

The official MAY final water supply forecast sets BiOp actions at all projects in the table below except Lower Granite.

Forecasts for GCL and ALF are also provided for informational purposes.

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 - Official MAY Final Water Supply Forecast



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COLUMBIA - THE DALLES DAM (TDAO3) Forecasts for Water Year 2014

Official Forecast

☐ 10 days QPF: Ensemble: 2014-05-07 Issued: 2014-05-07

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	95837	102614	111	110517	92704
APR-JUL	82466	87759	110	95440	79855
APR-AUG	90704	96311	110	104261	87532
JAN-JUL	103794	109087	108	116768	101368

☐ 5 days QPF: Ensemble: 2014-05-07 Issued: 2014-05-07

APR-SEP	96517	103660	112	110607	92704
APR-JUL	82894	88229	110	96079	79855
APR-AUG	91282	96741	111	104724	87532
JAN-JUL	104222	109557	108	117407	101368

☐ 0 days QPF: Ensemble: 2014-05-07 Issued: 2014-05-07

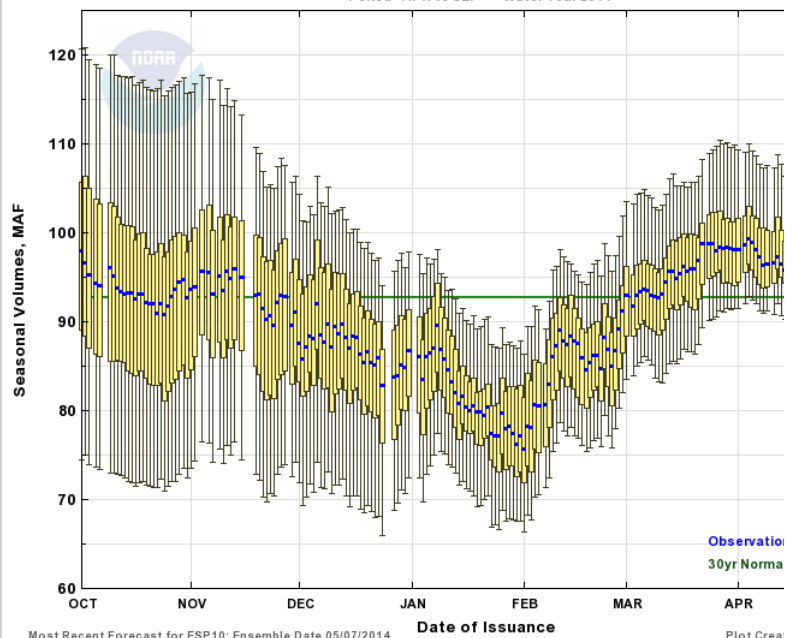
APR-SEP	96602	102684	111	109412	92704
APR-JUL	82680	87972	110	95667	79855
APR-AUG	91153	96861	111	103867	87532
JAN-JUL	104008	109300	108	116995	101368

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 2014


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

Overlay

ESP10

ESP5

ESP0

Data Files

CSV (ESP10 / APR-SEP)


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Water Year 2014 - Official MAY Final Water Supply Forecast



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

Official Forecast

10 days QPF: Ensemble: 2014-05-07 Issued: 2014-05-07

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	22660	23702	106	25915	22279
APR-JUL	20897	21857	110	23802	19848
APR-AUG	21577	22620	107	24700	21091
JAN-JUL	28124	29084	106	31029	27440

