

RECLAMATION

Managing Water in the West

May 10, 2017

Dear Customer:

Attached is the monthly water supply outlook and projected operations for Yellowtail Dam and Powerplant. Streamflows into Bighorn Lake during April were 411% of average. On May 1, the NRCS measured the snow water content of the mountain snowpack in the Bighorn River Basin at 165% of average. Based on the May 1 water supply forecast and the planned releases out of Boysen and Buffalo Bill Reservoirs, the May through July runoff into Bighorn Lake is expected to equal 2,454,200 acre-feet (259% of average). If you have any questions or concerns, please feel free to call me at 406-247-7334 or Stephanie Micek 406-247-7320.

Clayton R. Jordan
Reservoir and River Operations



U. S. Department of the Interior
Bureau of Reclamation
Montana Area Office
River and Reservoir Operations

YELLOWTAIL RESERVOIR OPERATIONS
 Water Supply Forecasts and Reservoir Operations
 May 1, 2017

Present Elevations & Storages:

	Elevation (feet)	Storage (acre-feet)	Percent of Average	Percent Full
Boysen	4707.95	464,983	86	63
Buffalo Bill	5353.29	357,368	89 *	55
Bighorn Lake	3607.08	747,489	99	73

Actual Inflows (1,000's of Acre-Feet):

Water Year 2017	Inflow	Percent of Average
October	202.6	127
November	139.9	116
December	109.2	106
January	120.5	117
February	212.9	200
March	306.7 (highest of record)	216
April	603.4 (highest of record)	411
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Water Year 2016	Inflow	Percent of Average
April	122.0	81
May	358.3	131
June	422.8	97
July	128.7	50
August	135.9	91
September	180.9	111
April-July	1,031.8	93

Actual Gains between Boysen and Buffalo Bill to Yellowtail (1,000's of Acre-Feet):

Water Year 2017	Gains	Percent of Average
October	116.9	177
November	77.5	136
December	40.2	106
January	51.8	129
February	144.0 (highest of record)	293
March	98.0	137
April	136.5 (highest of record)	411
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Water Year 2016	Gains	Percent of Average
April	32.2	98
May	21.5	40
June	-37.0 (avg. 92.6)	-
July	-97.7 (avg. -61.4)	-
August	-55.1 (avg. -52.7)	-
September	47.9	504
April-July	-78.1 (avg. 117.8)	-

May 1 Runoff Forecast (May through July Inflows - 1,000's of Acre-Feet):

Inflows	Percent of Average
2,454,200	259

Average based on past 30 years

*This does not reflect the 30 year average because in 1992 the capacity of the reservoir was increased to approximately 646,565 acre-feet as a result of raising the dam. The average used here reflects data from 1993 through 2016.

SNOW and PRECIPITATION UPDATE
Based on Mountain Data from NRCS SNOTEL Sites
As of May 1, 2017

