

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 MAY 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/>

May 5, 2021

Hungry Horse Dam – Official Water Supply Forecast MAY 2021

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

- May-Jul: 1,500 kaf (90%)
- Apr-Aug: 1,800 kaf (93%)
- May-Sep: 1,600 kaf (95%)

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 sets the summer draft target and not 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.

Water Management - Operations Team Supervisor
U.S. Bureau of Reclamation
Columbia - Pacific Northwest Region
Boise, ID 83706



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: 2021-05-05 Issued: 2021-05-05

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	75965	79779	86	87248	92704
APR-JUL	63398	67030	84	74058	79855
APR-AUG	70549	74529	85	82229	87532
JAN-SEP	92197	96012	84	103481	114216
JAN-JUL	79631	83262	82	90290	101368
OCT-SEP	107367	111182	85	118651	130518

Experimental Water Supply

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

APR-SEP	77749	81823	88	89963	92704
APR-JUL	65790	69674	87	76358	79855
APR-AUG	72611	76700	88	84474	87532
JAN-SEP	93982	98056	86	106195	114216
JAN-JUL	82023	85907	85	92591	101368
OCT-SEP	109152	113226	87	121365	130518

Reference

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

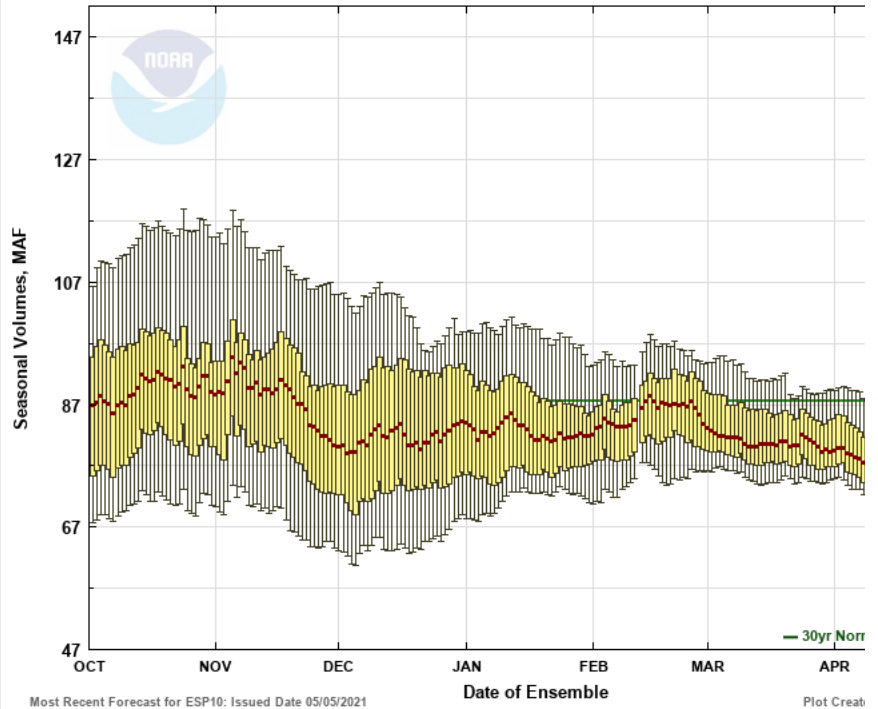
APR-SEP	77423	81791	88	89328	92704
APR-JUL	65395	69678	87	76834	79855
APR-AUG	72442	76625	88	84014	87532
JAN-SEP	93656	98024	86	105561	114216
JAN-JUL	81628	85910	85	93067	101368
OCT-SEP	108826	113194	87	120731	130518

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

Water Supply Forecasts

COLUMBIA - THE DALLES DAM

Period APR to AUG -- Water Year 2021



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

Overlay

ESP10

HEFS

ESPO

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: 2021-05-05 Issued: 2021-05-05

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	15193	15856	71	18332	22279
APR-JUL	13076	13634	69	15956	19848
APR-AUG	14129	14771	70	17133	21091
JAN-SEP	20470	21133	71	23609	29872
JAN-JUL	18353	18911	69	21233	27440
OCT-SEP	24567	25230	73	27706	34667

Experimental Water Supply

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

APR-SEP	15234	16224	73	18973	22279
APR-JUL	13137	13948	70	16601	19848
APR-AUG	14186	15054	71	17783	21091
JAN-SEP	20512	21502	72	24251	29872
JAN-JUL	18414	19225	70	21879	27440
OCT-SEP	24609	25599	74	28348	34667