5 days QPF Ensemble: 2014-05-07 Issued: 2014-05-07

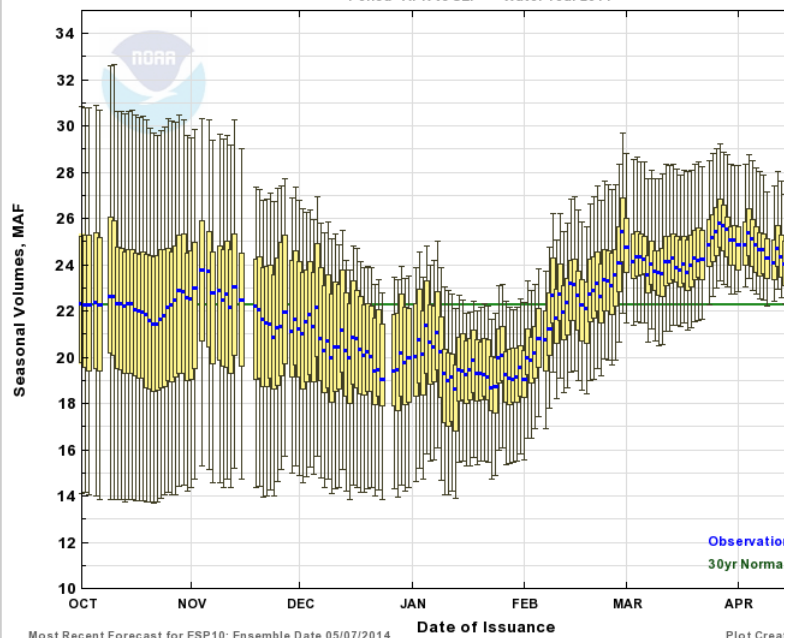
APR-SEP	22796	24117	108	25880	22279
APR-JUL	21040	22143	112	23945	19848
APR-AUG	21746	22869	108	24773	21091
JAN-JUL	28267	29370	107	31172	27440

0 days QPF Ensemble: 2014-05-07 Issued: 2014-05-07

APR-SEP	22551	23863	107	25794	22279
APR-JUL	20668	21947	111	23932	19848
APR-AUG	21404	22714	108	24701	21091
JAN-JUL	27895	29174	106	31159	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



Max Scale Scale To Data Scale To Last 45 Days

Overlay

ESP10

ESP5

ESPO

Data Files

CSV (ESP10 / APR-SEP)

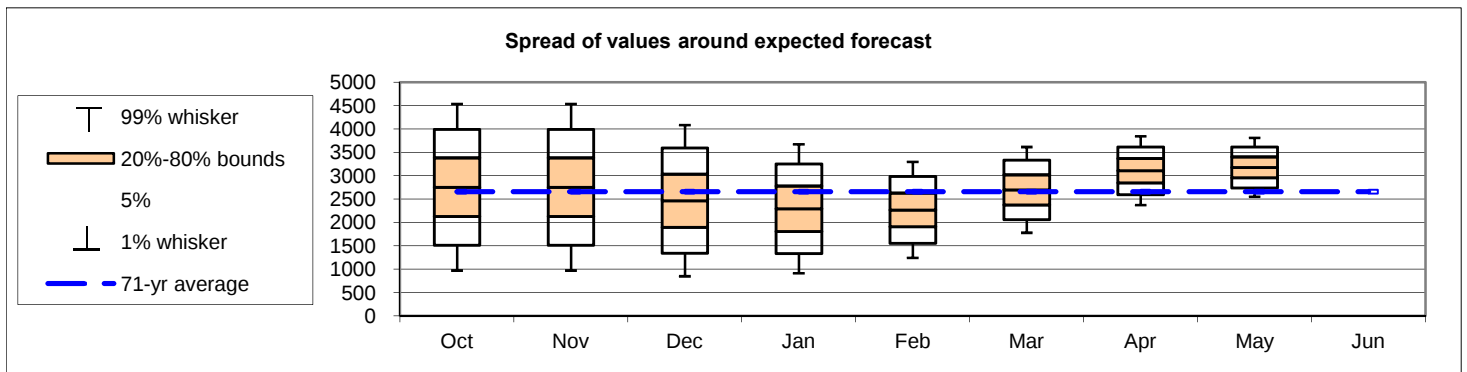
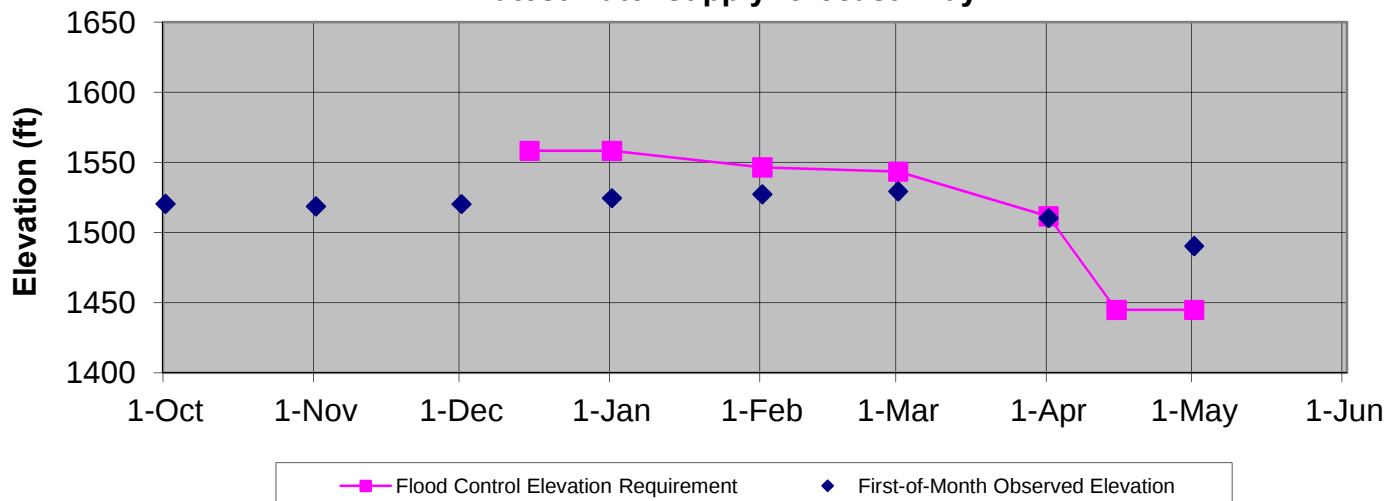


