

The Official Water Supply Forecasts for January through July are computed on the 3rd workday of the month. Flood Risk Management (FRM) requirements are computed at standard intervals and posted at: <https://www.nwd.usace.army.mil/CRWM/Forecasts/>

The APRIL Water Supply Forecast sets BiOp actions as highlighted in the table below.

Forecast Point	Forecast period	Forecast	BiOp Actions to be Determined
Hungry Horse	April – August Provided by Reclamation	January, February, March	Sets min. flows at Hungry Horse and Columbia Falls
	May – September Provided by Reclamation	January, February, March	Sets VARQ FRM targets
		April	Sets VARQ FRM targets Sets VARQ refill flows
		May	Sets VARQ refill flows Sets end of September draft target
		June	Sets VARQ refill flows
The Dalles	April – September Provided by NWRFC	March	Sets CRWMP adjustments at Grand Coulee
	April – August Provided by NWRFC	April	Sets spring flow objective at McNary
		July	Sets end of August draft limit at Grand Coulee
Lower Granite	April – July Provided by NWRFC	April	Sets spring flow objective at Lower Granite
		June	Sets summer flow objective at Lower Granite
Libby	April – August Provided by Corps Seattle District	December	Sets end of December variable draft target
		January, February, March	Sets VARQ FRM targets
		April	Sets VARQ FRM targets and VARQ refill flows
		May	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 Sets end of September draft limit.
		June	VARQ refill flows
Dworshak	April – July Provided by Corps Walla Walla District	January to March	Manage for reservoir FRM and VDL
		April to June	Manage for reservoir FRM and refill

Source: 2021 Water Management Plan, page 15:
<http://pweb.crohms.org/tmt/documents/wmp/2021/>

April 2, 2021

Hungry Horse Dam – Official Water Supply Forecast APRIL 2021

The volumes for the April 2021 final forecast for Hungry Horse Inflows are:

- Apr-Jul: 1,780 kaf (95%)
- Apr-Aug: 1,844 kaf (96%)
- May-Sep: 1,626 kaf (96%)
- May-Jul: 1,510 kaf (96%)

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

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

With the new BiOps, the Hungry Horse May-Sep volume forecast for May 1 sets the summer draft target and not the The Dalles forecast. For this year the end of September target will be 3,550 ft or 10 feet from full.

Joel Fenolio, P.E.

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Northwest River Forecast Center

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COLUMBIA - THE DALLES DAM (TDAO3)

Forecasts for Water Year 2021

Official Water Supply

ESP with 10 Days QPF Ensemble: 2021-04-05 Issued: 2021-04-05

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	78728	83826	90	94757	92704
APR-JUL	65778	71075	89	80817	79855
APR-AUG	73084	78733	90	89111	87532
JAN-SEP	94912	100011	88	110941	114216
JAN-JUL	81963	87260	86	97002	101368
OCT-SEP	110083	115181	88	126112	130518

Experimental Water Supply

HEFS with 15 days EQPF Ensemble: 2021-04-05 Issued: 2021-04-05

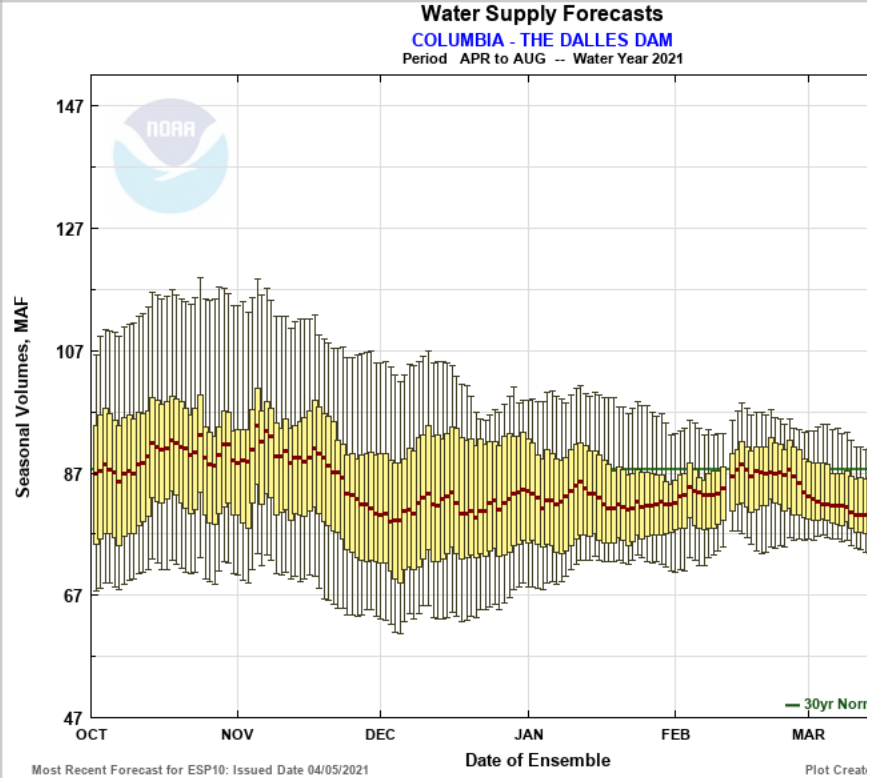
APR-SEP	78940	85104	92	94928	92704
APR-JUL	66965	73077	92	81404	79855
APR-AUG	74123	79946	91	89534	87532
JAN-SEP	95125	101289	89	111113	114216
JAN-JUL	83150	89262	88	97589	101368
OCT-SEP	110295	116459	89	126283	130518