Reference

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

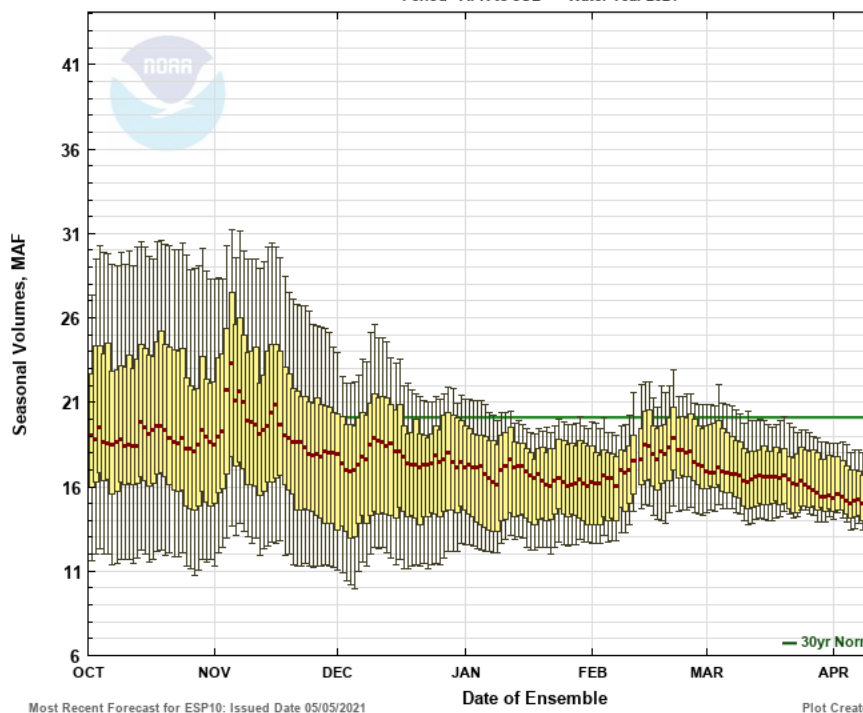
APR-SEP	15298	16427	74	19591	22279
APR-JUL	13228	14157	71	17110	19848
APR-AUG	14246	15234	72	18293	21091
JAN-SEP	20576	21704	73	24868	29872
JAN-JUL	18506	19434	71	22387	27440
OCT-SEP	24673	25801	74	28966	34667

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

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Forecast Ensemble



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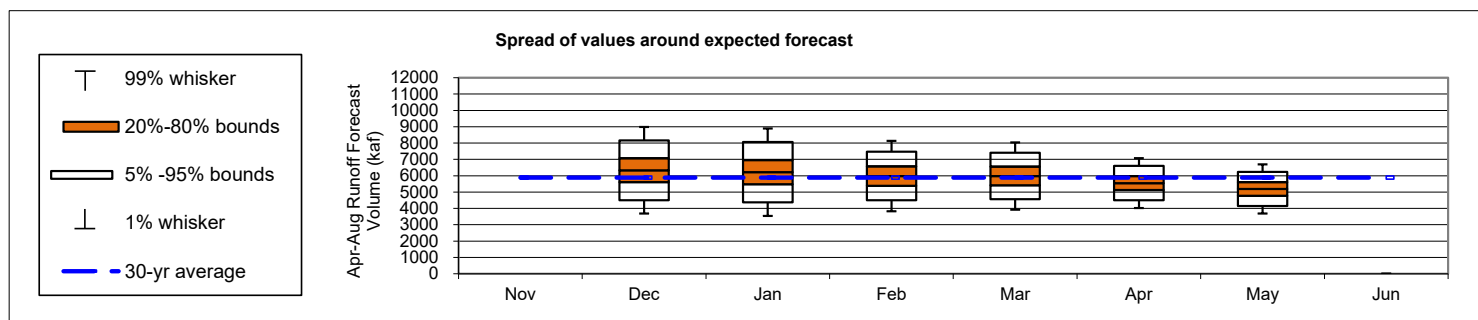
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Libby: May Runoff Forecast & Flood Risk Management Calculation

