

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 JANUARY 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/>

January 4, 2019

**Hungry Horse Dam – Official Water Supply Forecast
JANUARY 2019**

Here are the volumes for the January 2019 final forecast for Hungry Horse inflow:

Jan-Jul: 1,897 kaf (90%)

Apr-Aug: 1,740 kaf (90%)

May-Sep: 1,533 kaf (91%)

The minimum flows downstream of Hungry Horse are as follows:

Columbia Falls: 3,475 cfs

Hungry Horse: 858 cfs

Thanks,

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U.S. Bureau of Reclamation | Pacific Northwest Region
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C.Runyan
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J.Rocha



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

Official Forecast

☐ 10 days QPF: Ensemble: 2019-01-04 Issued: 2019-01-04

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	71967	86474	93	99911	92704
APR-JUL	60537	73646	92	84798	79855
APR-AUG	67486	81430	93	93893	87532
JAN-SEP	88242	104497	91	118712	114216
JAN-JUL	77859	91664	90	106112	101368
OCT-SEP	101783	118039	90	132253	130518

☐ 5 days QPF: Ensemble: 2019-01-04 Issued: 2019-01-04

APR-SEP	72840	88676	96	103749	92704
APR-JUL	61792	75508	95	89559	79855
APR-AUG	68364	83322	95	97116	87532
JAN-SEP	90250	106805	94	126330	114216
JAN-JUL	78689	93497	92	112677	101368
OCT-SEP	103792	120347	92	139871	130518

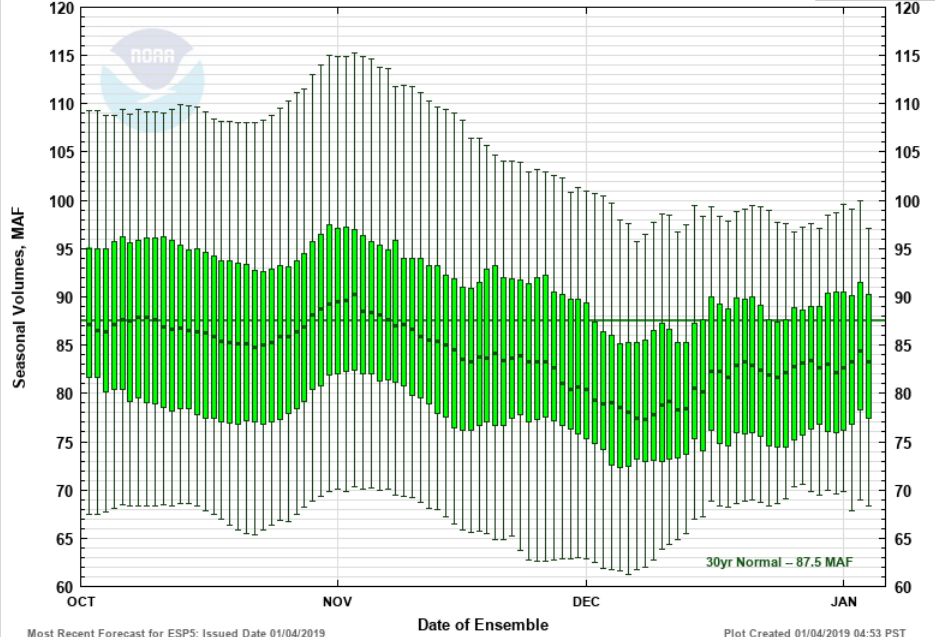
☐ 0 days QPF: Ensemble: 2019-01-04 Issued: 2019-01-04

APR-SEP	75468	90247	97	105707	92704
APR-JUL	64326	75554	95	90469	79855
APR-AUG	71075	84325	96	99631	87532
JAN-SEP	92450	108161	95	126952	114216
JAN-JUL	81468	95165	94	112617	101368
OCT-SEP	105991	121703	93	140493	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 2019



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

Overlay

ESP10 ESP5 ESP0

Data Files

CSV (ESP5 / APR-AUG)