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Dworshak : May Runoff Forecast & Flood Control Calculation**WY 2014**

Runoff Forecast and Flood Control				1981-2010 Average	Percent of 30yr Average	1929-2010 Average	Percent of Average		
Most Probable Runoff Volume	Apr-Jul	3183	KAF	2438	131%	2663	120%		
	May-Jul	2454	KAF	1784	138%	1953	126%		
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	3111	3183	
First-of-Month Elev	1520.6	1518.7	1520.4	1524.6	1527.3	1529.5	1510.4	1490.5	
Date >>	15-Dec	31-Dec	31-Jan	28-Feb	31-Mar	15-Apr	30-Apr		
Flood Control Space	--	700	700	869	912	1336	2016	2016	
Flood Control Elevation	--	1558.2	1558.2	1546.5	1543.5	1511.6	1445.0	1445.0	

**Dworshak Flood Control Elevations - 2014****Latest water supply forecast: May****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. 30-Apr flood control elevation is based on the 95% confidence Flood Control Refill Curve as computed on 1 April.

Dworshak : May 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		122.04	36.6
Hoodoo Basin SWE	1-Jan	57.4	126%	11.71	672.2
Shanghi Summit SWE	1-Jan	20.8	122%	14.41	299.7
Lost Lake SWE	1-Jan	65.2	109%	9.67	630.5
Hemlock SWE	1-Jan	63.1	137%	11.58	730.7
Intercept		1		84.24	84.2

1-May Forecast (KAF)

Σ 2453.9

Data Station	Sept	Nov	Dec	1-Jan	1-Feb	1-Mar	1-Apr	1-May	1-Jun
Climate (Stdzd SOI)									
September SOI	0.30								
Precipitation (in)									
Oct									
Headquarters, ID	0.40	4.20	4.90	5.00	5.80	8.00	2.20		
Cumulative HQSI Data	0.40	4.60	9.50	14.50	20.30	28.30	30.50		
Snow Water Equiv (First of Month values) (in)									
Elk Butte, ID				12.8	21.4	32.2	42.9		
Cool Creek, ID				16.6	28.6				
Hoodoo Basin, MT				13.3	22.2	37.3	52.3	57.4	--
Sherwin, ID				2.7	6.0	9.3	3.4		
Shanghi Summit, ID								20.8	--
Lost Lake, ID				19.8	30.0	44.9	59.6	65.2	--
Hemlock, ID								63.1	--
Crater Meadows Mar						46.9	65.1		
Streamflow (End of Month) (kaf)				Jan	Feb	Mar	Apr	May	Jun
Dworshak Inflow				132	143	678	729	--	--

Approval:

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

Peter Brooks, P.E., D. WRE
Ch., Hydrologic Engineering and Power Brar
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: 2014-05-07 Issued: 2014-05-07

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	3344	3525	137	3862	2575
APR-JUL	3201	3352	139	3658	2419
JAN-JUL	4152	4303	131	4609	3289