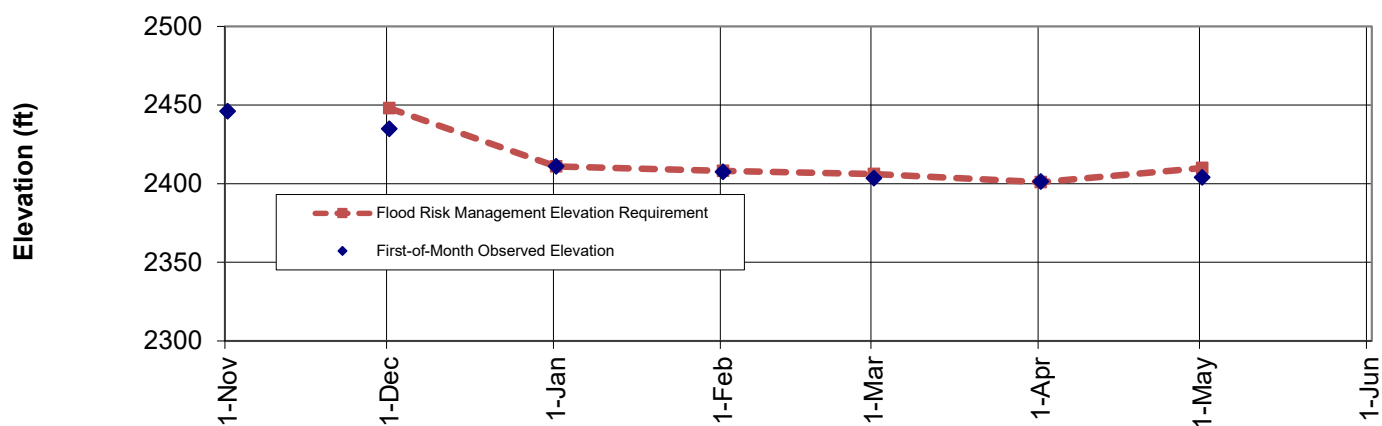
WY 2021

Runoff Forecast	May	1981-2010 Average	1981 - 2010 Percent of Average	1929-2008 Average	1929 - 2008 Percent of Average
Most Probable Runoff Volume: Apr-Aug (kaf)	5191	5885	88%	6282	83%
Most Probable Runoff Volume: Apr-Jul (kaf)	4700	5342	88%	5720	82%
Most Probable Runoff Volume: May-Jul (kaf)	4365	4821	91%	5199	84%

Forecast/Reservoir Data	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Apr-Aug Runoff Forecast (kaf)		6336	6215	5979	5980	5549	5191	
First-of-Month Elev (ft)	2446.1	2434.8	2410.9	2407.6	2403.4	2401.2	2403.9	
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 May- WY 2021



Notes:

1. 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.
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. Cranbrook A gage data was intermittent during the month of April. Nearby Cranbrook Airport Auto gage data was used instead.

Libby: May 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:Apr Prcp	inches	5.30	78%	57.5	304.49
West Glacier, MT	ΣOct:Apr Prcp	inches	18.47	100%	28.0	517.90
Cranbrook A, BC	ΣOct:Apr Prcp	millimeters	131.40	71%	2.8	367.92
Fernie, BC	ΣOct:Apr Prcp	millimeters	674.06	89%	0.6	411.18
Hawkins Lake, MT	1-May SWE	inches	20.60	78%	17.3	356.38
Stahl Peak, MT	1-May SWE	inches	27.60	74%	16.7	462.02
East Creek, BC	1-May SWE	millimeters	1029.00	112%	0.6	586.53
Moyie Mountain, BC	1-May SWE	millimeters	220.00	61%	0.9	200.20
Sunshine Village, AB	1-May SWE	millimeters	625.60	102%	1.3	788.26
Akamina Pass, AB	1-May SWE	millimeters	263.29	78%	0.6	144.81
South Racehorse Creek, AB	1-May SWE	millimeters	371.80	102%	0.8	308.59
Intercept			1		408.0	408.0
Forecast Inflow	May-August	kaf				4856.27
Observed Inflow	April	kaf				334.99
1-May Forecast Inflow	April-August	kaf				5191.26

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	0.80	
West Glacier, MT (inch)	4.52	4.32	2.34	2.92	2.36	0.72	1.29	
Cranbrook A, BC (mm)	27.60	21.90	26.30	34.20	3.40	0.90	17.10	
Fernie, BC (mm)	118.80	158.00	106.68	109.73	55.63	73.15	52.07	
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	21	
Stahl Peak, MT (inch)			16	21	24	28	28	
East Creek, BC (mm)				715	848	991	1029	
Moyie Mountain, BC (mm)			166	235	323	354	220	
Sunshine Village, AB (mm)			322	422	522	609	626	
Akamina Pass, AB (mm)				316	384	428	263	
South Racehorse Creek, AB (mm)				263	345	398	372	
Streamflow	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Libby Inflow Volume (Kaf)			182.3	128.4	169.4	335.0		
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	2403.9	

William D. Proctor, P.E.
 Approving Official
 Ch., Hydrologic Engineering and Power Branch
 Northwestern Division