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

Official Forecast

☐ 10 days QPF: Ensemble: 2019-01-04 Issued: 2019-01-04

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	13917	19585	88	23961	22279
APR-JUL	12034	17182	87	21088	19848
APR-AUG	12953	18362	87	22578	21091
JAN-SEP	18614	24909	83	31393	29872
JAN-JUL	16785	22443	82	28789	27440
OCT-SEP	22605	28899	83	35383	34667

☐ 5 days QPF: Ensemble: 2019-01-04 Issued: 2019-01-04

APR-SEP	14056	19848	89	24982	22279
APR-JUL	12170	17405	88	22312	19848
APR-AUG	13070	18614	88	23695	21091
JAN-SEP	19012	25543	86	32229	29872
JAN-JUL	17051	23116	84	29371	27440
OCT-SEP	23002	29533	85	36219	34667

☐ 0 days QPF: Ensemble: 2019-01-04 Issued: 2019-01-04

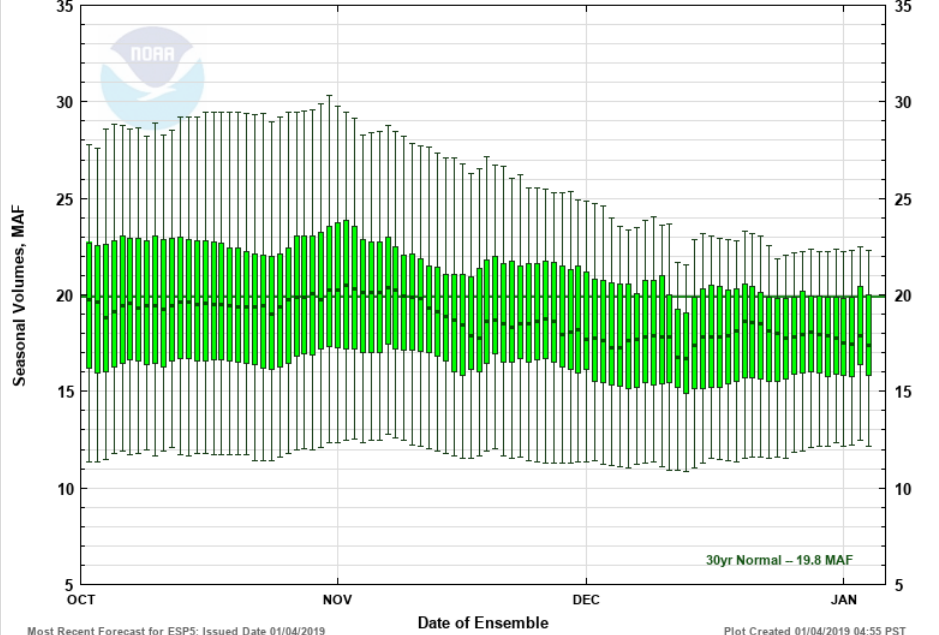
APR-SEP	14241	20458	92	25133	22279
APR-JUL	12393	18118	91	22418	19848
APR-AUG	13302	19330	92	23860	21091
JAN-SEP	18985	26225	88	32218	29872
JAN-JUL	17180	23675	86	29550	27440
OCT-SEP	22975	30215	87	36208	34667

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 2019



Most Recent Forecast for ESP5: Issued Date 01/04/2019

Plot Created 01/04/2019 04:55 PST

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

Overlay

ESP10 ESP5 ESP0

Data Files

CSV (ESP5 / APR-JUL)

