

The Official WSF is computed on the 3rd work day of the month, January through July, using the 5-day QPF 50% exceedance value. FRM is computed at standard intervals and posted online at: <http://www.nwd.usace.army.mil/Missions/Water/Columbia/FloodControl>

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

Source: 2019 Water Management Plan
<http://pweb.crohms.org/tmt/documents/wmp/2019/>

April 3, 2019

Hungry Horse Dam – Official Water Supply Forecast APRIL 2019

The forecasts dropped off quite a bit over the last month with a cool but dry month in the Flathead River Basin. Operations for Hungry Horse Dam will continue to meet Columbia Falls Minimum Flows through the next few weeks. Below are the volumes for the April 2019 final forecast for Hungry Horse:

- Apr-Jul: 1,515 kaf (81%)
- Apr-Aug: 1,560 kaf (81%)
- May-Sep: 1,400 kaf (83%)

The minimum flows downstream of Hungry Horse are as follows:

- Columbia Falls: 3,480 cfs
- Hungry Horse: 870 cfs

The May-Sept forecast sets the April 30 FRM elevation to about 3,553 ft but the Dam is projected to be at elevation 3,526 ft.

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Joel Fenolio, P.E.
Water Management - Operations Team Supervisor
U.S. Bureau of Reclamation
PN Regional Office
Boise, ID



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COLUMBIA - THE DALLES DAM (TDAO3) Forecasts for Water Year 2019

Official Forecast

10 days QPF: Ensemble: 2019-04-03 Issued: 2019-04-03

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	75454	80208	87	89742	92704
APR-JUL	63784	68359	86	77886	79855
APR-AUG	70692	74988	86	84018	87532
JAN-SEP	91305	96059	84	105593	114216
JAN-JUL	79636	84210	83	93737	101368
OCT-SEP	104846	109600	84	119134	130518

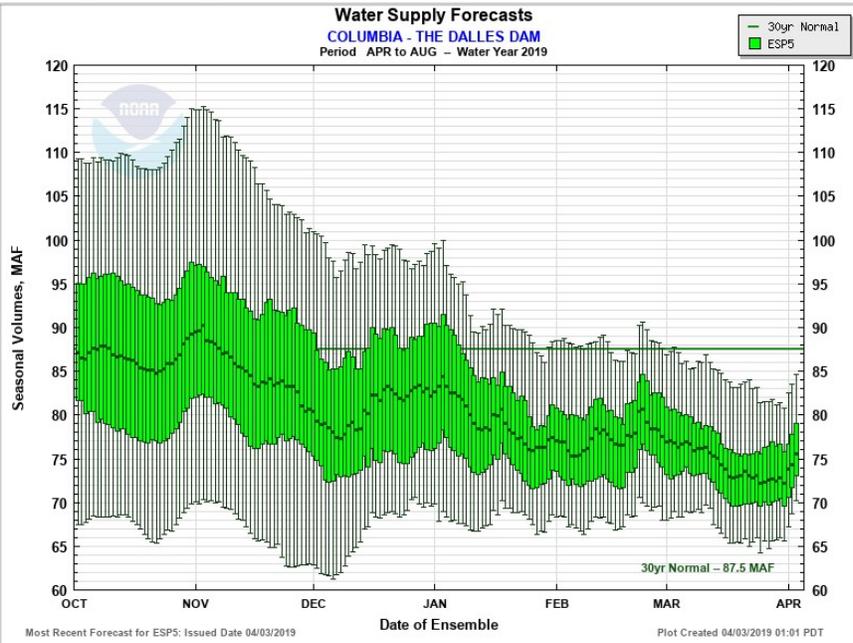
5 days QPF: Ensemble: 2019-04-03 Issued: 2019-04-03

APR-SEP	75308	80934	87	89509	92704
APR-JUL	63139	68275	85	77958	79855
APR-AUG	70250	75577	86	84658	87532
JAN-SEP	91159	96785	85	105360	114216
JAN-JUL	78991	84126	83	93809	101368
OCT-SEP	104700	110326	85	118901	130518