BASIN Data Site Name	Elev.	Snow Water Equivalent			Total Precipitation			
	feet	Current	Median	% Median	Current	Median	% Median	
UPPER YELLOWSTONE RIVER BASIN								
Beartooth Lake	9360	36.1	22.8	158	31.0	21.9	142	
Box Canyon	6670	.0	3.0	0	15.1	14.6	103	
Brackett Creek	7320	24.5	20.1	122	34.8	29.2	119	
Burnt Mtn Canyon	5880 7870	.4 18.7	.0 10.4	* 180	18.4 28.8	15.9 18.0	116 160	
Cole Creek	7850	17.1	16.6	103	14.1	16.4	86	
East Boulder Mine	6335	.9	-M	*	20.0	-M	*	
Evening Star	9200	41.7	24.9	167	48.8	30.4	161	
Fisher Creek	9100	47.6	32.7	146	51.8	35.1	148	
Monument Peak	8850	26.2	21.0	125	33.5	24.3	138	
Northeast Entrance	7350	2.9	3.0	97	23.0	13.8	167	
Parker Peak	9400	42.6	21.3	200	39.8	20.0	199	
Placer Basin	8830	20.2	17.6	115	25.6	22.2	115	
Porcupine	6500	.1	.8	12	16.0	14.6	110	
Sacajawea	6550	8.4	10.3	82	31.9	25.7	124	
Shower Falls	8100	25.0	23.9	105	35.5	27.6	129	
S Fork Shields	8100	22.1	17.8	124	30.3	24.4	124	
Sylvan Lake	8420	27.1	19.8	137	41.9	25.1	167	
Sylvan Road	7120	.0	5.8	0	32.5	18.6	175	
Thumb Divide	7980	20.6	12.4	166	30.6	20.9	146	
Two Ocean Plateau	9240	46.2	29.7	156	45.8	30.1	152	
White Mill	8700	40.4	23.8	170	39.4	26.3	150	
Wolverine	7650	2.9	2.5	116	23.6	13.7	172	
Younts Peak	8350	23.5	15.5	152	33.8	17.6	192	
Basin Index (%)							139	143
WIND RIVER BASIN (WYOMING)								
Burroughs Creek	8750	20.3	-M	*	29.2	-M	*	
Castle Creek	8400	7.5	-M	*	17.3	-M	*	
Cold Springs	9630	16.1	1.3	1238	22.3	12.4	180	
Deer Park	9700	37.2	16.0	232	43.1	23.4	184	
Hobbs Park	10100	35.0	16.0	219	32.9	16.6	198	
Kirwin	9550	26.2	10.4	252	29.1	13.8	211	
Little Warm	9370	19.2	8.7	221	26.9	15.3	176	
Owl Creek	8975	9.0	1.0	900	15.3	7.9	194	
South Pass	9040	34.5	14.9	232	33.6	20.3	166	
St. Lawrence Alt	8620	9.6	2.5	384	20.5	11.5	178	
Togwotee Pass	9580	37.0	24.7	150	42.9	27.2	158	
Townsend Creek	8700	19.9	7.5	265	28.1	14.9	189	
Younts Peak	8350	23.5	15.5	152	33.8	17.6	192	
Basin Index (%)							225	182
SHOSHONE RIVER BASIN (WYOMING)								
Blackwater	9780	42.0	25.3	166	46.2	23.4	197	
Evening Star	9200	41.7	24.9	167	48.8	30.4	161	
Marquette	8760	20.4	-M	*	23.6	-M	*	
Sylvan Lake	8420	27.1	19.8	137	41.9	25.1	167	
Sylvan Road	7120	.0	5.8	0	32.5	18.6	175	
Younts Peak	8350	23.5	15.5	152	33.8	17.6	192	
Basin Index (%)							147	177

