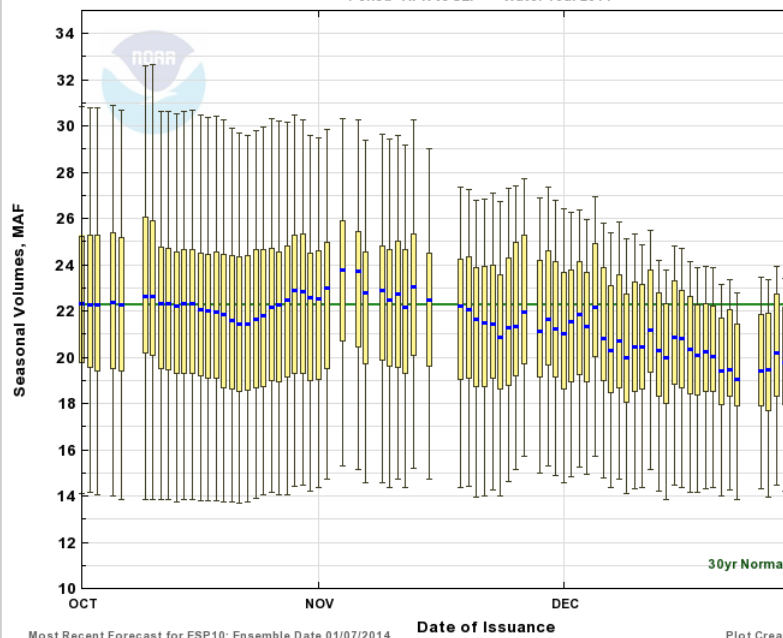
APR-SEP	16052	21871	98	25417	22279
APR-JUL	13928	19204	97	22535	19848
APR-AUG	14951	20643	98	24032	21091
JAN-JUL	19670	25223	92	31110	27440

☐ 0 days QPF Ensemble: 2014-01-07 Issued: 2014-01-08

APR-SEP	14475	20047	90	23856	22279
APR-JUL	12410	17598	89	20934	19848
APR-AUG	13452	18855	89	22431	21091
JAN-JUL	17521	23745	87	29086	27440

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 2014


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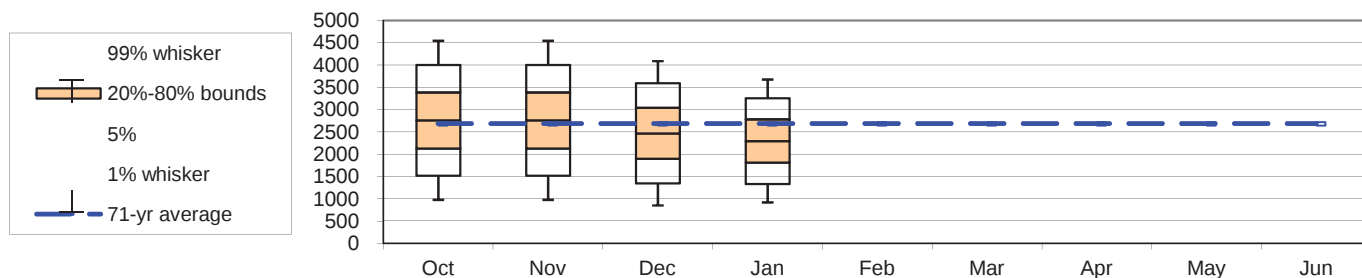
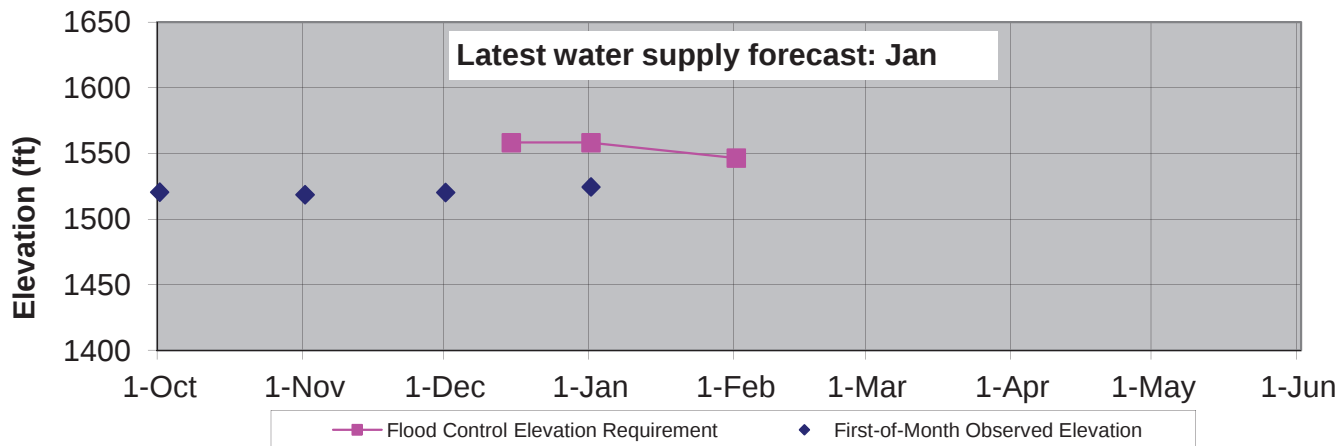
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Dworshak : January Runoff Forecast & Flood Control Calculation**WY 2014**