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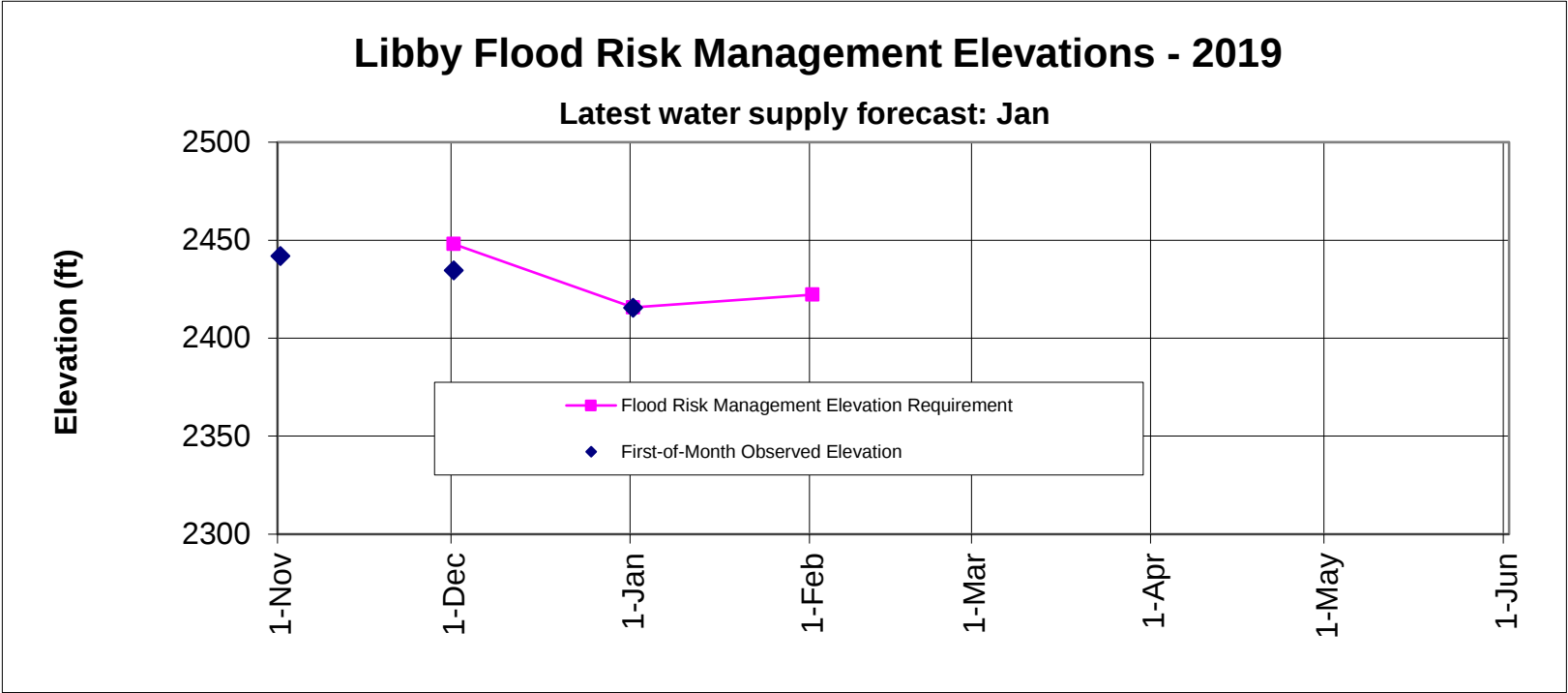
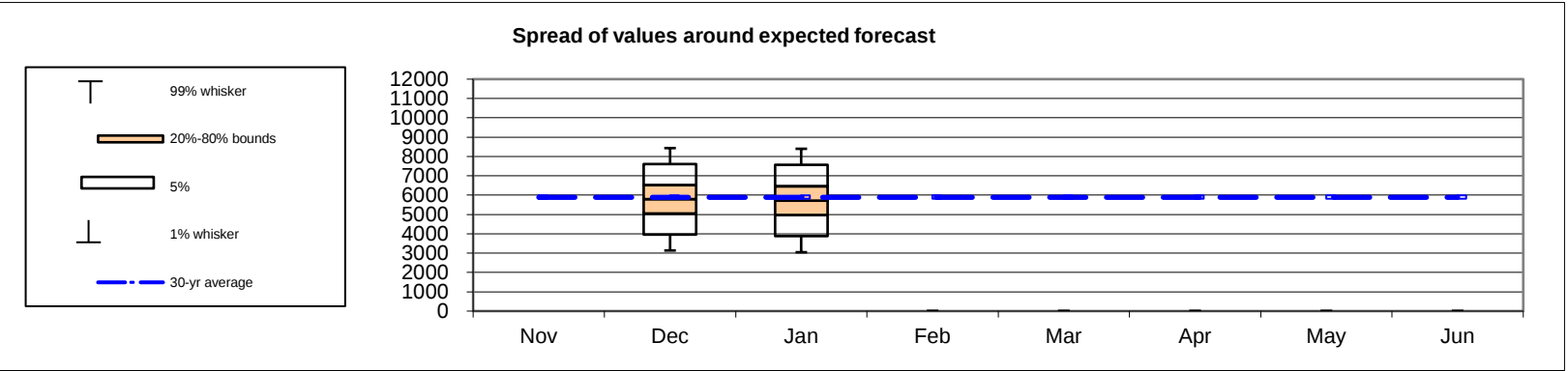
Libby : January Runoff Forecast & Flood Risk Management Calculation