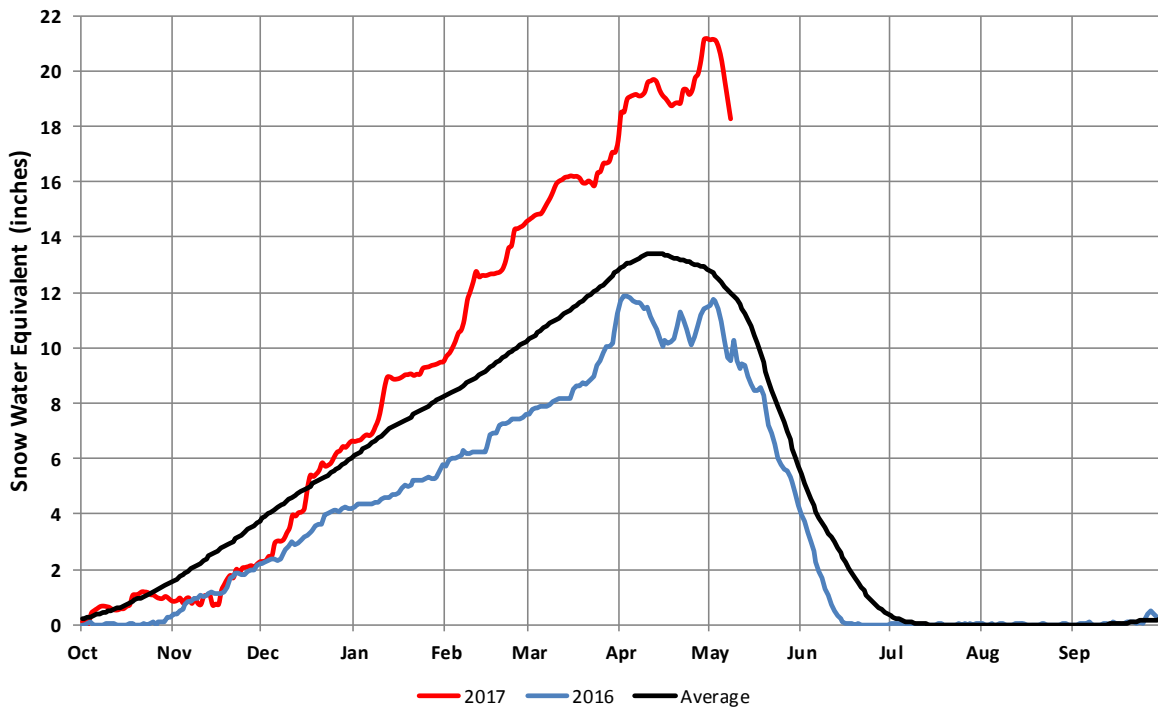
SNOW and PRECIPITATION UPDATE
Based on Mountain Data from NRCS SNOTEL Sites
As of May 1, 2017

BASIN Data Site Name	Elev.	Snow Water Equivalent			Total Precipitation		
		Current	Median	% Median	Current	Median	% Median
BIGHORN BASIN ABOVE YELLOWTAIL DAM							
Bald Mtn.	9380	24.1	20.5	118	20.8	19.7	106
Bear Trap Meadow	8200	7.0	.9	778	14.6	10.6	138
Blackwater	9780	42.0	25.3	166	46.2	23.4	197
Bone Springs Div	9350	23.4	16.5	142	21.2	18.2	116
Burroughs Creek	8750	20.3	-M	*	29.2	-M	*
Castle Creek	8400	7.5	-M	*	17.3	-M	*
Cold Springs	9630	16.1	1.3	1238	22.3	12.4	180
Deer Park	9700	37.2	16.0	232	43.1	23.4	184
Evening Star	9200	41.7	24.9	167	48.8	30.4	161
Grave Springs	8550	11.2	9.4	119	13.5	12.8	105
Kirwin	9550	26.2	10.4	252	29.1	13.8	211
Little Warm	9370	19.2	8.7	221	26.9	15.3	176
Marquette	8760	20.4	-M	*	23.6	-M	*
Middle Powder	7760	13.0	11.6	112	13.8	14.1	98
Owl Creek	8975	9.0	1.0	900	15.3	7.9	194
Powder River Pass	9480	11.7	9.4	124	17.9	15.1	119
Shell Creek	9580	20.2	15.9	127	18.0	16.3	110
South Pass	9040	34.5	14.9	232	33.6	20.3	166
St. Lawrence Alt	8620	9.6	2.5	384	20.5	11.5	178
Sylvan Lake	8420	27.1	19.8	137	41.9	25.1	167
Sylvan Road	7120	.0	5.8	0	32.5	18.6	175
Timber Creek	7950	8.1	3.1	261	15.1	9.9	153
Togwotee Pass	9580	37.0	24.7	150	42.9	27.2	158
Townsend Creek	8700	19.9	7.5	265	28.1	14.9	189
Younts Peak	8350	23.5	15.5	152	33.8	17.6	192
Basin Index (%)					174		158