Runoff Forecast and Flood Control						units	1981-2010 Average	Percent of Average	1929-1999 Average	Percent of Average
Most Probable Runoff Volume	Apr-Jul	2296	KAF			2438	94%	2683	86%	
	May-Jul	1646	KAF			1784	92%	1980	83%	
31-Jan Flood Control Space		869	KAF							
31-Jan Flood Control Elevation		1546.5	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						
First-of-Month Elev	1520.6	1518.7	1520.4	1524.6						
Date >>	15-Dec	31-Dec	31-Jan	28-Feb	31-Mar	15-Apr	30-Apr			
Flood Control Space	--	700	700	869						
Flood Control Elevation	--	1558.2	1558.2	1546.5						

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 : January 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		355.71	106.7
HQSI Cumulative Precip	Oct-Date	9.50	74%	48.12	457.1
Elk Butte SWE	1-Jan	12.80	75%	6.25	80.0
Cool Creek SWE	1-Jan	16.6	76%	9.96	165.3
Hoodoo Basin SWE	1-Jan	13.3	69%	12.22	162.5
Sherwin SWE	1-Jan	2.7	53%	44.69	120.7
Lost Lake SWE	1-Jan	19.8	73%	4.24	84.0
Intercept		1		1119.86	1119.9
1-Jan Forecast (KAF)				Σ	2296.2

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)										
Headquarters, ID	0.40	4.20	4.90	--	--	--	--			
Cumulative HQSI Data	0.40	4.60	9.50	--	--	--	--			
Snow Water Equiv (First of Month values) (in)										
Elk Butte, ID				12.8	--	--	--			
Cool Creek, ID				16.6	--					
Hoodoo Basin, MT				13.3	--	--	--	--	--	
Sherwin, ID				2.7	--	--	--			
Shanghi Summit, ID								--	--	
Lost Lake, ID				19.8	--	--	--	--	--	
Hemlock, ID								--	--	
Crater Meadows Mar						--	--			
Streamflow (End of Month) (kaf)				Jan	Feb	Mar	Apr	May	Jun	Jul
Dworshak Inflow				--	--	--	--	--	--	--