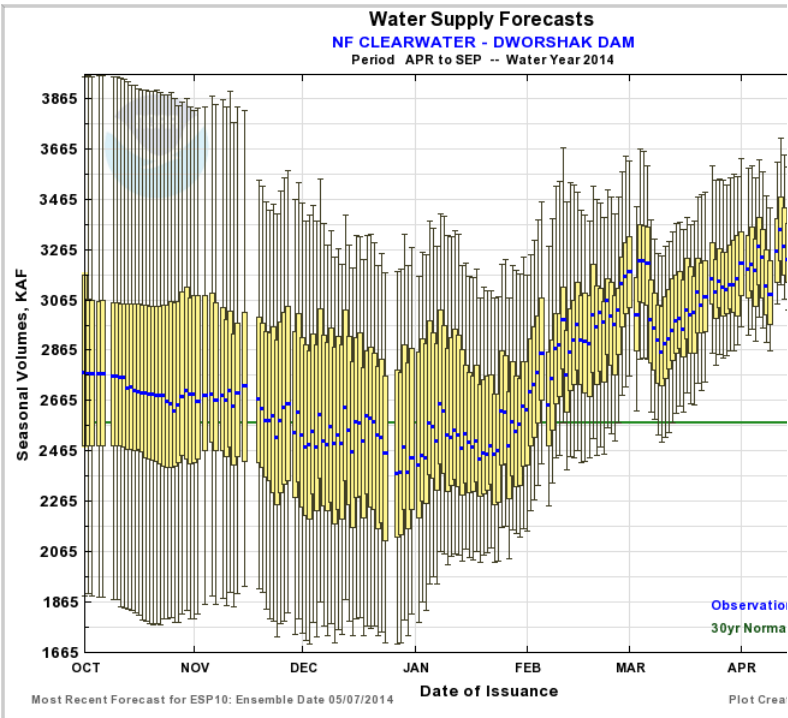
5 days QPF Ensemble: 2014-05-07 Issued: 2014-05-07

APR-SEP	3348	3570	139	3928	2575
APR-JUL	3194	3369	139	3743	2419
JAN-JUL	4145	4320	131	4694	3289

0 days QPF Ensemble: 2014-05-07 Issued: 2014-05-07

APR-SEP	3310	3506	136	3885	2575
APR-JUL	3143	3328	138	3707	2419
JAN-JUL	4094	4279	130	4658	3289

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



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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.



Northwest River Forecast Center Water Supply Forecasts

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COLUMBIA - GRAND COULEE DAM (GCDW1) Forecasts for Water Year 2014

Official Forecast

10 days QPF: Ensemble: 2014-05-07 Issued: 2014-05-07

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	63320	67765	113	74188	60110
APR-JUL	53946	57239	112	62988	51015
APR-AUG	59995	63930	113	69651	56763
JAN-JUL	61879	65172	109	70921	59599

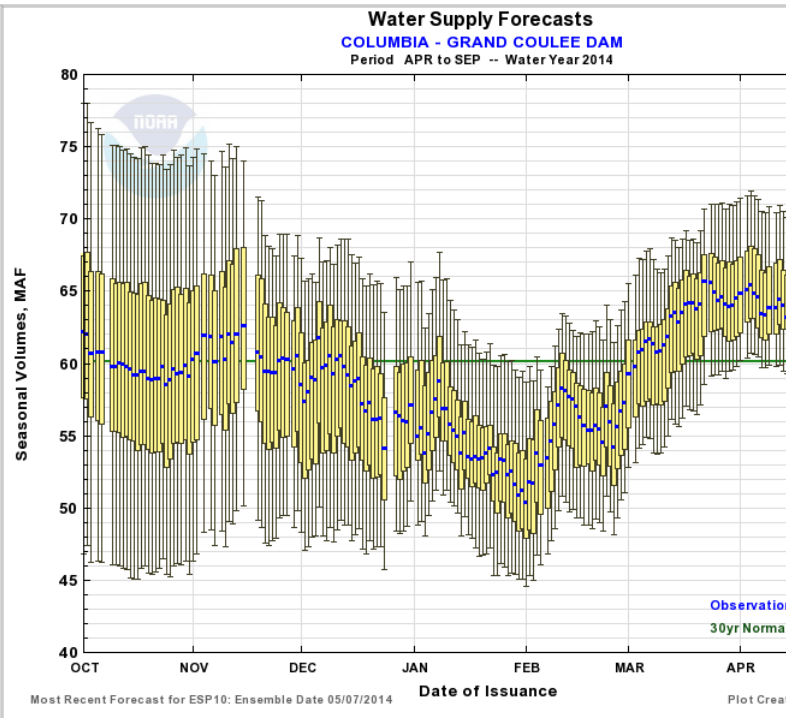
5 days QPF Ensemble: 2014-05-07 Issued: 2014-05-07