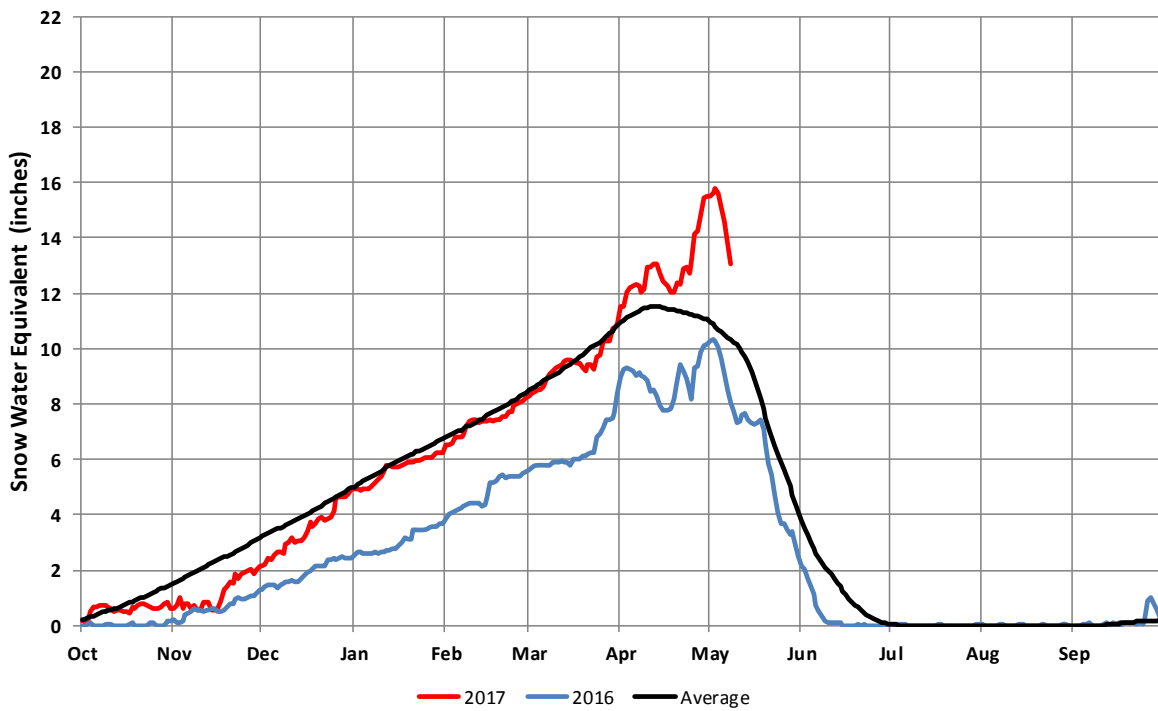
-M = Missing data

* = Data may not provide a valid measure of conditions.

Snowpack above Bighorn Lake



Snowpack in Bighorn Mountains



Based on Most Probable Inflow Forecast (May-July Inflow: 2,454.2 KAF)