0 days QPF: Ensemble: 2019-04-03 Issued: 2019-04-03

APR-SEP	70664	77564	84	86444	92704
APR-JUL	59638	65729	82	73898	79855
APR-AUG	65709	72476	83	81107	87532
JAN-SEP	86515	93415	82	102295	114216
JAN-JUL	75489	81580	80	89749	101368
OCT-SEP	100057	106956	82	115836	130518

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

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SNAKE - LOWER GRANITE DAM (LGDW1)
Forecasts for Water Year 2019

Official Forecast

10 days QPF: Ensemble: 2019-04-03 Issued: 2019-04-03

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	19710	21805	98	25778	22279
APR-JUL	17252	19284	97	23183	19848
APR-AUG	18442	20556	97	24539	21091
JAN-SEP	25513	27608	92	31581	29872
JAN-JUL	23055	25087	91	28986	27440
OCT-SEP	29504	31598	91	35571	34667

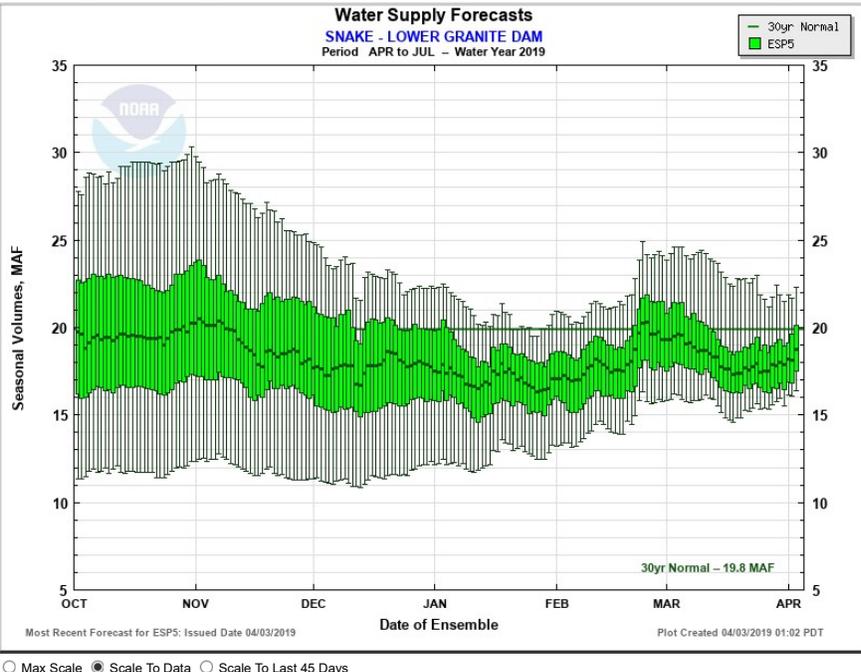
5 days QPF: Ensemble: 2019-04-03 Issued: 2019-04-03

APR-SEP	18742	21338	96	25047	22279
APR-JUL	16412	18783	95	22318	19848
APR-AUG	17557	20102	95	23682	21091
JAN-SEP	24545	27141	91	30850	29872
JAN-JUL	22215	24586	90	28121	27440
OCT-SEP	28535	31131	90	34840	34667

0 days QPF: Ensemble: 2019-04-03 Issued: 2019-04-03

APR-SEP	17767	19831	89	24281	22279
APR-JUL	15299	17327	87	21662	19848
APR-AUG	16587	18638	88	23002	21091
JAN-SEP	23570	25634	86	30084	29872
JAN-JUL	21102	23130	84	27465	27440
OCT-SEP	27560	29625	85	34074	34667

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



Overlay

ESP10 **ESP5** ESP0

Data Files

CSV (ESP5 / APR-JUL)

Forecast Ensemble



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Libby : April Runoff Forecast & Flood Risk Management Calculation