Approval: HEITSTUMAN.JOHN
N.JOSEPH.1159402580

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

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

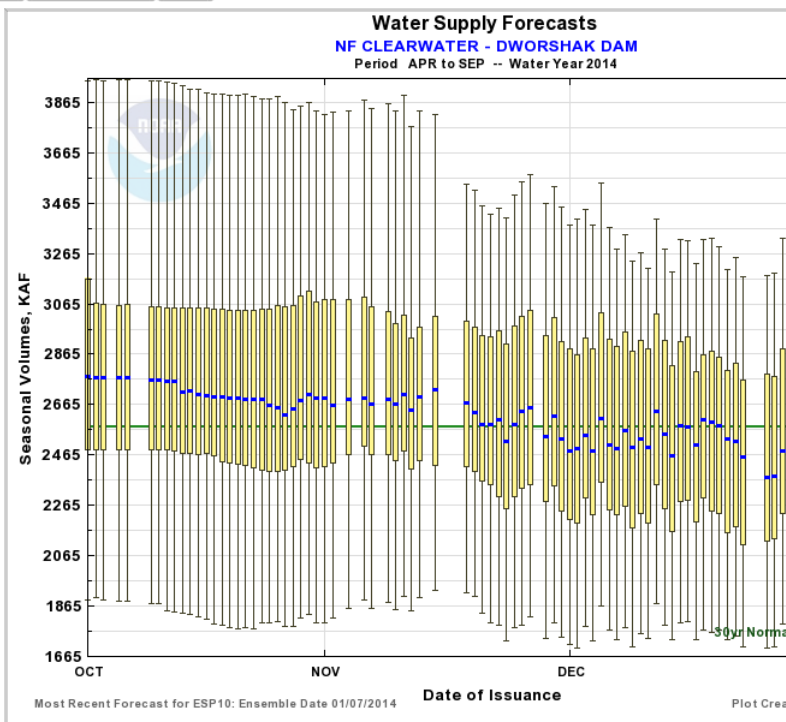
**** The Dworshak Dam official water supply forecast is computed by the Corps Walla Walla District (provided on previous pages). This forecast from NWRFC is provided for informational purposes only. ****



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NF CLEARWATER - DWORSHAK DAM (DWRI1) Forecasts for Water Year 2014					
Official Forecast					
10 days QPF: Ensemble: 2014-01-07 Issued: 2014-01-08					
Hide Forecast	Forecasts Are in KAF				30 Year Average (1981-2010)
Forecast Period	90 %	50 %	% Average	10 %	
APR-SEP	2066	2651	103	3408	2575
APR-JUL	1916	2524	104	3248	2419
JAN-JUL	2796	3379	103	4342	3289
5 days QPF Ensemble: 2014-01-07 Issued: 2014-01-08					
APR-SEP	2113	2706	105	3532	2575
APR-JUL	1965	2575	106	3361	2419
JAN-JUL	2831	3539	108	4551	3289
0 days QPF Ensemble: 2014-01-07 Issued: 2014-01-08					
APR-SEP	1925	2595	101	3419	2575
APR-JUL	1767	2451	101	3210	2419
JAN-JUL	2476	3318	101	4360	3289
Move the mouse over the desired "Forecast Period" to display a graph.					



☐ 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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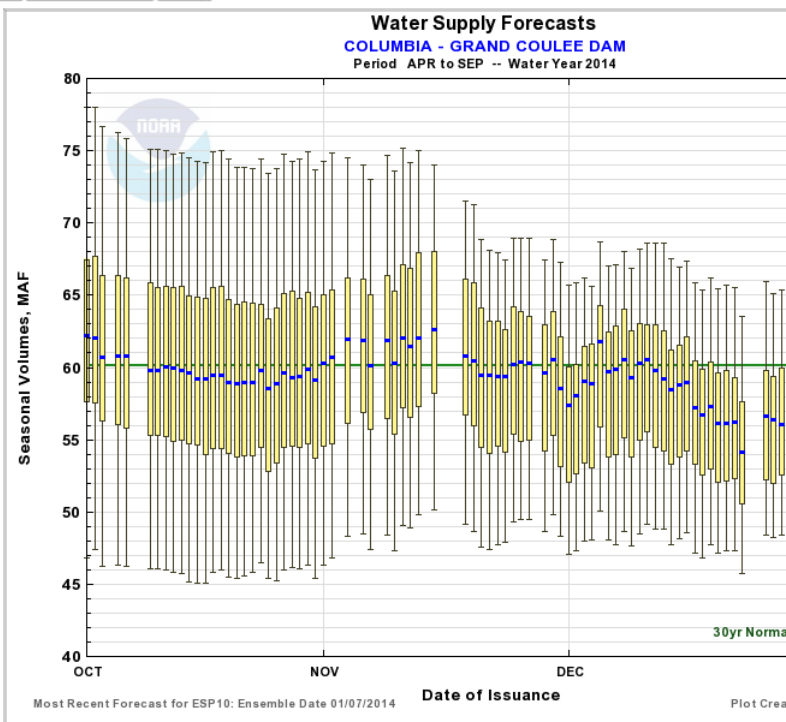
The Grand Coulee Dam water supply forecast is not used for implementation of any BiOp actions. This forecast is provided for informational purposes only. See the current Water Management Plan (Table 4) for more info.