BIGHORN LAKE MONTHLY OPERATIONS

Bighorn Reservoir		Initial Cont 747.5 kaf Elev 3607.08 ft					Maximum Cont 1278.9 kaf Elev 3657.00 ft				Minimum Cont 469.9 kaf Elev 3547.00 ft				Total
	2017	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr		
Boysen Release	kaf	331.7	504.9	260.3	123.1	79.1	61.5	59.5	61.5	61.5	55.5	61.5	130.9	1791.0	
Boysen Release	cfs	5395	8485	4233	2002	1329	1000	1000	1000	1000	999	1000	2200		
Buffalo Bill Release	kaf	297.0	377.9	202.2	123.2	100.0	49.2	21.1	21.8	21.8	19.7	21.8	41.7	1297.4	
Buffalo Bill Release	cfs	4830	6351	3288	2004	1681	800	355	355	355	355	355	701		
Station Gain	kaf	260.9	219.2	0.1	-35.0	22.5	65.2	68.0	49.6	51.9	62.3	82.4	39.9	887.0	
Monthly Inflow	kaf	889.6	1102.0	462.6	211.3	201.6	175.9	148.6	132.9	135.2	137.5	165.7	212.5	3975.4	
Monthly Inflow	cfs	14468	18520	7523	3436	3388	2861	2497	2161	2199	2476	2695	3571		
Turbine Release	kaf	368.9	357.0	368.9	237.9	191.8	183.2	180.5	186.5	186.5	168.5	186.5	230.9	2847.1	
Bypass/Spill/Waste	kaf	493.0	524.4	68.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1086.3	
Total Release	kaf	861.9	881.4	437.8	237.9	191.8	183.2	180.5	186.5	186.5	168.5	186.5	230.9	3933.4	
Total Release	cfs	14017	14812	7120	3869	3223	2979	3033	3033	3033	3034	3033	3880		
Spring Flow	kaf	4.3	4.2	4.3	4.3	4.2	4.3	4.2	4.3	4.3	3.9	4.3	4.2	50.8	
Irrigation Reqmnt	kaf	5.4	22.8	28.1	27.0	17.5	3.0	0.0	0.0	0.0	0.0	0.0	1.3	105.1	
Afterbay Rels	kaf	866.2	885.6	442.1	242.2	196.0	187.5	184.7	190.8	190.8	172.4	190.8	235.1	3984.2	
Afterbay Rels	cfs	14087	14883	7190	3939	3294	3049	3104	3103	3103	3104	3103	3951		
River Release	kaf	860.8	862.8	414.0	215.2	178.5	184.5	184.7	190.8	190.8	172.4	190.8	233.8	3879.1	
River Release	cfs	14000	14500	6733	3500	3000	3001	3104	3103	3103	3104	3103	3929		
Min Release	kaf	860.8	862.8	92.2	215.2	178.5	184.5	89.3	92.2	92.2	83.3	92.2	148.8	2992.0	
End-Month Content	kaf	775.2	995.8	1020.6	994.0	1003.8	996.5	964.6	911.0	859.7	828.7	807.9	789.5		
End-Month Elevation	ft	3611.90	3637.98	3640.00	3637.83	3638.64	3638.04	3635.27	3629.96	3623.96	3619.93	3617.00	3614.20		
Net Change Content	kaf	27.7	220.6	24.8	-26.6	9.8	-7.3	-31.9	-53.6	-51.3	-31.0	-20.8	-18.4	42.0	
Yellowtail Power	2017	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Total	
Turbine Release	kaf	368.9	357.0	368.9	237.9	191.8	183.2	180.5	186.5	186.5	168.5	186.5	230.9	2847.1	
Generation	gwh	150.660	145.800	150.660	97.156	76.797	72.800	71.138	72.978	71.998	63.486	70.863	89.209	1133.545	
End-Month Power Cap	mw	260.8	285.6	287.5	285.5	286.2	285.7	283.0	278.0	272.3	268.5	265.7	263.0		
% Max Gen		70	70	70	45	37	34	34	34	34	33	33	43		
Ave kwh/af		408	408	408	408	400	397	394	391	386	377	380	386	398	
Upstream Generation	gwh	32.044	32.867	35.202	33.679	27.667	17.937	10.786	11.106	11.022	9.866	10.879	29.318	262.373	
Total Generation	gwh	182.704	178.667	185.862	130.835	104.464	90.737	81.924	84.084	83.020	73.352	81.742	118.527	1395.918	

Based on Minimum Probable Inflow Forecast (May-July Inflow: 1,853.5 KAF)