WY 2019

Runoff Forecast and Flood Risk Management			
Most Probable Runoff Volume:	Apr-Aug	5721	KAF
	Apr-Jul	5193	KAF
	May-Jul	4686	KAF
31-Jan Flood Risk Management Space		1574	KAF
31-Jan Flood Risk Management Elevation		2422.3	ft

1981-2010 Average	Percent of Average	1929-2008 Average	Percent of Average
5885	97%	6282	91%
5342	97%	5720	91%
4821	97%	5199	90%

Seasonal Flood Risk Management		VARQ Flood Risk Management Implemented						
Forecast Date >>	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Apr-Aug Runoff Forecast		5784	5721					
First-of-Month Elev	2441.9	2434.6	2415.5					
Date >>	30-Nov	31-Dec	31-Jan	28-Feb	15-Mar	31-Mar	15-Apr	30-Apr
Flood Risk Management Space	500	1826	1574					
Flood Risk Management Elevation	2448.0	2415.7	2422.3					



*** Due to the government shutdown, the observed data used for this forecast are preliminary.
Th forecast may be updated when finalized data are released. (applicable as of 1/3/2019) ***

- Notes:
- 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.
 - If you notice that 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 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	Σ Jun:Jul		0.10		95.3	9.5
Eureka RS, MT	Σ Oct,Nov,Dec Prcp	inches	2.99	88%	141.7	423.8
West Glacier, MT	Σ Oct,Nov,Dec Prcp	inches	8.41	93%	58.4	491.3
Cranbrook A, BC	Σ Oct,Nov,Dec Prcp	millimeters	75.70	83%	4.6	346.7
Fernie, BC	Σ Oct,Nov,Dec Prcp	millimeters	343.00	94%	1.2	411.6
Hawkins Lake, MT	1-Jan SWE	inches				0.0
Stahl Peak, MT	1-Jan SWE	inches	14.10	87%	34.6	488.3
East Creek, BC	1-Jan SWE	millimeters				0.0
Moyie Mountain, BC	1-Jan SWE	millimeters	153.00	86%	1.6	242.5
Sunshine Village, AB	1-Jan SWE	millimeters	272.16	99%	2.1	582.4
Akamina Pass, AB	1-Jan SWE	millimeters				0.0
South Racehorse Creek, AB	1-Jan SWE	millimeters				0.0
Intercept			1		2724.4	2724.4
1-Jan Forecast (KAF)					Σ	5720.6