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COLUMBIA - GRAND COULEE DAM (GCDW1)					
Forecasts for Water Year 2014					
Official Forecast					
10 days QPF: Ensemble: 2014-01-07 Issued: 2014-01-08					
Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	52529	58756	98	67656	60110
APR-JUL	43740	48935	96	57062	51015
APR-AUG	49384	55062	97	63425	56763
JAN-JUL	51154	56395	95	65448	59599
5 days QPF Ensemble: 2014-01-07 Issued: 2014-01-08					
APR-SEP	51819	57957	96	68361	60110
APR-JUL	42948	48953	96	57415	51015
APR-AUG	48388	54638	96	63825	56763
JAN-JUL	50475	56875	95	65683	59599
0 days QPF Ensemble: 2014-01-07 Issued: 2014-01-08					
APR-SEP	48058	55645	93	64983	60110
APR-JUL	39919	46808	92	54569	51015
APR-AUG	45150	52376	92	60955	56763
JAN-JUL	46153	53625	90	63136	59599
Move the mouse over the desired "Forecast Period" to display a graph.					



☐ 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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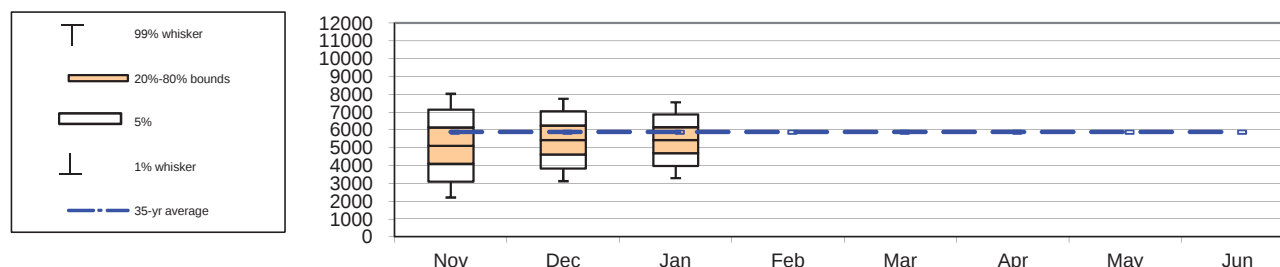
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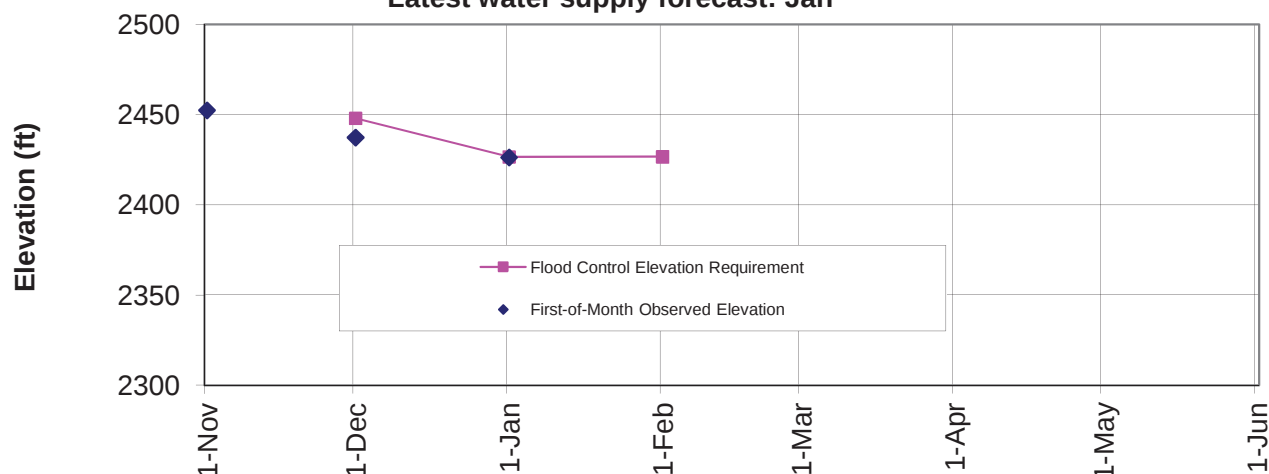
Libby : January Runoff Forecast & Flood Control Calculation**WY 2014**