BIGHORN LAKE MONTHLY OPERATIONS

Bighorn Reservoir		Initial Cont 747.5 kaf Elev 3607.08 ft				Maximum Cont 1278.9 kaf Elev 3657.00 ft				Minimum Cont 469.9 kaf Elev 3547.00 ft				Total
	2017	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	
Boysen Release	kaf	331.8	344.7	217.7	75.8	73.4	61.5	59.5	61.5	61.5	55.5	61.5	59.5	1463.9
Boysen Release	cfs	5396	5793	3541	1233	1234	1000	1000	1000	1000	999	1000	1000	
Buffalo Bill Release	kaf	297.0	205.3	173.8	105.2	89.2	40.9	21.1	21.8	21.8	19.8	21.8	28.1	1045.8
Buffalo Bill Release	cfs	4830	3450	2827	1711	1499	665	355	355	355	357	355	472	
Station Gain	kaf	180.0	122.0	-18.8	-45.3	7.8	46.2	62.0	42.6	47.9	56.5	73.8	20.3	595.0
Monthly Inflow	kaf	808.8	672.0	372.7	135.7	170.4	148.6	142.6	125.9	131.2	131.8	157.1	107.9	3104.7
Monthly Inflow	cfs	13154	11293	6061	2207	2864	2417	2396	2048	2134	2373	2555	1813	
Turbine Release	kaf	368.9	357.0	285.4	191.8	176.9	167.8	162.8	168.2	168.3	152.0	168.2	116.1	2483.4
Bypass/Spill/Waste	kaf	431.5	137.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	569.1
Total Release	kaf	800.4	494.6	285.4	191.8	176.9	167.8	162.8	168.2	168.3	152.0	168.2	116.1	3052.5
Total Release	cfs	13017	8312	4642	3119	2973	2729	2736	2736	2737	2737	2736	1951	
Spring Flow	kaf	4.3	4.2	4.3	4.3	4.2	4.3	4.2	4.3	4.3	3.9	4.3	4.2	50.8
Irrigation Reqmnt	kaf	5.4	22.8	28.1	27.0	17.5	3.0	0.0	0.0	0.0	0.0	0.0	1.3	105.1
Afterbay Rels	kaf	804.7	498.8	289.7	196.1	181.1	172.1	167.0	172.5	172.6	155.9	172.5	120.3	3103.3
Afterbay Rels	cfs	13087	8383	4712	3189	3043	2799	2807	2805	2807	2807	2805	2022	
River Release	kaf	799.3	476.0	261.6	169.1	163.6	169.1	167.0	172.5	172.6	155.9	172.5	119.0	2998.2
River Release	cfs	12999	7999	4255	2750	2749	2750	2807	2805	2807	2807	2805	2000	
Min Release	kaf	799.3	476.0	184.5	169.1	163.6	169.1	89.3	92.2	92.2	83.3	92.2	119.0	2529.8
End-Month Content	kaf	755.9	933.3	1020.6	964.5	958.0	938.8	918.6	876.3	839.2	819.0	807.9	799.7	
End-Month Elevation	ft	3608.59	3632.29	3640.00	3635.26	3634.66	3632.84	3630.78	3625.99	3621.33	3618.58	3617.00	3615.77	
Net Change Content	kaf	8.4	177.4	87.3	-56.1	-6.5	-19.2	-20.2	-42.3	-37.1	-20.2	-11.1	-8.2	52.2
Yellowtail Power	2017	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Total
Turbine Release	kaf	368.9	357.0	285.4	191.8	176.9	167.8	162.8	168.2	168.3	152.0	168.2	116.1	2483.4
Generation	gwh	150.660	145.800	117.843	76.228	69.418	65.045	62.508	64.233	63.601	56.104	62.930	40.411	974.781
End-Month Power Cap	mw	257.7	280.2	287.5	283.0	282.5	280.7	278.8	274.2	269.8	267.2	265.7	264.5	
% Max Gen		70	70	55	36	33	30	30	30	30	29	29	19	
Ave kwh/af		408	408	413	397	392	388	384	382	378	369	374	348	393
Upstream Generation	gwh	31.477	32.773	35.257	27.046	24.107	15.321	10.703	10.993	10.881	8.909	10.679	11.597	229.743
Total Generation	gwh	182.137	178.573	153.100	103.274	93.525	80.366	73.211	75.226	74.482	65.013	73.609	52.008	1204.524