Reference

ESP with 0 Days QPF Ensemble: 2021-04-05 Issued: 2021-04-05

APR-SEP	80856	88169	95	95662	92704
APR-JUL	69634	76147	95	82099	79855
APR-AUG	76129	83014	95	90508	87532
JAN-SEP	97041	104354	91	111847	114216
JAN-JUL	85819	92332	91	98284	101368
OCT-SEP	112211	119524	92	127017	130518

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



☐ Max Scale
 ☒ Scale To Data
 ☐ Scale To Last 45 Days
 ☐ Show Min/Max Ensemble Volume
 ☐ Show Tooltips He

Overlay

ESP10

HEFS

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Data Files

CSV (ESP10 / APR-AUG)

Forecast Ensemble



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SNAKE - LOWER GRANITE DAM (LGDW1) Forecasts for Water Year 2021

Official Water Supply

ESP with 10 Days QPF Ensemble: 2021-04-05 Issued: 2021-04-05

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	15466	17141	77	20432	22279
APR-JUL	13197	14811	75	17823	19848
APR-AUG	14349	15995	76	19131	21091
JAN-SEP	20710	22385	75	25676	29872
JAN-JUL	18440	20055	73	23067	27440
OCT-SEP	24808	26482	76	29773	34667

Experimental Water Supply

HEFS with 15 days EQPF Ensemble: 2021-04-05 Issued: 2021-04-05

APR-SEP	15938	17372	78	20366	22279
APR-JUL	13794	15030	76	17953	19848
APR-AUG	14910	16174	77	19157	21091
JAN-SEP	21182	22616	76	25610	29872
JAN-JUL	19038	20274	74	23197	27440
OCT-SEP	25280	26713	77	29708	34667

Reference

ESP with 0 Days QPF Ensemble: 2021-04-05 Issued: 2021-04-05

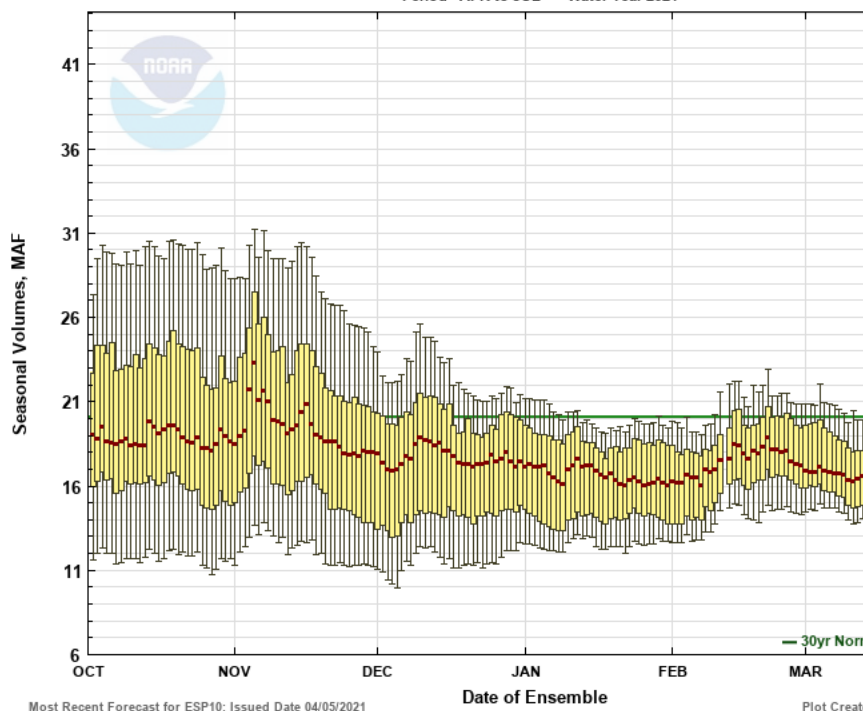
APR-SEP	16483	18179	82	21667	22279
APR-JUL	14392	15943	80	19137	19848
APR-AUG	15459	17063	81	20409	21091
JAN-SEP	21726	23423	78	26911	29872
JAN-JUL	19636	21187	77	24381	27440
OCT-SEP	25824	27520	79	31008	34667