APR-SEP	63477	68544	114	74180	60110
APR-JUL	53937	57598	113	63344	51015
APR-AUG	59937	64683	114	69851	56763
JAN-JUL	61870	65531	110	71277	59599

0 days QPF Ensemble: 2014-05-07 Issued: 2014-05-07

APR-SEP	63633	68186	113	73313	60110
APR-JUL	54014	57543	113	62739	51015
APR-AUG	60169	64197	113	69060	56763
JAN-JUL	61947	65476	110	70672	59599

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

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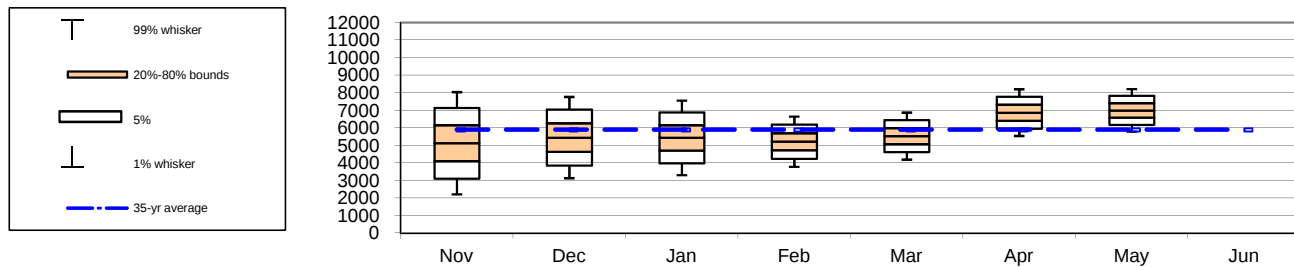
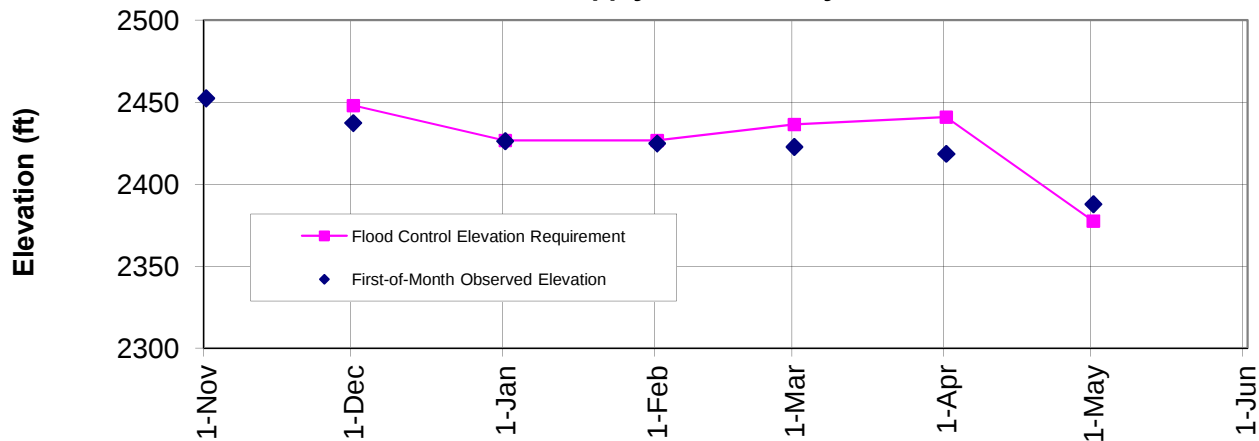
Libby: May Runoff Forecast & Flood Control Calculation**WY 2014****Runoff Forecast and Flood Control**

Most Probable Runoff Volume:	Apr-Aug	6996	KAF
	Apr-Jul	6334	KAF
	May-Jul	5874	KAF

1981-2010 Average	Percent of Average	1929-2008 Average	Percent of Average
5885	119%	6282	111%
5342	119%	5720	111%
4821	122%	5199	113%