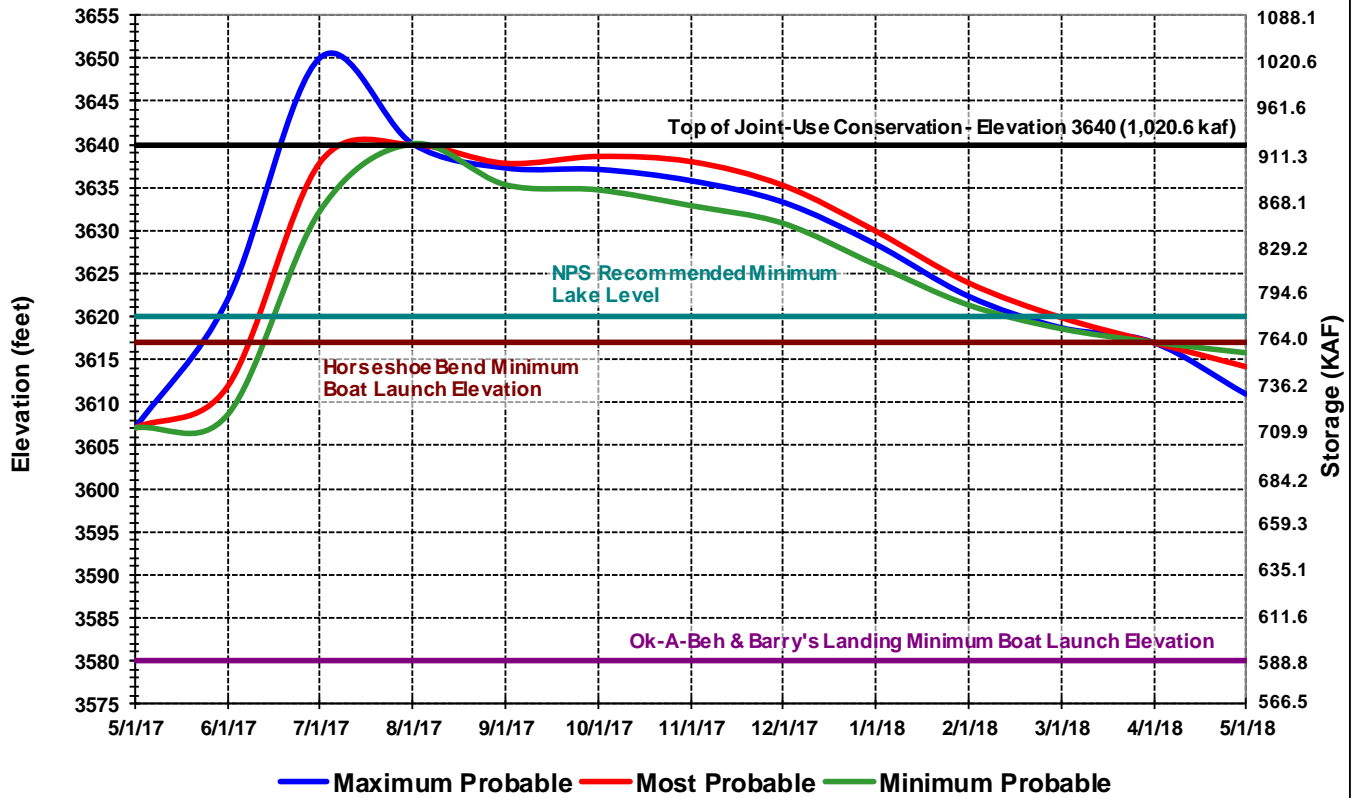
Based on Maximum Probable Inflow Forecast (May-July Inflow: 3,008.8 KAF)