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

Water Supply Forecasts

SNAKE - LOWER GRANITE DAM

Period APR to JUL -- Water Year 2021



☐ Max Scale ☒ Scale To Data ☐ Scale To Last 45 Days ☐ Show Min/Max Ensemble Volume ☐ Show Tooltips He

Overlay

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Libby : April Runoff Forecast & Flood Risk Management Calculation

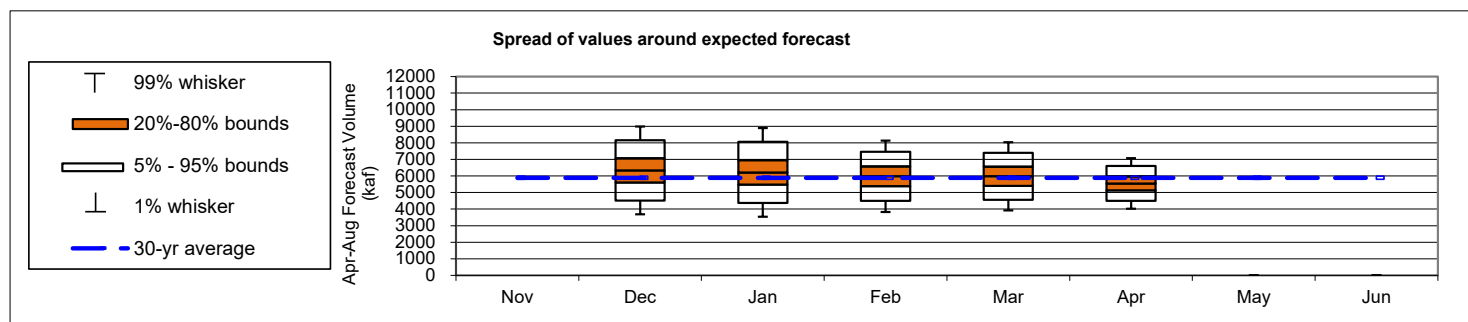
WY 2021

Runoff Forecast	April	1981-2010 Average	1981 - 2010 Percent of Average	1929-2008 Average	1929 - 2008 Percent of Average
Most Probable Runoff Volume: Apr-Aug (kaf)	5549	5885	94%	6282	88%
Most Probable Runoff Volume: Apr-Jul (kaf)	5037	5342	94%	5720	88%
Most Probable Runoff Volume: May-Jul (kaf)	4545	4821	94%	5199	87%

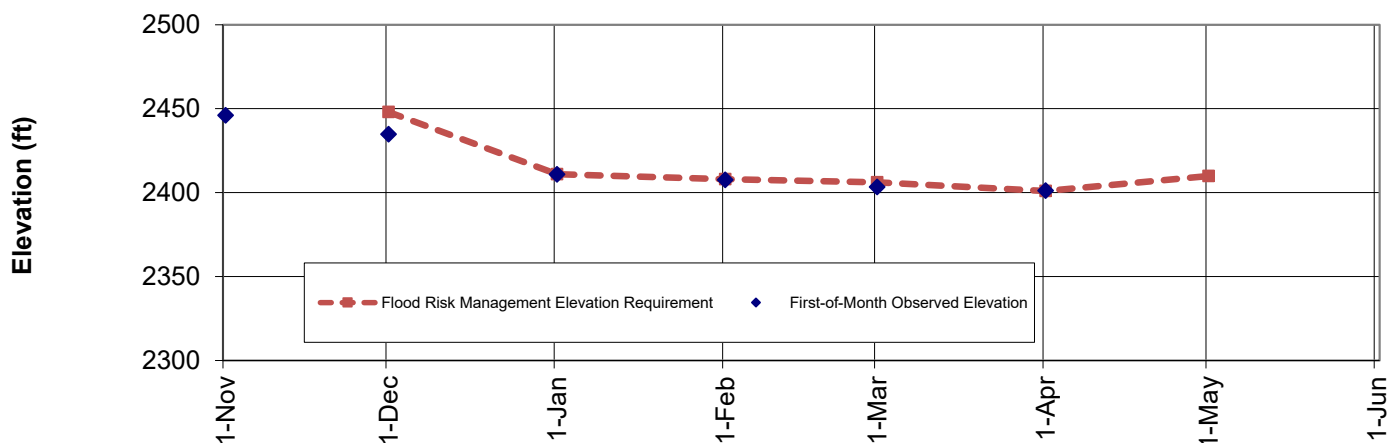
Flood Risk Management	April
30-April Flood Risk Management Space (kaf)	2039
30-April Flood Risk Management Elevation (ft)	2409.9