WY 2019

Runoff Forecast and Flood Risk Management

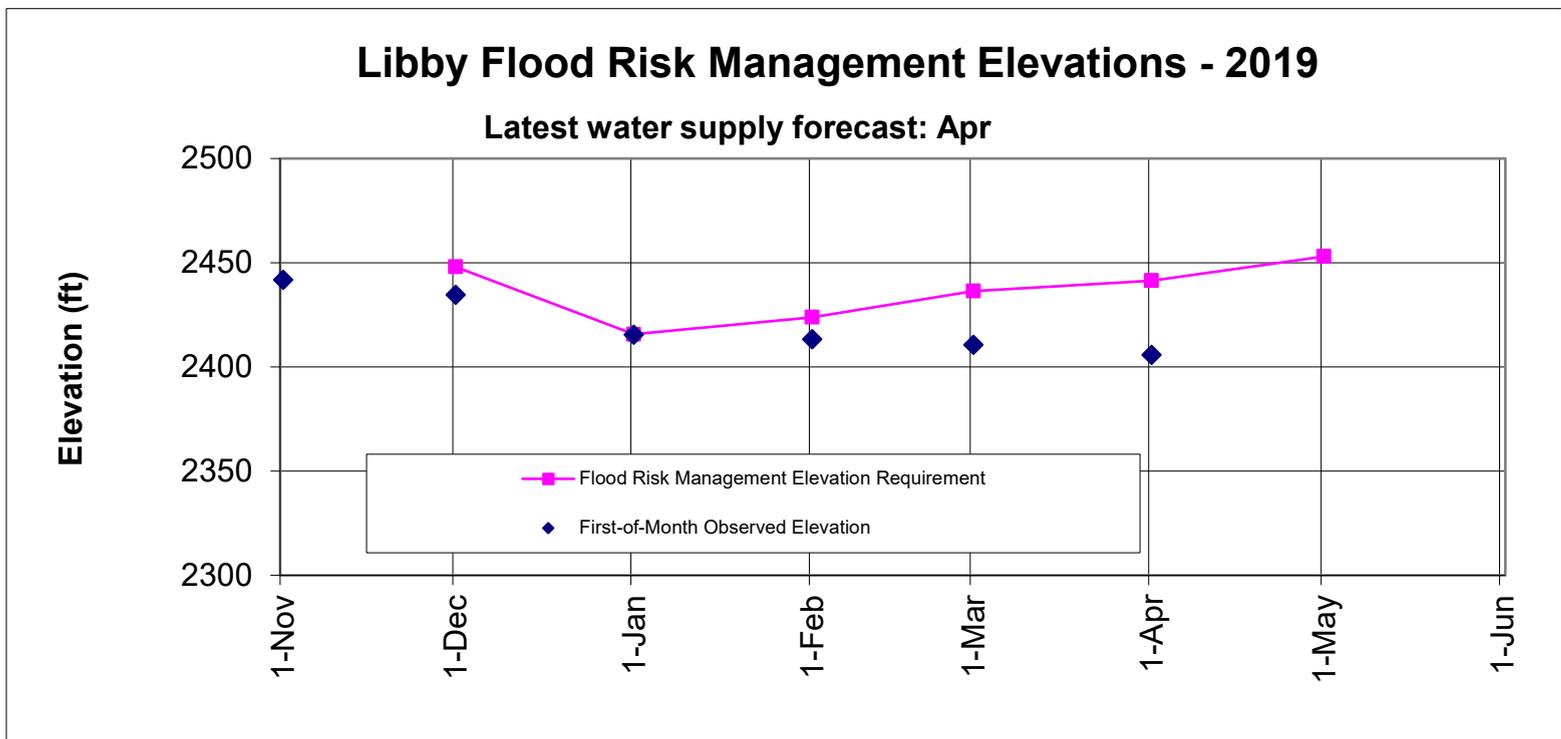
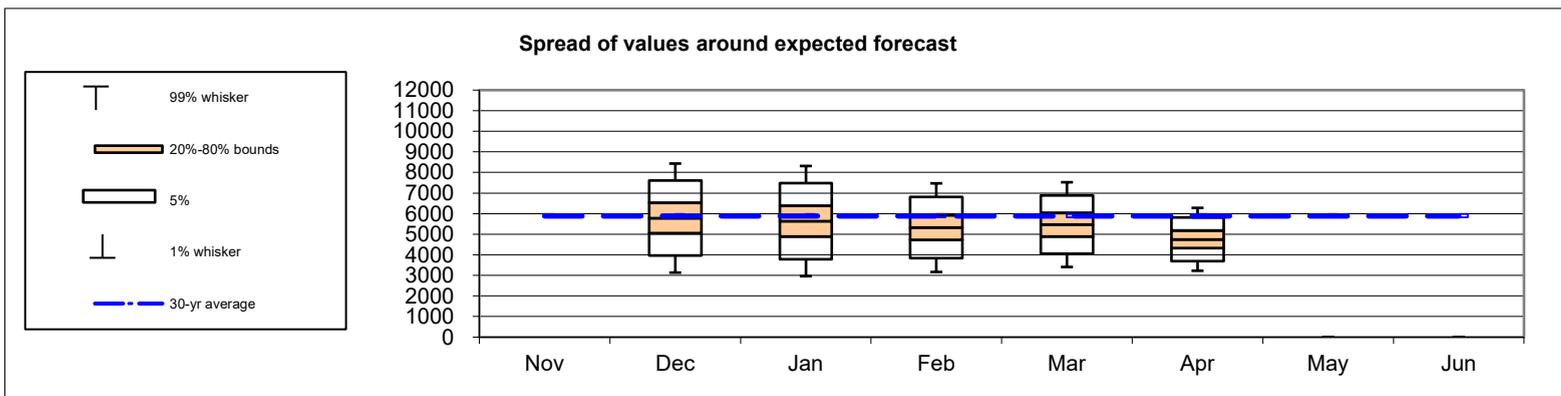
Most Probable Runoff Volume:	Apr-Aug	4752	KAF
	Apr-Jul	4314	KAF
	May-Jul	3893	KAF
30-Apr Flood Risk Management Space		276	KAF
30-Apr Flood Risk Management Elevation		2453.0	ft