Runoff Forecast and Flood Control				1981-2010 Average	Percent of Average	1929-2008 Average	Percent of Average	
Most Probable Runoff Volume:	Apr-Aug	5432	KAF	5885	92%	6282	86%	
	Apr-Jul	4931	KAF	5342	92%	5720	86%	
	May-Jul	4450	KAF	4821	92%	5199	86%	
31-Jan Flood Control Space		1400	KAF					
31-Jan Flood Control Elevation		2426.7	ft					
Seasonal Flood Control VARQ Flood Control Implemented								
Forecast Date >>	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Apr-Aug Runoff Forecast	5125	5446	5432					
First-of-Month Elev	2452.5	2437.4	2426.3					
Date >>	30-Nov	31-Dec	31-Jan	28-Feb	15-Mar	31-Mar	15-Apr	30-Apr
Flood Control Space	500	1403	1400					
Flood Control Elevation	2448.0	2426.6	2426.7					

Spread of values around expected forecast

**Libby Flood Control Elevations - 2014**

Latest water supply forecast: Jan

**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.

Libby : January 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	ΣJan:Mar		-4.45		-7.4	33.0
Eureka, MT	ΣOct,Nov,Dec Prcp	inches	2.30	67%	77.3	177.8
Libby 1 NE RS, MT	ΣOct,Nov,Dec Prcp	inches	4.01	66%	60.7	243.4
West Glacier, MT	ΣOct,Nov,Dec Prcp	inches	7.52	84%	31.8	239.2
Fernie, BC	ΣOct,Nov,Dec Prcp	inches	14.41	88%	13.3	191.5
Floe Lake, BC	1-Jan SWE	inches	10.79	77%	9.4	101.4
Sunshine Village, AB	1-Jan SWE	inches	9.29	87%	24.3	226.0
East Creek, BC	1-Jan SWE	inches	13.19	78%	5.8	76.9
Stahl Peak, MT	1-Jan SWE	inches	15.40	95%	22.6	347.7
Gardiner Creek, AB	1-Jan SWE	inches	10.12	112%	21.8	220.6
Three Isle Lake, AB	1-Jan SWE	inches	8.39	91%	28.7	240.5
Lost Creek South, AB	1-Jan SWE	inches	10.75	96%	17.8	191.0
Morrissey Ridge, BC	1-Jan SWE	inches	11.26	97%	24.4	275.2
Hawkins Lake, MT	1-Jan SWE	inches	8.40	78%	36.5	306.2
Intercept			1		2561.5	2561.5
1-Jan Forecast (KAF)					Σ	5431.9

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		
Precipitation Data		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Units
Eureka, MT		0.37	1.16	0.77						inch
Libby 1 NE RS, MT		0.59	2.22	1.20						inch
West Glacier, MT		0.55	4.31	2.66						inch
Fernie, BC		27.50	128.50	210.00						mm
Snow Water Equiv		1-Jan		1-Feb	1-Mar	1-Apr	1-May	1-Jun		Units
Floe Lake, BC			274							mm
Sunshine Village, AB			236							mm
East Creek, BC			335							mm
Stahl Peak, MT			15.4							inch
Gardiner Creek, AB			257							mm
Three Isle Lake, AB			213							mm
Lost Creek South, AB			273							mm
Morrissey Ridge, BC			286							mm
Hawkins Lake, MT			8.4							inch
Streamflow		Jan		Feb	Mar	Apr	May	Jun		Units
Libby Inflow Volume										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						feet