Seasonal Flood Control**VARQ Flood Control Implemented**

Forecast Date >>	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Apr-Aug Runoff Forecast	5125	5446	5432	5213	5528	6868	6996	
First-of-Month Elev	2452.5	2437.4	2426.3	2424.9	2422.8	2418.6	2387.9	
Date >>	30-Nov	31-Dec	31-Jan	28-Feb	31-Mar	30-Apr		
Flood Control Space	500	1400	1400	1000	809	3051		
Flood Control Elevation	2448.0	2426.7	2426.7	2436.4	2440.9	2377.6		

Spread of values around expected forecast**Libby Flood Control Elevations - 2014****Latest water supply forecast: May****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: May 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		-3.0	13.4
PNA	Σ Oct:Jan		-1.92		-87.2	167.4
West Glacier, MT	Σ Jan:Apr Prcp	inches	14.08	141%	83.4	1174.5
Fernie, BC	Σ Jan:Apr Prcp	inches	13.57	83%	39.2	531.5
Sunshine Village, AB	1-May SWE	inches	25.35	106%	57.8	1465.0
East Creek, BC	1-May SWE	inches	45.94	129%	27.7	1270.4
Stahl Peak, MT	1-May SWE	inches	44.20	121%	30.2	1332.6
Gardiner Creek, AB	1-May SWE	inches	31.89	132%	17.6	561.8
Intercept			1		18.5	18.5
1-May May-Aug Forecast (KAF)						Σ 6535.1
Libby Inflow	April	KAF	461	88%		
1-May Apr-Aug Forecast (KAF)						6995.7

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	3.37	2.05	6.49	2.17		inch
Fernie, BC	27.50	128.50	210.00	91.50	64.00	161.81	27.47		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	593	644		mm
East Creek, BC			335	471	581	910	1167		mm
Stahl Peak, MT			15	21	26	40	44		inch
Gardiner Creek, AB			257	352	488	753	810		mm
Three Isle Lake, AB			213	279	352	522			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	137.7	255.5	460.6			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	2418.6	2387.9		feet

for:

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

Amy Reese, P.E.
 Branch Chief, Hydraulics and Hydrology
 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: 2014-05-07 Issued: 2014-05-07

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	6752	7386	118	8547	6254
APR-JUL	5715	6265	117	7334	5342
APR-AUG	6350	6992	119	8164	5885
JAN-JUL	6298	6848	114	7917	6002

5 days QPF Ensemble: 2014-05-07 Issued: 2014-05-07

APR-SEP	6778	7505	120	8693	6254
APR-JUL	5713	6391	120	7482	5342
APR-AUG	6378	7108	121	8286	5885
JAN-JUL	6296	6974	116	8065	6002

0 days QPF Ensemble: 2014-05-07 Issued: 2014-05-07

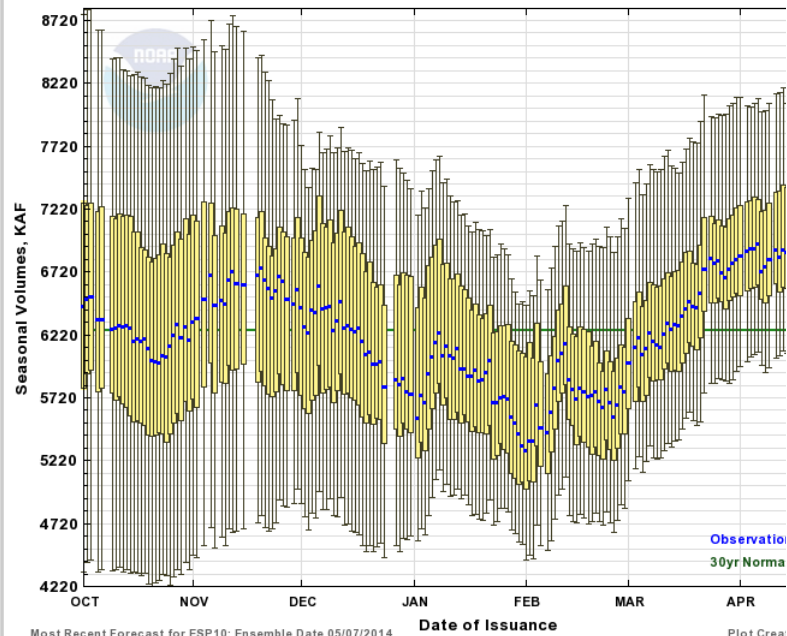
APR-SEP	6685	7454	119	8572	6254
APR-JUL	5705	6370	119	7422	5342
APR-AUG	6317	7045	120	8177	5885
JAN-JUL	6288	6953	116	8005	6002