1981-2010 Average	Percent of Average	1929-2008 Average	Percent of Average
5885	81%	6282	76%
5342	81%	5720	75%
4821	81%	5199	75%

Seasonal Flood Risk Management VARQ Flood Risk Management Implemented

Forecast Date >>	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Apr-Aug Runoff Forecast		5784	5639	5318	5467	4752		
First-of-Month Elev	2441.8	2434.6	2415.5	2413.3	2410.6	2405.8		

Date >>	30-Nov	31-Dec	31-Jan	28-Feb	31-Mar	30-Apr
FRM Space	500	1826	1511	1002	790	276
FRM Elevation	2448.0	2415.7	2423.9	2436.4	2441.4	2453.0



- Notes:
1. The given forecast is the official Corps of Engineers forecast for Libby. If you have any questions please contact Logan Osgood-Zimmerman (206) 764-6928, Kevin Shaffer (206) 764-3660, Sonja Michelsen (206) 316-3947, or Jon Moen (206) 764-3561.
 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. The Akamina Pass snow station was destroyed in a fire in Sept. 2017. Akamina Pass SWE was estimated based on a regression equation and observed values at nearby sites Grave Creek, Poorman Creek, Three Isle Lake, and Mount Odium.

Libby : April Runoff Forecast & Flood Risk Management Calculation

Apr-Aug Runoff Forecast Calculation:						
Variable	Month(s)	Units	Observed Value	Percent of Average	Regression Coefficient	Marginal Runoff (KAF)
			A		B	=A*B
SOI	ΣJun:Jul					
Eureka RS, MT	ΣOct:Mar Prcp	inches	6.07	104%	68.5	415.9
West Glacier, MT	ΣOct:Mar Prcp	inches	13.65	83%	29.5	402.3
Cranbrook A, BC	ΣOct:Mar Prcp	millimeters	132.30	83%	3.0	395.6
Fernie, BC	ΣOct:Mar Prcp	millimeters	507.00	75%	0.7	360.0
Hawkins Lake, MT	1-Apr SWE	inches	18.30	73%	22.4	410.5
Stahl Peak, MT	1-Apr SWE	inches	27.60	79%	19.7	543.7
East Creek, BC	1-Apr SWE	millimeters	842.00	98%	0.7	614.7
Moyie Mountain, BC	1-Apr SWE	millimeters	284.00	66%	1.2	343.6
Sunshine Village, AB	1-Apr SWE	millimeters	432.80	77%	1.4	618.9
Akamina Pass, AB	1-Apr SWE	millimeters	348.20	75%	0.7	250.7
South Racehorse Creek, AB	1-Apr SWE	millimeters	241.10	56%	1.4	325.5
Intercept			1		70.5	70.5
1-Apr Forecast (KAF)					Σ	4751.9