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

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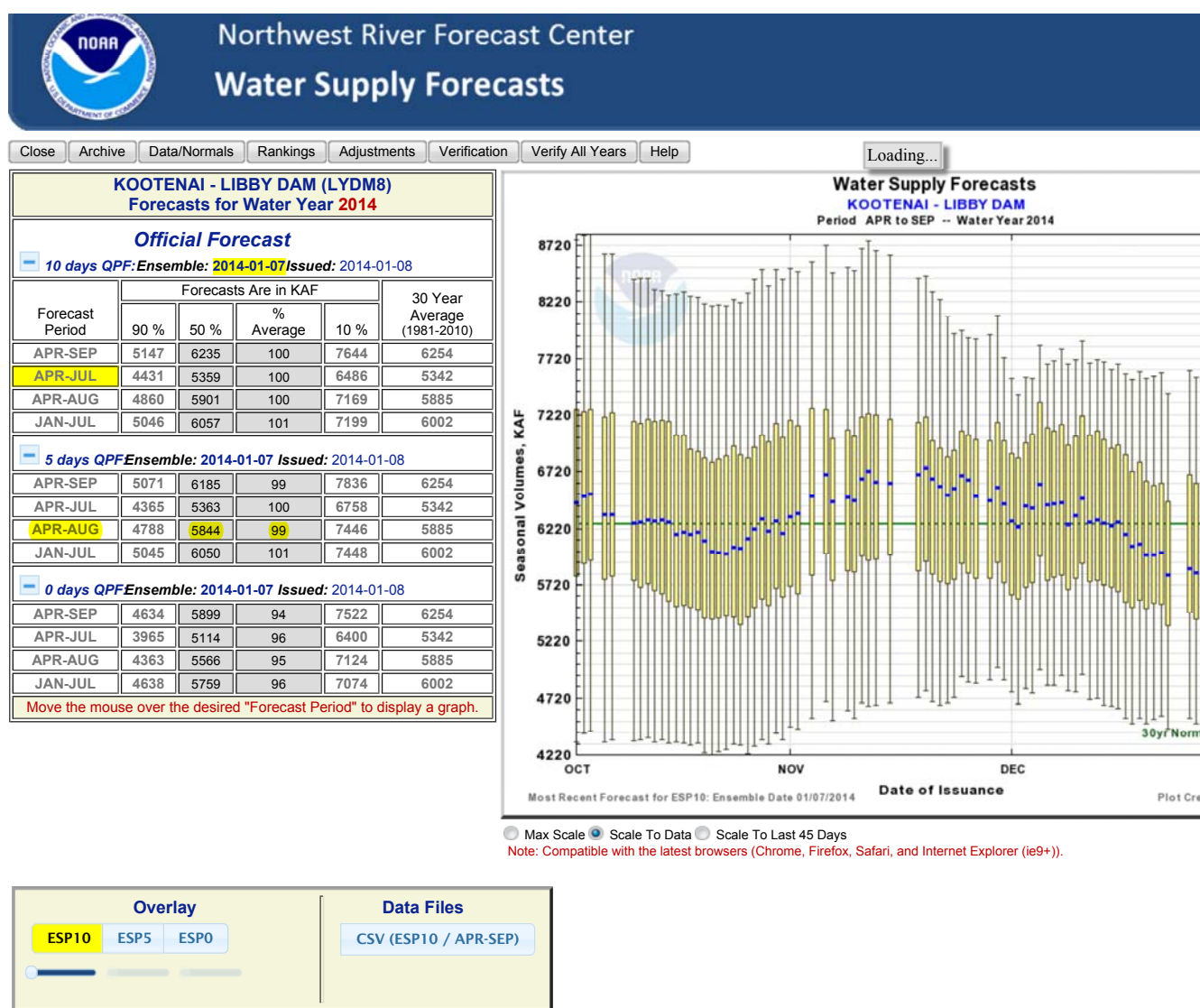
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Joel Fenolio, P.E.
Upper Columbia Senior Water Manager
Seattle District

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



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The Hungry Horse Dam official water supply forecast (WSF) is computed by the Bureau of Reclamation on the 3rd working day of the month from January-June. See the current [Water Management Plan](#) (Table 4) for more info.