Forecast/Reservoir Data	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Apr-Aug Runoff Forecast (kaf)		6336	6215	5979	5980	5549		
First-of-Month Elev (ft)	2446.1	2434.8	2410.9	2407.6	2403.4	2401.2		

Seasonal FRM Requirements	30-Nov	31-Dec	31-Jan	28-Feb	31-Mar	30-Apr
Flood Risk Management Space (kaf)	500	2000	2105	2173	2349	2039
Flood Risk Management Elevation (ft)	2448.0	2411.0	2408.1	2406.2	2401.0	2409.9



Libby Flood Risk Management Elevations April- WY 2021



Notes:

- The given forecast is the official Corps of Engineers forecast for Libby. If you have any questions please contact David Bogema (615) 736-5631, Justin Lawrence (206) 764-3699, Logan Osgood-Zimmerman (206) 764-6928, or Kevin Shaffer (206) 764-3660.
- 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.
- Cranbrook A gage data contained some missing values in the month of March (March 25, 28, 29, 31). Nearby Cranbrook Airport Auto gage data was used to fill in missing values for these dates.

Libby : April Runoff Forecast & Flood Risk Management Calculation

Apr-Aug Runoff Forecast Calculation:

Variable	Month(s)	Units	Observed Value A	Percent of Average	Regression Coefficient	Marginal Runoff (kaf) =A*B
SOI	ΣJun:Jul					
Eureka RS, MT	ΣOct:Mar Prcp	inches	4.50	77%	68.5	308.3
West Glacier, MT	ΣOct:Mar Prcp	inches	17.18	104%	29.5	506.3
Cranbrook A, BC	ΣOct:Mar Prcp	millimeters	114.30	72%	3.0	341.8
Fernie, BC	ΣOct:Mar Prcp	millimeters	621.99	92%	0.7	441.6
Hawkins Lake, MT	1-Apr SWE	inches	20.70	83%	22.4	464.3
Stahl Peak, MT	1-Apr SWE	inches	27.80	79%	19.7	547.7
East Creek, BC	1-Apr SWE	millimeters	991.00	115%	0.7	723.4
Moyie Mountain, BC	1-Apr SWE	millimeters	354.00	83%	1.2	428.3
Sunshine Village, AB	1-Apr SWE	millimeters	608.58	108%	1.4	870.3
Akamina Pass, AB	1-Apr SWE	millimeters	428.46	92%	0.7	308.5
South Racehorse Creek, AB	1-Apr SWE	millimeters	398.27	93%	1.4	537.7
Intercept			1		70.5	70.5
April Forecast	April - August	kaf				5548.7

Data used in Libby Water Supply Forecast

WY 2021

Climate Data	Jun-20	Jul-20
SOI	-0.40	0.40

Precipitation Data	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Eureka RS, MT (inch)	1.77	0.92	0.98	0.37	0.29	0.17		
West Glacier, MT (inch)	4.52	4.32	2.34	2.92	2.36	0.72		
Cranbrook A, BC (mm)	27.60	21.90	26.30	34.20	3.40	0.90		
Fernie, BC (mm)	118.80	158.00	106.68	109.73	55.63	73.15		
Snow Water Equiv	1-Nov	1-Dec	1-Jan	1-Feb	1-Mar	1-Apr	1-May	1-Jun
Hawkins Lake, MT (inch)				16	19	21		
Stahl Peak, MT (inch)			16	21	24	28		
East Creek, BC (mm)				715	848	991		
Moyie Mountain, BC (mm)			166	235	323	354		
Sunshine Village, AB (mm)			322	422	522	609		
Akamina Pass, AB (mm)				316	384	428		
South Racehorse Creek, AB (mm)				263	345	398		
Streamflow	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Libby Inflow Volume (kaf)			182.3	128.4	169.4			
Reservoir Elevation	1-Nov	1-Dec	1-Jan	1-Feb	1-Mar	1-Apr	1-May	1-Jun
Libby FOM Elev (feet)	2446.1	2434.8	2410.9	2407.6	2403.4	2401.2		