Data used in Libby Water Supply Forecast

WY 2019

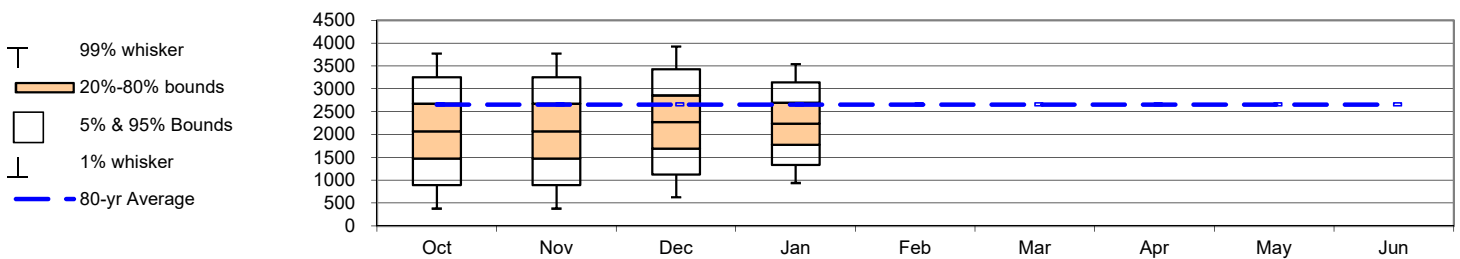
Climate Data				Jun-18	Jul-18							
SOI				-0.10	0.20							
Precipitation Data				Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Units
Eureka RS, MT				1.64	0.55	0.80						inch
West Glacier, MT				2.55	3.19	2.67						inch
Cranbrook A, BC				34.50	14.60	26.60						mm
Fernie, BC				87.00	139.00	117.00						mm
Snow Water Equiv				1-Jan			1-Feb	1-Mar	1-Apr	1-May	1-Jun	Units
Hawkins Lake, MT												inch
Stahl Peak, MT				14								inch
East Creek, BC												mm
Moyie Mountain, BC				153								mm
Sunshine Village, AB				272								mm
Akamina Pass, AB												mm
South Racehorse Creek, AB												mm
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				2441.9	2434.6	2415.5						feet

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

Logan Osgood-Zimmerman, P.E.
 Upper Columbia Senior Water Manager
 Seattle District

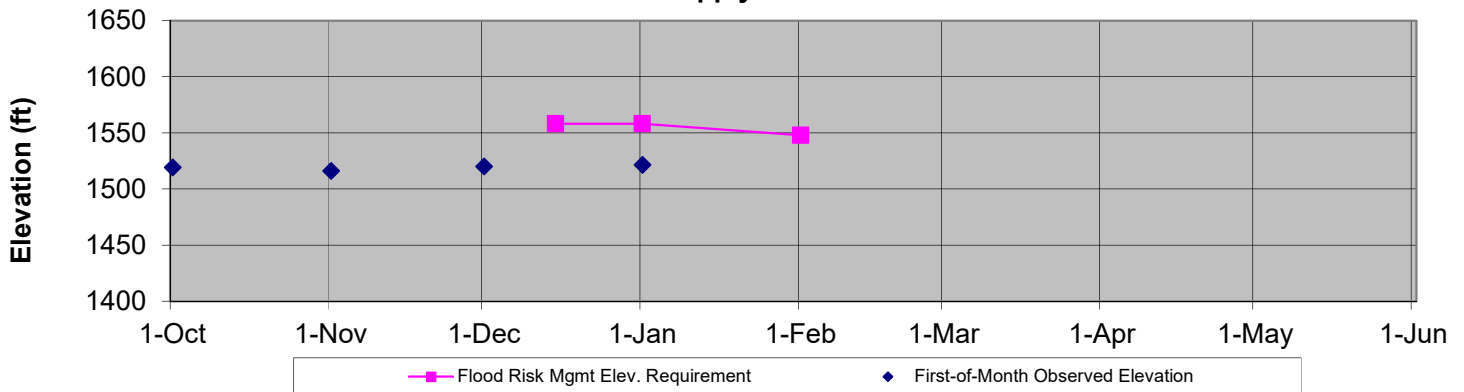
Runoff Forecast and Flood Risk Management (FRM)				1981-2010 Average	Percent of 30yr Average	1929-2008 Average	Percent of Average		
Most Probable Runoff Volume		Apr-Jul	2239	KAF	2438	92%	2655	84%	
		May-Jul	1638	KAF	1784	92%	1959	84%	
31-Jan Flood Risk Management Space			849	KAF					
31-Jan Flood Risk Management Elevation			1547.9	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					
First-of-Month Elev	1519.3	1516.1	1520.1	1521.4					
Date >>	15-Dec		31-Dec	31-Jan	28-Feb	31-Mar	15-Apr	30-Apr	31-May
FRM Space	--	700	700	849					
FRM Elevation	--	1558.2	1558.2	1547.9					