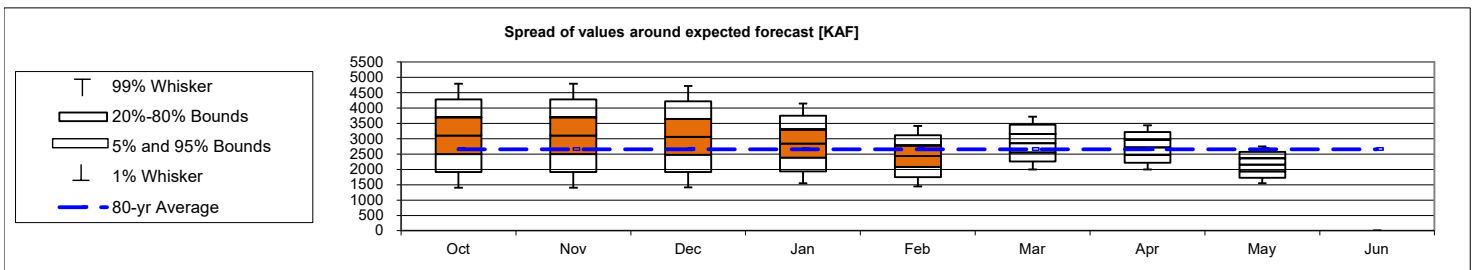
David Bogema
 Upper Columbia Senior Water Manager
 Seattle District

Runoff Forecast	May	1981-2010 Average	1981 - 2010 Percent of Average	1929-2008 Average	1929 - 2008 Percent of Average
Most Probable Runoff Volume: Apr-Jul (KAF)	2149	2438	88%	2655	81%
Most Probable Runoff Volume: May-Jul (KAF)	1632	1784	91%	1959	83%

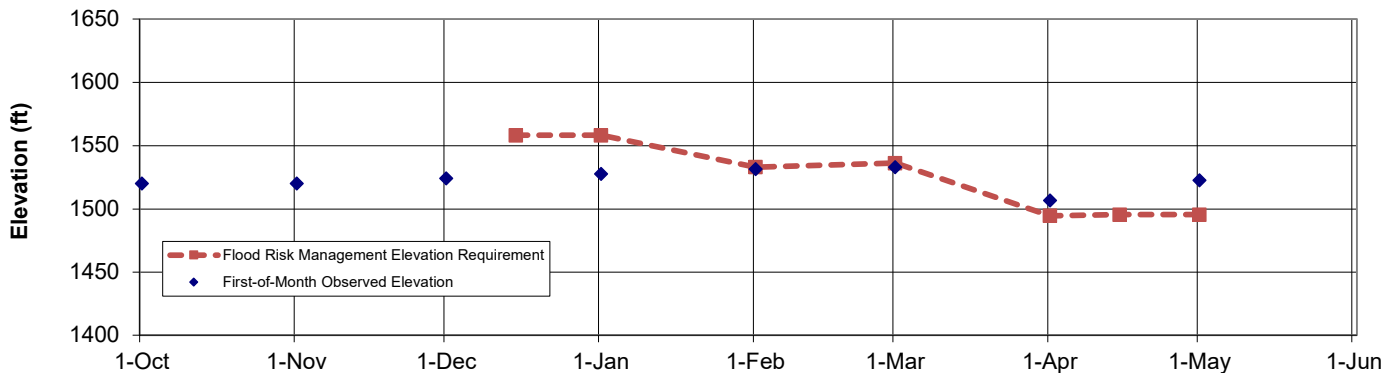
Seasonal Flood Risk Management (assumes no shift of Flood Risk Management space to Grand Coulee, nor refill on the Flood Control Refill Curve)

Seasonal Flood Risk Management (FRM) Forecast	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Apr-Jul Runoff Forecast (KAF)	3100	3100	3063	2843	2432	2855	2716	2149	
First-of-Month Elevation (ft)	1520.2	1520.2	1524.2	1527.8	1531.7	1533.0	1506.8	1522.8	

Seasonal FRM Space	15-Dec	31-Dec	31-Jan	28-Feb	31-Mar	15-Apr	30-Apr
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 Flood Risk Management Elevations - WY 2021



Dworshak : May Runoff Forecast and 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		122.04	109.8
Hoodoo Basin SWE	1-May	Inch	35.5	88%	11.71	415.6
Shanghi Summit SWE	1-May	Inch	8.8	64%	14.41	126.7
Lost Lake SWE	1-May	Inch	48.5	95%	9.67	469.3
Hemlock SWE	1-May	Inch	36.8	92%	11.58	426.1
Intercept			1		84.24	84.2
1-May Forecast	Apr-Jul	KAF				1631.8

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	1.10	
Cumulative HQSI Data (inch)		4.00	8.30	13.40	17.70	23.61	25.55	26.65	
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	35.5	--
Sherwin, ID (inch)				5.6	6.8	11.9	9.0		
Shanghi Summit, ID (inch)								8.8	--
Lost Lake, ID (inch)				18.8	27.0	44.0	48.8	48.5	--
Hemlock, ID (inch)								36.8	--
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	517	--

- 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.
 3. An approved deviation request allowed Dworshak reservoir to target elevation 1,533.8 ft for 30 April rather than the listed 30 April FRM target elevation of 1,495.5 ft.

Approval:

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

William D. Proctor, P.E.
Ch., Hydrologic Engineering and Power Branch
Columbia Basin Water Management Division