Data used in Libby Water Supply Forecast

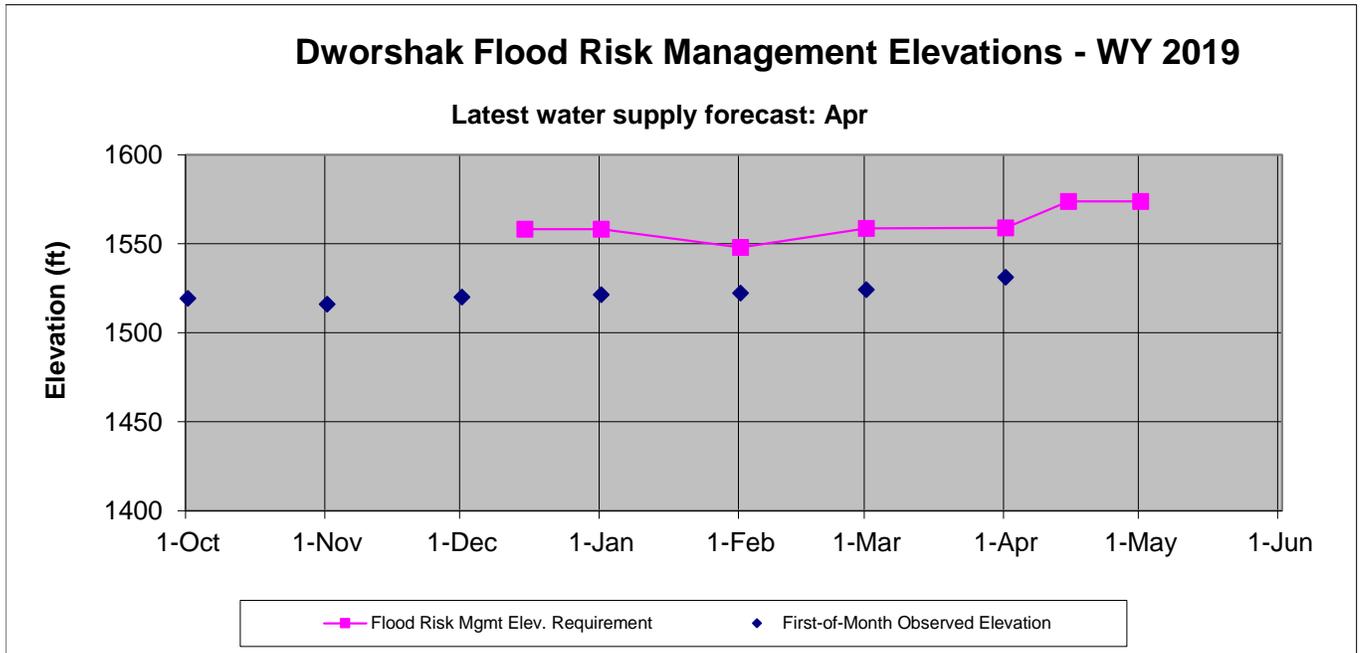
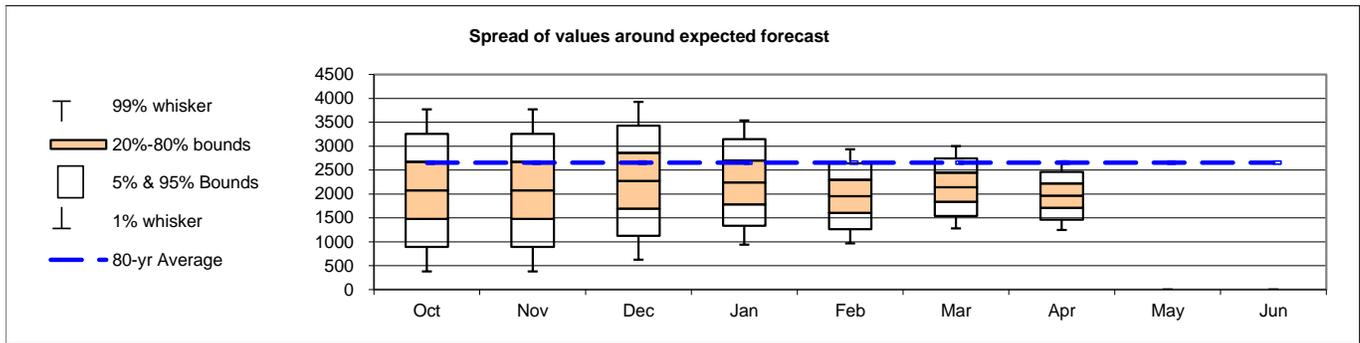
WY 2019