Spread of values around expected forecast



Dworshak Flood Risk Management Elevations - WY 2019

Latest water supply forecast: Jan



Dworshak : January 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		355.71	-320.1
HQSI Cumulative Precip	Oct-Date	14.70	105%	48.12	707.4
Elk Butte SWE	1-Jan	15.50	105%	6.25	96.9
Cool Creek SWE	1-Jan	21.5	119%	9.96	214.1
Hoodoo Basin SWE	1-Jan	14.4	85%	12.22	176.0
Sherwin SWE	1-Jan	3.7	80%	44.69	165.4
Lost Lake SWE	1-Jan	18.8	82%	4.24	79.7
Intercept		1		1119.86	1119.9
1-Jan Forecast (KAF)				Σ	2239.1

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	--	--	--	--		
Cumulative HQSI Data	3.80	9.40	14.70	--	--	--	--		
Snow Water Equiv (First of Month values) (in)									
Elk Butte, ID				15.5	--	--	--		
Cool Creek, ID				21.5	--				
Hoodoo Basin, MT				14.4	--	--	--	--	--
Sherwin, ID				3.7	--	--	--		
Shanghi Summit, ID								--	--
Lost Lake, ID				18.8	--	--	--	--	--
Hemlock, ID								--	--
Crater Meadows Mar						--	--		
Streamflow (End of Month) (kaf)				Jan	Feb	Mar	Apr	May	Jun
Dworshak Inflow				--	--	--	--	--	--

Notes:

1. 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).
2. Due to updated values for precipitation, snow or streamflow, subsequent forecasts may be different from the forecast published herein.
3. Hoodoo Basin, MT SNOTEL quit reporting on 12/28/18 at 0300. Value of 14.4in is the last recorded value from the station.

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: 2019-01-04 Issued: 2019-01-04

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	51013	57440	96	67578	60110
APR-JUL	42255	48085	94	57080	51015
APR-AUG	47856	54215	96	63311	56763
JAN-SEP	58928	65588	95	77919	68694
JAN-JUL	49657	55783	94	66941	59599
OCT-SEP	66120	72780	95	85111	76824

☐ 5 days QPF: Ensemble: 2019-01-04 Issued: 2019-01-04

APR-SEP	51094	59338	99	69490	60110
APR-JUL	42427	49782	98	59155	51015
APR-AUG	47944	55941	99	65609	56763
JAN-SEP	59438	67390	98	78525	68694
JAN-JUL	49548	57973	97	68395	59599
OCT-SEP	66630	74582	97	85718	76824

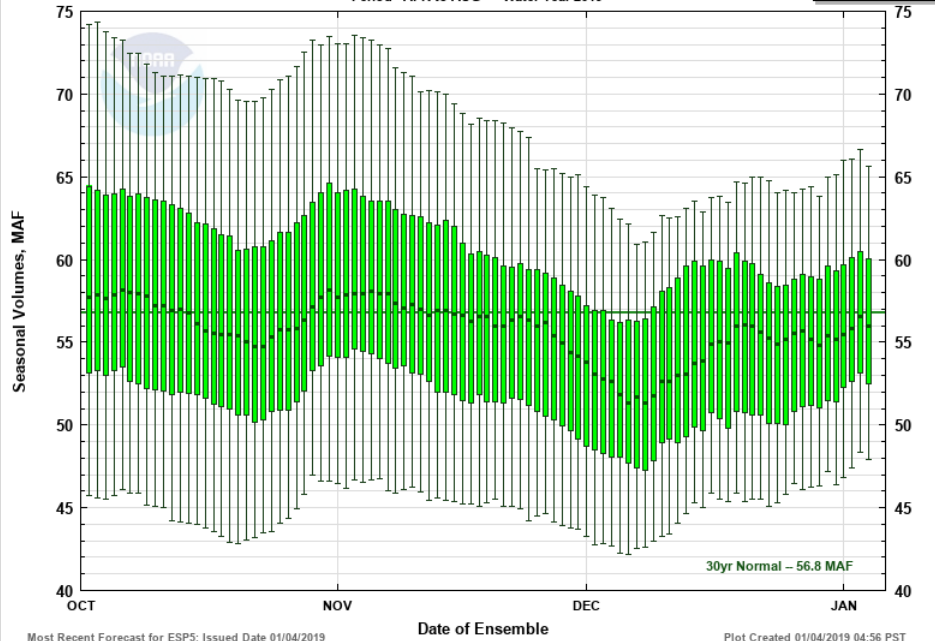
☐ 0 days QPF: Ensemble: 2019-01-04 Issued: 2019-01-04