The JANUARY final WSF sets the following actions for HGH:

- *Apr-Aug* runoff volume - sets minimum flows at HGH and Columbia Falls;
 - *May-Sep* runoff volume - sets VARQ flood control targets.
-

1/8/14: JANUARY final forecast of runoff volumes (kaf) for Hungry Horse inflow:

- Jan – July: 2,216 kaf (106%)
- April – Aug: 2,045 kaf (106%)
- May – Sep: 1,787 kaf (106%)

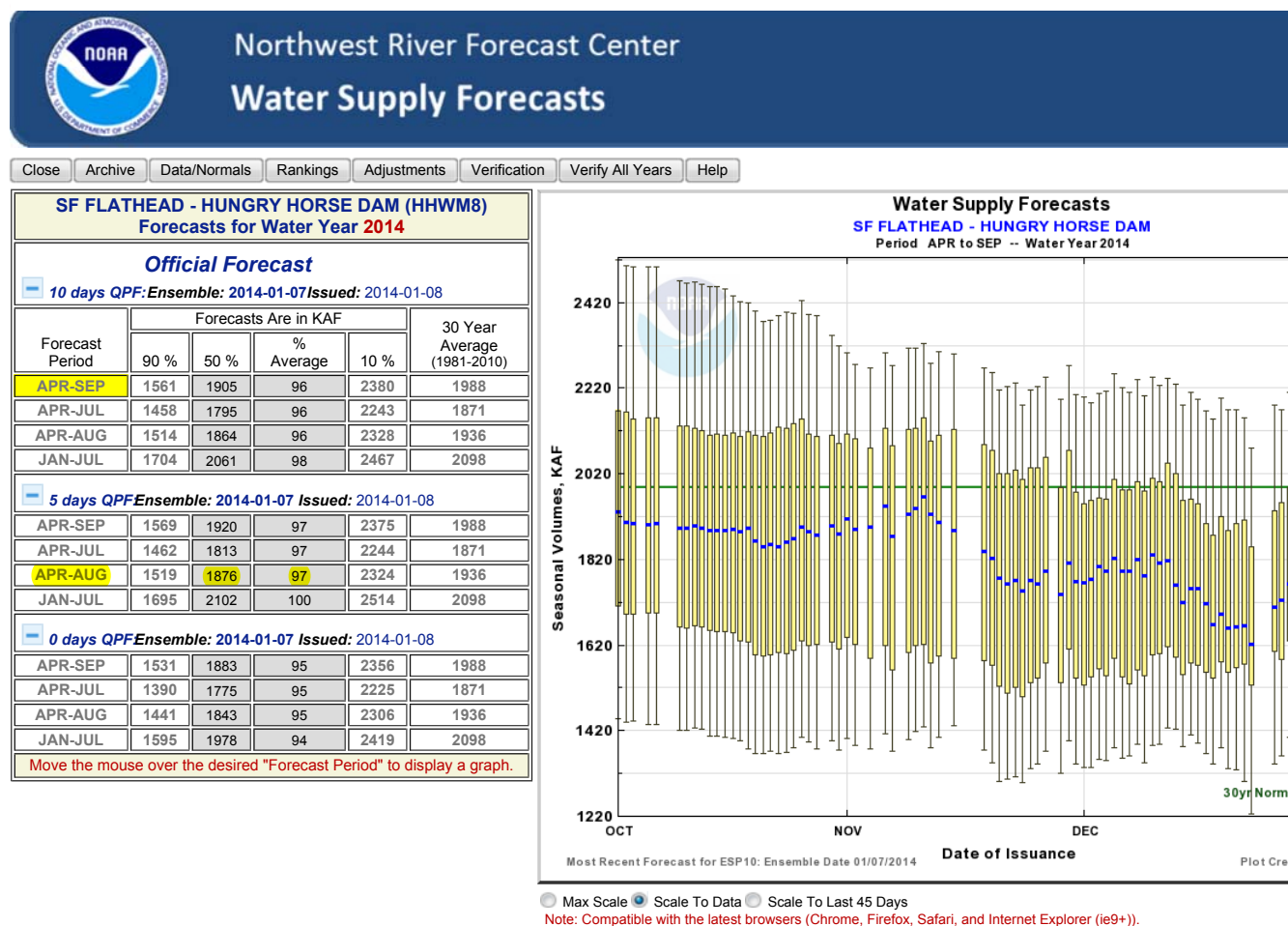
Minimum flows for Columbia Falls and below Hungry Horse are:

- Columbia Falls: 3,500 cfs
- Hungry Horse: 900 cfs

--

John Roache, Civil Engineer
River and Reservoir Operations
U.S. Bureau of Reclamation
PN Regional Office, Boise, ID