Climate Data		Jun-18	Jul-18					Units		
SOI		-0.10	0.20							
Precipitation Data		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Units
Eureka RS, MT		1.64	0.55	0.40	0.94	1.74	0.80			inch
West Glacier, MT		2.55	3.19	2.24	2.29	2.29	1.09			inch
Cranbrook A, BC		34.50	14.60	26.60	19.00	33.60	4.00			mm
Fernie, BC		87.00	139.00	117.00	83.00	68.00	13.00			mm
Snow Water Equiv		1-Jan	1-Feb	1-Mar	1-Apr	1-May	1-Jun	Units		
Hawkins Lake, MT			13	17	18				inch	
Stahl Peak, MT			14	20	25	28			inch	
East Creek, BC				709	806	842			mm	
Moyie Mountain, BC			153	223	299	284			mm	
Sunshine Village, AB			272	373	379	433			mm	
Akamina Pass, AB				259	316	348			mm	
South Racehorse Creek, AB				180	252	241			mm	
Streamflow		Jan	Feb	Mar	Apr	May	Jun	Units		
Libby Inflow Volume		162.5	120.6	177.6					KAF	
Reservoir Elevation		1-Nov	1-Dec	1-Jan	1-Feb	1-Mar	1-Apr	1-May	1-Jun	Units
Libby FOM Elev		2441.9	2434.6	2415.5	2413.3	2410.6	2405.8			feet

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

Logan Osgood-Zimmerman, P.E.
 Water Management Section
 Seattle District

Runoff Forecast and Flood Risk Management (FRM)				1981-2010 Average	Percent of 30yr Average	1929-2008 Average	Percent of Average		
Most Probable Runoff Volume	Apr-Jul	1964	KAF	2438	81%	2655	74%		
	May-Jul	1437	KAF						
30-Apr Flood Risk Management Space		460	KAF						
30-Apr Flood Risk Management Elevation		1573.8	ft						
Seasonal Flood Risk Management (assumes no shift of flood risk management space to Grand Coulee)									
Forecast Date>>	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Apr-Jul Runoff Forecast	2075	2075	2276	2239	1951	2142	1964		
First-of-Month Elev	1519.3	1516.1	1520.1	1521.4	1522.3	1524.3	1531.3		
Date >>	15-Dec	31-Dec	31-Jan	28-Feb	31-Mar	15-Apr	30-Apr	31-May	
FRM Space	--	700	700	849	694	689	460	460	
FRM Elevation	--	1558.2	1558.2	1547.9	1558.6	1559.0	1573.8	1573.8	



Dworshak : April Runoff Forecast & Flood Risk Management Calculation

Apr-Jul Runoff Forecast Calculation					
Variable	Month	Observed Value	% of Average	Regression Coefficient	Marginal Runoff (KAF)
		A		B	=A*B
SOI	Sep	-0.90		171.32	-154.2
HQSI Cumulative Precip	Oct-Date	21.00	77%	22.32	468.7
Elk Butte SWE	1-Apr	31.3	90%	11.61	363.4
Hoodoo Basin SWE	1-Apr	33.1	84%	10.27	339.9
Sherwin SWE	1-Apr	5.7	83%	19.49	111.1
Lost Lake SWE	1-Apr	39.8	76%	7.91	314.8
Crater meadows SWE	1-Apr	40.1	93%	13.37	536.1
Intercept		1		-15.43	-15.4
1-Apr Forecast (KAF)				Σ	1964.5