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

David Bogema
 Upper Columbia Senior Water Manager
 Seattle District

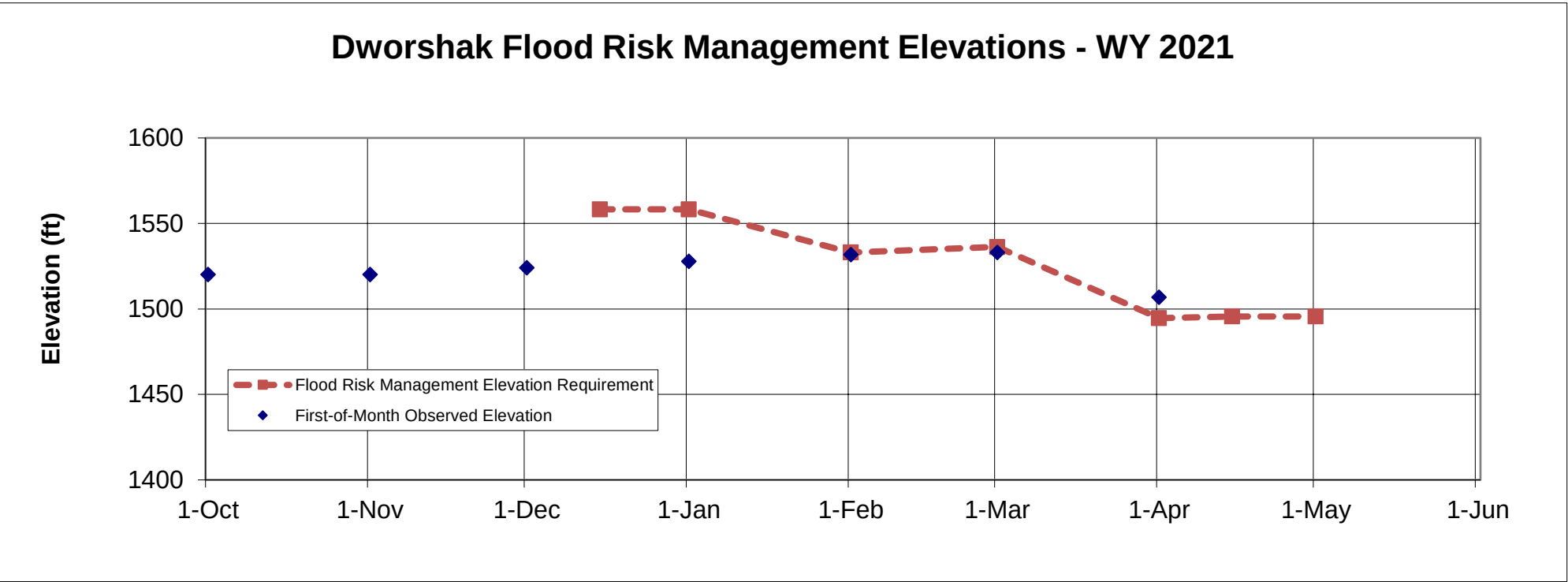
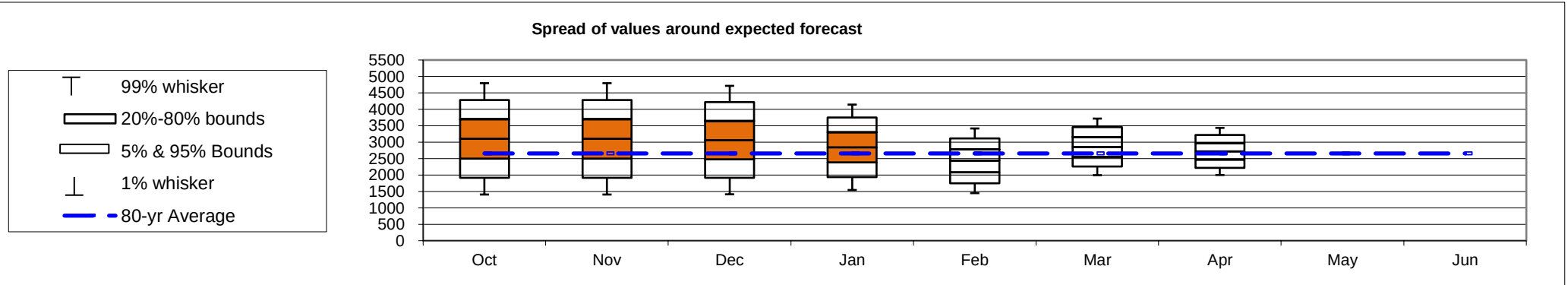
Runoff Forecast	April	1981 2010 Average	1981 2010 Percent of Average	1929 2008 Average	1929 2008 Percent of Average
Most Probable Runoff Volume: Apr-Jul (KAF)	2716	2438	111%	2655	102%
Most Probable Runoff Volume: May-Jul (KAF)	1987	1784	111%	1959	101%