**** The Hungry Horse Dam official water supply forecast is computed by the Bureau of Reclamation (provided on previous page). This forecast from NWRFC is provided for informational purposes only. ****



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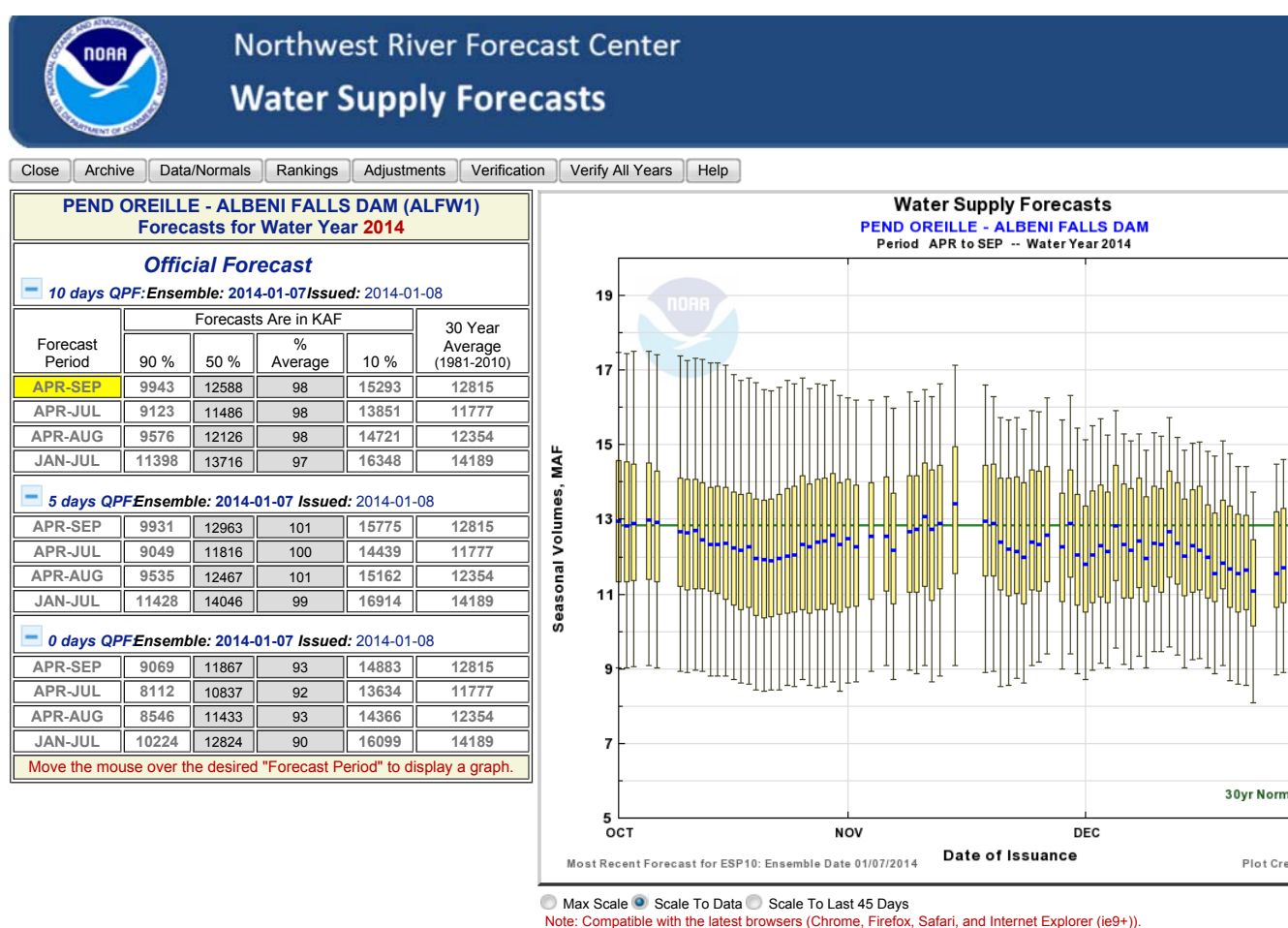
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The Albeni Falls Dam water supply forecast is not used for the implementation of any BiOp actions. This forecast is provided for informational purposes only. See the current Water Management Plan (Table 4) for more info.



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