Data Station	Sept	Nov	Dec	1-Jan	1-Feb	1-Mar	1-Apr	1-May	1-Jun
Climate (Stdzd SOI)									
September SOI	-0.90								
Precipitation (in)									
	Oct								
Headquarters, ID	3.80	5.60	5.30	2.20	1.40	2.70	--		
Cumulative HQSI Data	3.80	9.40	14.70	16.90	18.30	21.00	--		
Snow Water Equiv (First of Month values) (in)									
Elk Butte, ID				15.5	20.6	29.9	31.3		
Cool Creek, ID				21.5	26.7				
Hoodoo Basin, MT				14.4	21.1	30.6	33.1	--	--
Sherwin, ID				3.7	6.1	10.2	5.7		
Shanghi Summit, ID								--	--
Lost Lake, ID				18.8	26.1	36.2	39.8	--	--
Hemlock, ID								--	--
Crater Meadows Mar						37.8	40.1		
Streamflow (End of Month) (kaf)									
				Jan	Feb	Mar	Apr	May	Jun
Dworshak Inflow				114	121	219	--	--	--

Notes:

- The given forecast is the official Corps of Engineers forecast for Dworshak. If you have any questions please contact Steve Hall (509-527-7550), Alfredo Rodriguez (509-527-7532), or Jon Roberts (509-527-7518).
- Due to updated values for precipitation, snow or streamflow, subsequent forecasts may be different from the forecast published herein.

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



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COLUMBIA - GRAND COULEE DAM (GCDW1) Forecasts for Water Year 2019

Official Forecast

10 days QPF: Ensemble: 2019-04-03 Issued: 2019-04-03

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	46799	50380	84	55271	60110
APR-JUL	38278	42058	82	46965	51015
APR-AUG	43603	46826	82	51464	56763
JAN-SEP	52900	56481	82	61372	68694
JAN-JUL	44379	48159	81	53067	59599
OCT-SEP	60093	63673	83	68564	76824

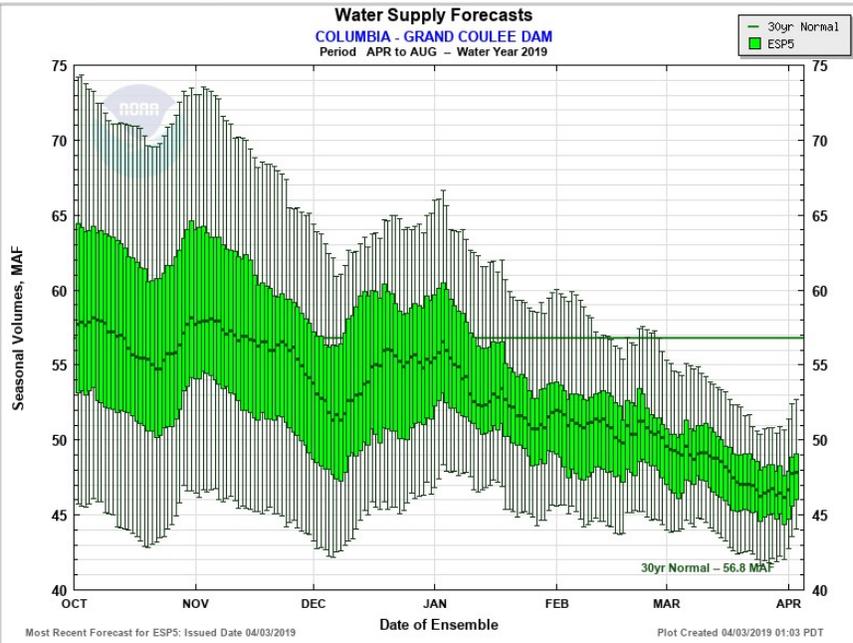
5 days QPF: Ensemble: 2019-04-03 Issued: 2019-04-03