APR-SEP	51423	59898	100	70672	60110
APR-JUL	43600	50185	98	59128	51015
APR-AUG	48119	56330	99	65930	56763
JAN-SEP	59702	67799	99	82391	68694
JAN-JUL	51129	58001	97	69806	59599
OCT-SEP	66894	74991	98	89583	76824

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

Water Supply Forecasts

COLUMBIA - GRAND COULEE DAM
Period APR to AUG - Water Year 2019



☐ 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: 2019-01-04 Issued: 2019-01-04

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	8995	11747	92	14592	12815
APR-JUL	8093	10737	91	13175	11777
APR-AUG	8508	11293	91	13936	12354
JAN-SEP	10911	14039	92	17100	15226
JAN-JUL	10169	12918	91	15762	14189
OCT-SEP	12593	15721	91	18782	17218

☐ 5 days QPF: Ensemble: 2019-01-04 Issued: 2019-01-04

APR-SEP	9342	12129	95	15657	12815
APR-JUL	8452	11057	94	14271	11777
APR-AUG	8867	11633	94	15098	12354
JAN-SEP	11282	14390	95	18597	15226
JAN-JUL	10445	13292	94	17225	14189
OCT-SEP	12963	16072	93	20279	17218

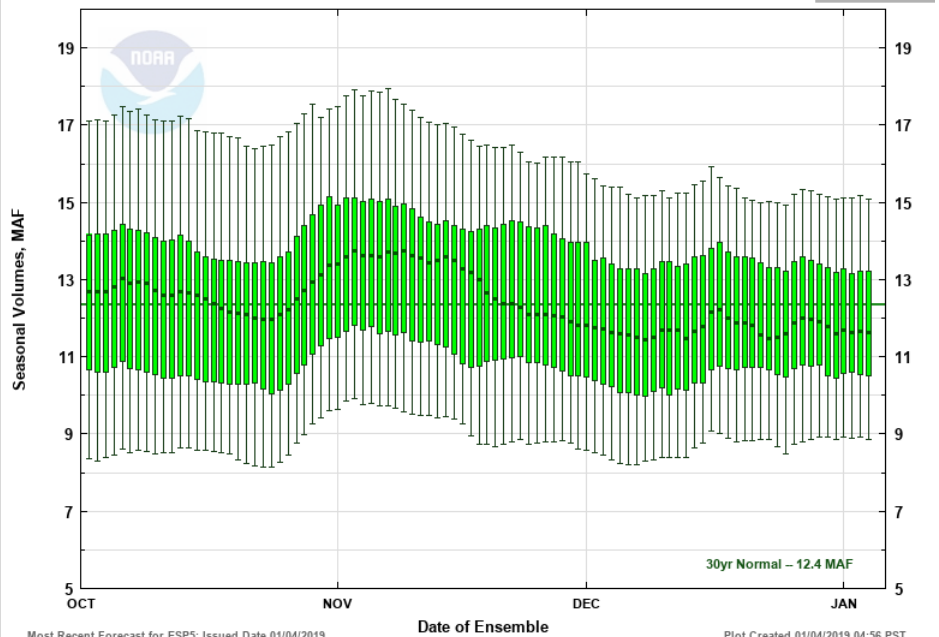
☐ 0 days QPF: Ensemble: 2019-01-04 Issued: 2019-01-04

APR-SEP	9375	12379	97	15791	12815
APR-JUL	8513	11286	96	14505	11777
APR-AUG	8992	11871	96	15247	12354
JAN-SEP	11541	14789	97	18775	15226
JAN-JUL	10810	13547	95	17287	14189
OCT-SEP	13223	16471	96	20456	17218

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

Water Supply Forecasts

PEND OREILLE - ALBENI FALLS DAM
Period APR to AUG - Water Year 2019



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

Overlay

ESP10 ESP5 ESP0

Data Files

CSV (ESP5 / APR-AUG)

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