Flood Risk Management (FRM)	April
30-April Flood Risk Management Space (KAF)	1525
30-April Flood Risk Management Elevation (ft)	1495.5

Seasonal Flood Risk Management (assumes no shift of Flood Risk Management space to Grand Coulee, nor refill on the Flood Control Refill Curve)

Seasonal FRM Forecast	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Apr-Jul Runoff Forecast (KAF)	3100	3100	3063	2843	2432	2855	2716		
First-of-Month Elevation (ft)	1520.2	1520.2	1524.2	1527.8	1531.7	1533.0	1506.8		

Seasonal FRM Space	15 Dec	31 Dec	31 Jan	28 Feb	31 Mar	15 Apr	30 Apr	31 May
Flood Risk Management Space (KAF)	700	700	1057	1013	1534	1525	1525	
Flood Risk Management Elevation (ft)	1558.2	1558.2	1533.0	1536.2	1494.6	1495.5	1495.5	



Dworshak : April Runoff Forecast & Flood Risk Management Calculation

Apr-Jul Runoff Forecast Calculation:

Variable	Month(s)	Units	Observed Value A	Percent of Average	Regression Coefficient B	Marginal Runoff (KAF) A*B
SOI	Sept		0.90		171.32	154.2
HQSI Cumulative Precipitation (calculated based on HQSI1 and PIRI1 due to gage outage)	Oct-Date	Inch	25.55	94%	22.32	570.3
Elk Butte SWE	1-Apr	Inch	37.4	108%	11.61	434.2
Hoodoo Basin SWE	1-Apr	Inch	34.2	87%	10.27	351.2
Sherwin SWE	1-Apr	Inch	9.0	130%	19.49	175.4
Lost Lake SWE	1-Apr	Inch	48.8	94%	7.91	386.0
Crater meadows SWE	1-Apr	Inch	49.4	115%	13.37	660.5
Intercept			1		-15.43	-15.4
1-Apr Forecast	Apr-Jul	KAF				2716.4

Data used in Dworshak Water Supply Forecast:

Climate Data	Sept								
SOI	0.90								
Precipitation Data	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Headquarters, ID (inch)		4.00	4.30	5.10	4.30	5.91	1.94	--	
Cumulative HQSI Data (inch)		4.00	8.30	13.40	17.70	23.61	25.55	--	
Snow Water Equivalent, 1st of Month	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Elk Butte, ID (inch)				13.0	19.2	34.2	37.4		
Cool Creek, ID (inch)				16.4	24.3				
Hoodoo Basin, MT (inch)				14.9	21.1	30.9	34.2	--	--
Sherwin, ID (inch)				5.6	6.8	11.9	9.0		
Shanghi Summit, ID (inch)								--	--
Lost Lake, ID (inch)				18.8	27.0	44.0	48.8	--	--
Hemlock, ID (inch)								--	--
Crater Meadows Mar (inch)						41.4	49.4		
Streamflow	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Dworshak Inflow Volume (KAF)				160	205	146	255	--	--

- Notes:
- 1. The given forecast is the official Corps of Engineers forecast for Dworshak. If you have any questions please contact Willow Walker (509-527-7073), or Jon Roberts (509-527-7518).
 - 2. Due to updated values for precipitation, snow or streamflow, subsequent forecasts may be different from the forecast published herein.

Approval:

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