APR-SEP	47231	51214	85	55928	60110
APR-JUL	39077	42578	83	47947	51015
APR-AUG	44031	47853	84	52733	56763
JAN-SEP	53333	57315	83	62029	68694
JAN-JUL	45179	48680	82	54048	59599
OCT-SEP	60525	64507	84	69222	76824

0 days QPF: Ensemble: 2019-04-03 Issued: 2019-04-03

APR-SEP	45851	50664	84	54373	60110
APR-JUL	37303	41553	81	46303	51015
APR-AUG	42403	46869	83	51076	56763
JAN-SEP	51953	56765	83	60475	68694
JAN-JUL	43404	47654	80	52404	59599
OCT-SEP	59145	63957	83	67667	76824

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

CSV (ESP5 / APR-AUG)

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PEND OREILLE - ALBENI FALLS DAM (ALFW1) Forecasts for Water Year 2019

Official Forecast

10 days QPF: Ensemble: 2019-04-03 Issued: 2019-04-03

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	9016	10629	83	12366	12815
APR-JUL	8118	9627	82	11266	11777
APR-AUG	8589	10181	82	11902	12354
JAN-SEP	10595	12208	80	13945	15226
JAN-JUL	9697	11206	79	12845	14189
OCT-SEP	12276	13889	81	15626	17218

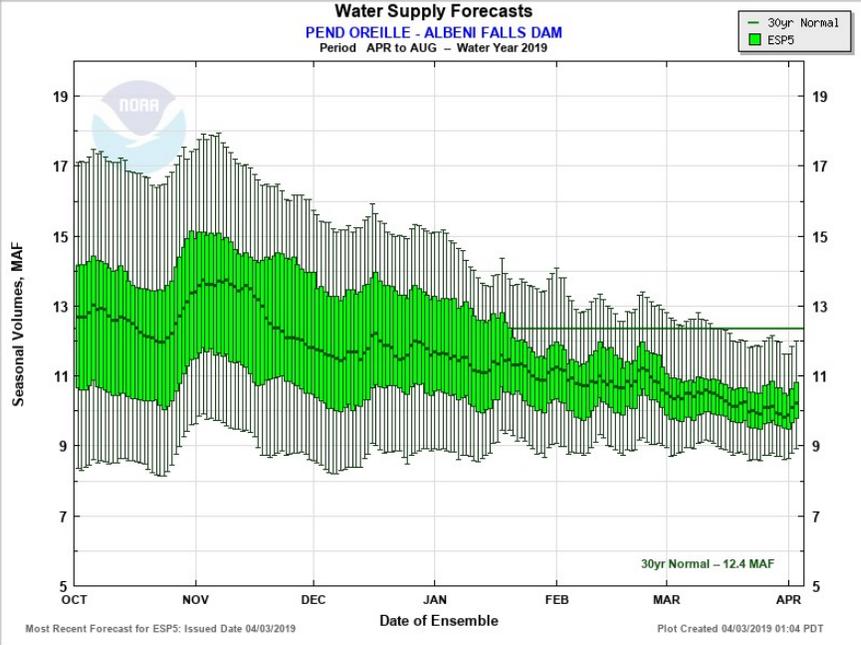
5 days QPF: Ensemble: 2019-04-03 Issued: 2019-04-03

APR-SEP	9319	10690	83	12513	12815
APR-JUL	8489	9714	82	11407	11777
APR-AUG	8933	10234	83	12005	12354
JAN-SEP	10898	12269	81	14092	15226
JAN-JUL	10068	11293	80	12986	14189
OCT-SEP	12579	13951	81	15773	17218

0 days QPF: Ensemble: 2019-04-03 Issued: 2019-04-03

APR-SEP	9151	10526	82	12554	12815
APR-JUL	8297	9473	80	11326	11777
APR-AUG	8763	10019	81	12056	12354
JAN-SEP	10730	12105	80	14133	15226
JAN-JUL	9877	11052	78	12905	14189
OCT-SEP	12412	13786	80	15814	17218

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

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CSV (ESP5 / APR-AUG)

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