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

Water Supply Forecasts

KOOTENAI - LIBBY DAM

Period APR to SEP -- Water Year 2014



Max Scale Scale To Data Scale To Last 45 Days

Overlay

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May 6, 2014

Hungry Horse Dam

Here are the volumes for the May final forecast for Hungry Horse inflow:

May - Jul: 2,234 kaf (142%)

Jan - Jul: 2,510 kaf (120%)

Apr - Aug: 2,463 kaf (127%)

May - Sep: 2,404 kaf (142%)

The minimum flows downstream of Hungry Horse are as follows:

Columbia Falls: 3,500 cfs

Hungry Horse: 900 cfs

Mary Mellema

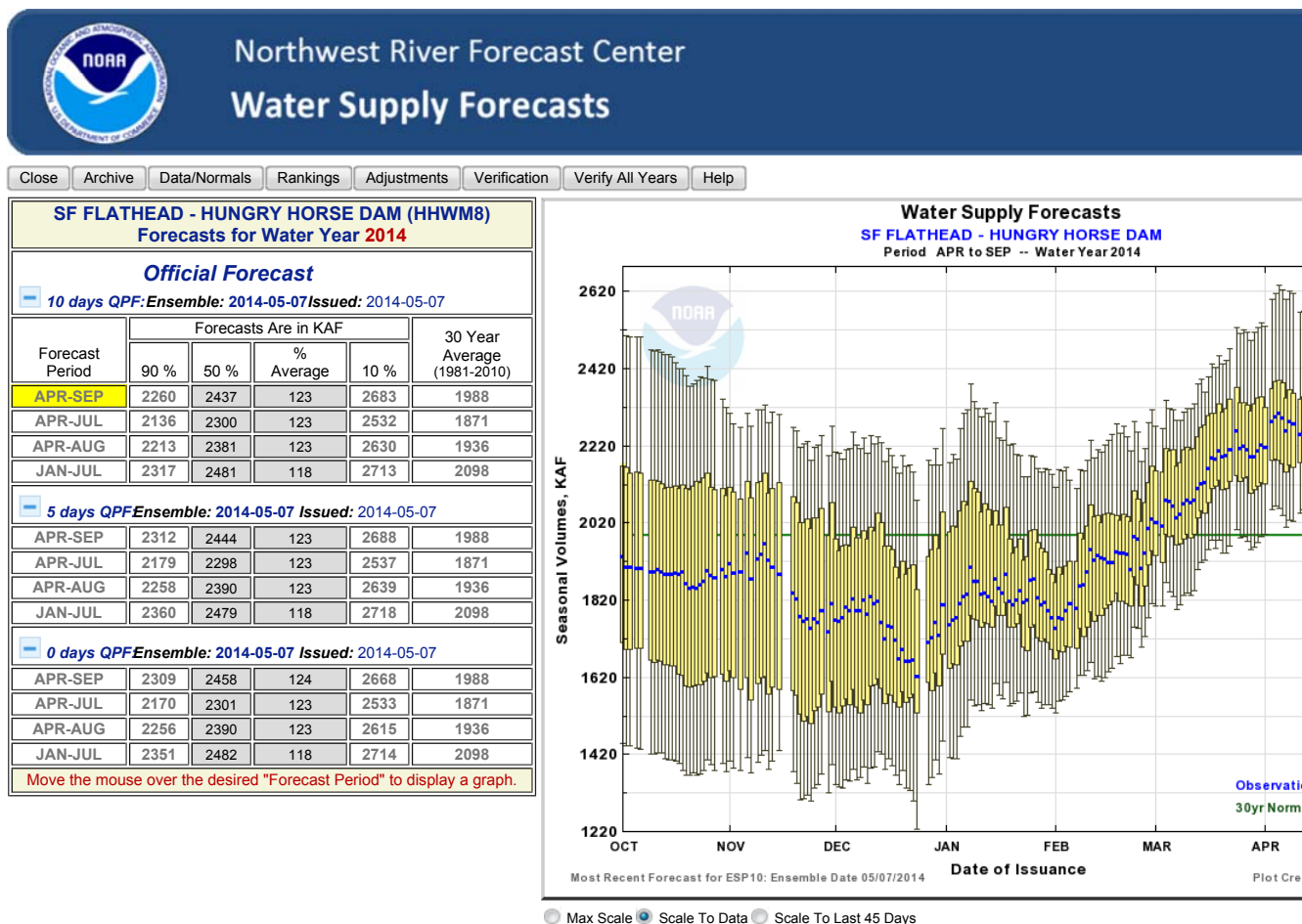
River and Reservoir Operations

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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Overlay