BIGHORN LAKE MONTHLY OPERATIONS

Bighorn Reservoir		Initial Cont 747.5 kaf Elev 3607.08 ft				Maximum Cont 1278.9 kaf Elev 3657.00 ft				Minimum Cont 469.9 kaf Elev 3547.00 ft				Total
	2017	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Total
Boysen Release	kaf	368.4	535.9	364.6	118.2	129.4	67.6	59.5	61.5	61.5	55.5	61.5	130.9	2014.5
Boysen Release	cfs	5991	9006	5930	1922	2175	1099	1000	1000	1000	999	1000	2200	
Buffalo Bill Release	kaf	320.9	502.8	253.2	160.6	98.2	47.2	21.1	21.8	21.8	19.8	21.8	41.7	1530.9
Buffalo Bill Release	cfs	5219	8450	4118	2612	1650	768	355	355	355	357	355	701	
Station Gain	kaf	300.0	303.7	59.3	-28.7	36.7	84.2	72.6	56.8	53.2	65.7	91.0	51.0	1145.5
Monthly Inflow	kaf	989.3	1342.4	677.1	250.1	264.3	199.0	153.2	140.1	136.5	141.0	174.3	223.6	4690.9
Monthly Inflow	cfs	16089	22560	11012	4067	4442	3236	2575	2279	2220	2539	2835	3758	
Turbine Release	kaf	368.9	357.0	368.9	284.0	266.2	213.9	180.2	186.2	186.2	168.2	186.3	261.6	3027.6
Bypass/Spill/Waste	kaf	523.8	666.1	451.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1640.9
Total Release	kaf	892.7	1023.1	819.9	284.0	266.2	213.9	180.2	186.2	186.2	168.2	186.3	261.6	4668.5
Total Release	cfs	14518	17194	13334	4619	4474	3479	3028	3028	3028	3029	3030	4396	
Spring Flow	kaf	4.3	4.2	4.3	4.3	4.2	4.3	4.2	4.3	4.3	3.9	4.3	4.2	50.8
Irrigation Reqmnt	kaf	5.4	22.8	28.1	27.0	17.5	3.0	0.0	0.0	0.0	0.0	0.0	1.3	105.1
Afterbay Rels	kaf	897.0	1027.3	824.2	288.3	270.4	218.2	184.4	190.5	190.5	172.1	190.6	265.8	4719.3
Afterbay Rels	cfs	14588	17264	13404	4689	4544	3549	3099	3098	3098	3099	3100	4467	
River Release	kaf	891.6	1004.5	796.1	261.3	252.9	215.2	184.4	190.5	190.5	172.1	190.6	264.5	4614.2
River Release	cfs	14500	16881	12947	4250	4250	3500	3099	3098	3098	3099	3100	4445	
Min Release	kaf	891.6	89.3	92.2	261.3	252.9	215.2	89.3	92.2	92.2	83.3	92.2	89.3	2341.0
End-Month Content	kaf	844.1	1163.4	1020.6	986.7	984.8	969.9	942.9	896.8	847.1	819.9	807.9	769.9	
End-Month Elevation	ft	3621.97	3650.00	3640.00	3637.21	3637.05	3635.74	3633.24	3628.38	3622.36	3618.71	3617.00	3611.01	
Net Change Content	kaf	96.6	319.3	-142.8	-33.9	-1.9	-14.9	-27.0	-46.1	-49.7	-27.2	-12.0	-38.0	22.4
Yellowtail Power	2017	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Total
Turbine Release	kaf	368.9	357.0	368.9	284.0	266.2	213.9	180.2	186.2	186.2	168.2	186.3	261.6	3027.6
Generation	gwh	150.660	145.800	150.660	116.547	109.096	86.185	70.684	72.587	71.606	63.178	70.776	101.009	1208.788
End-Month Power Cap	mw	270.4	288.0	287.5	284.9	284.7	283.5	281.1	276.5	270.8	267.3	265.7	260.0	
% Max Gen		70	70	70	54	53	40	34	34	33	33	33	49	
Ave kwh/af		408	408	408	410	410	403	392	390	385	376	380	386	399
Upstream Generation	gwh	8.871	10.340	10.902	9.729	10.466	4.988	4.278	4.419	4.361	3.797	4.294	9.943	86.388
Total Generation	gwh	159.531	156.140	161.562	126.276	119.562	91.173	74.962	77.006	75.967	66.975	75.070	110.952	1295.176

BIGHORN LAKE

BIGHORN LAKE ELEVATION



BIGHORN RIVER FLOW BELOW AFTERBAY