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ESP5
ESP0

Data Files

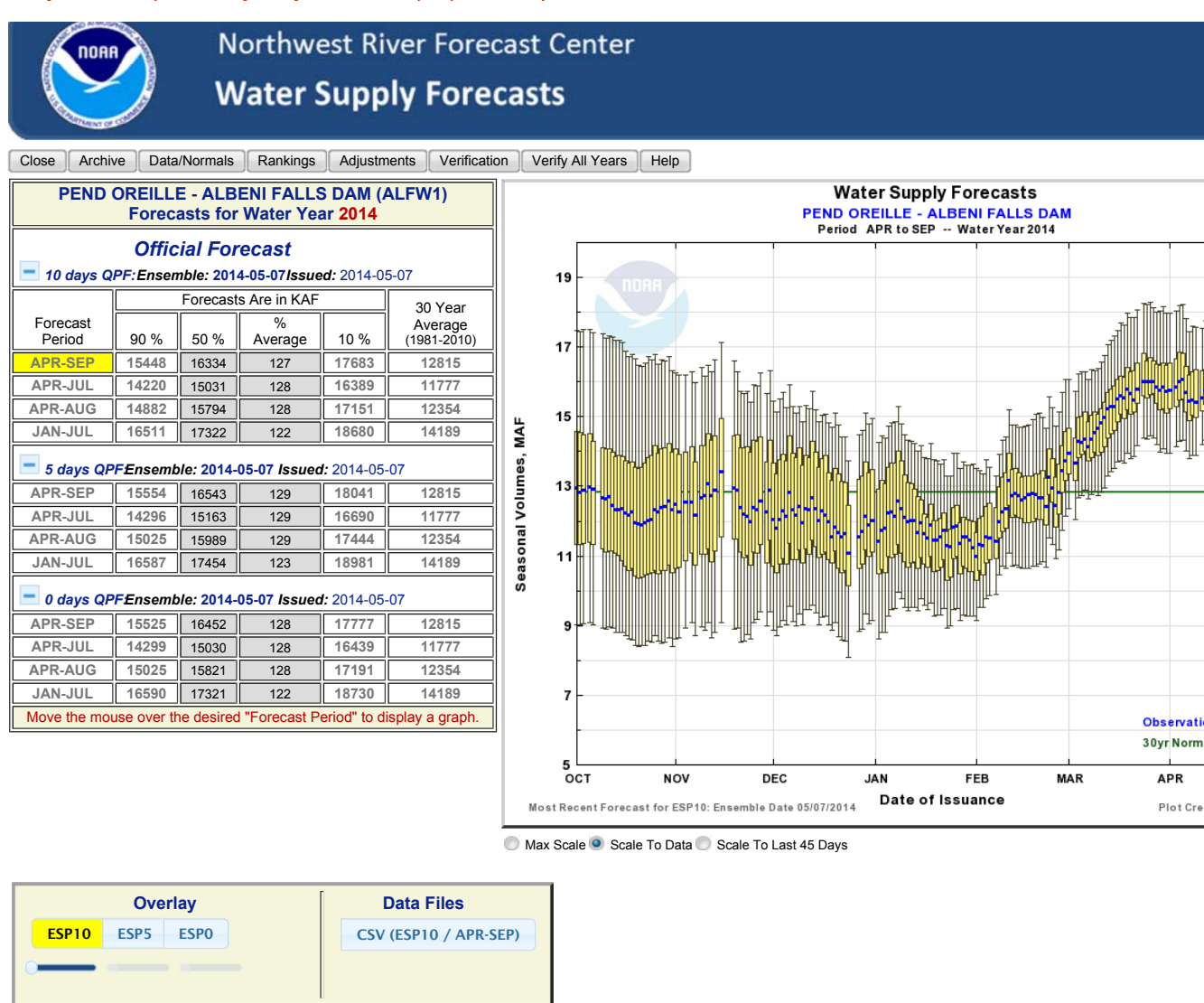
CSV (ESP10 / APR-SEP)



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