

RECLAMATION

Managing Water in the West

July 7, 2016

Dear Customer:

Attached is the Monthly Water Supply Outlook and projected operations for Yellowtail Dam and Powerplant. Streamflows into Bighorn Lake during June were 97 percent of average. Based on the July 1 water supply forecast and the planned releases out of Boysen and Buffalo Bill Reservoirs, the July runoff into Bighorn Lake is expected to equal 103,900 acre-feet (40 percent of average). If you have any questions or concerns, please feel free to contact Tim Felchle at 406-247-7318 or me at 406-247-7334.

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
 July 1, 2016

Present Elevations & Storages:

	Elevation (feet)	Storage (acre-feet)	Percent of Average	Percent Full
Boysen	4724.19	725,840	113	98
Buffalo Bill	5390.80	624,910	109 *	97
Bighorn Lake	3634.93	960,852	104	94

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

<u>Water Year 2016</u>	<u>Inflow</u>	<u>Percent of Average</u>
October	133.5	84
November	121.1	102
December	116.1	114
January	118.1	115
February	123.8	117
March	111.5	77
April	122.0	81
May	358.3	131
June	422.8	97
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<u>Water Year 2015</u>	<u>Inflow</u>	<u>Percent of Average</u>
May	311.8	116
June	876.9	214
July	223.6	88
August	150.1	102
September	134.2	83
April-July	1,542.8	142

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

<u>Water Year 2016</u>	<u>Gains</u>	<u>Percent of Average</u>
October	34.3	51
November	58.0	103
December	51.2	136
January	52.7	132
February	64.3	130
March	53.0	74
April	32.2	98
May	21.5	40
June	-37.0 (avg. 92.6)	-
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<u>Water Year 2015</u>	<u>Gains</u>	<u>Percent of Average</u>
May	96.4	192
June	178.1	207
July	-50.2 (avg. -62.9)	-
August	-31.7 (avg. -54.0)	-
September	-12.6 (avg. 10.5)	-
April-July	248.6	232

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

<u>Agency</u>	<u>Inflows</u>	<u>Percent of Average</u>
USBR	103.9	40

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 2015.

BHXAOP V1.16 Run: 07-Jul-2016 16:42
 Based on Most Probable Inflow Forecast

BIGHORN LAKE MONTHLY OPERATIONS

Bighorn Reservoir	2016	Initial Cont Elev 3634.93 ft				Maximum Cont Elev 3657.00 ft				Minimum Cont Elev 3547.00 ft				Total
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Boysen Release	kaf	90.0	90.0	71.3	61.5	59.5	61.5	61.5	55.5	67.6	59.5	72.2	140.4	890.5
Boysen Release	cfs	1464	1464	1198	1000	1000	1000	1000	999	1099	1000	1174	2360	
Buffalo Bill Release	kaf	119.9	112.9	83.3	51.2	21.1	21.8	21.8	19.8	21.8	35.7	126.9	141.6	777.8
Buffalo Bill Release	cfs	1950	1836	1400	833	355	355	355	357	355	600	2064	2380	
Station Gain	kaf	-106.0	-78.2	-7.8	55.6	48.1	30.5	34.6	39.8	58.4	39.9	62.2	119.0	296.1
Monthly Inflow	kaf	103.9	124.7	146.8	168.3	128.7	113.8	117.9	115.1	147.8	135.1	261.3	401.0	1964.4
Monthly Inflow	cfs	1690	2028	2467	2737	2163	1851	1917	2072	2404	2270	4250	6739	
Turbine Release	kaf	162.1	161.0	147.2	137.0	141.6	146.3	146.3	132.2	146.3	153.8	221.2	252.0	1947.0
Bypass/Spill/Waste	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Release	kaf	162.1	161.0	147.2	137.0	141.6	146.3	146.3	132.2	146.3	153.8	221.2	252.0	1947.0
Total Release	cfs	2636	2618	2474	2228	2380	2379	2379	2380	2379	2585	3597	4235	
Spring Flow	kaf	4.3	4.3	4.2	4.3	4.2	4.3	4.3	3.9	4.3	4.2	4.3	4.2	50.8
Irrigation Reqmnt	kaf	28.1	27.0	17.5	3.0	0.0	0.0	0.0	0.0	0.0	12.5	14.9	22.8	125.8
Afterbay Rels	kaf	166.4	165.3	151.4	141.3	145.8	150.6	150.6	136.1	150.6	158.0	225.5	256.2	1997.8
Afterbay Rels	cfs	2706	2688	2544	2298	2450	2449	2449	2451	2449	2655	3667	4306	
River Release	kaf	138.3	138.3	133.9	138.3	145.8	150.6	150.6	136.1	150.6	145.5	210.6	233.4	1872.0
River Release	cfs	2249	2249	2250	2249	2450	2449	2449	2451	2449	2445	3425	3922	
Min Release	kaf	138.3	138.3	133.9	138.3	89.3	92.2	92.2	83.3	92.2	145.5	92.2	89.3	1325.0
End-Month Content	kaf	902.7	866.4	866.0	897.3	884.4	851.9	823.5	806.4	807.9	789.2	829.3	978.3	
End-Month Elevation	ft	3629.04	3624.79	3624.74	3628.44	3626.95	3622.98	3619.21	3616.77	3617.00	3614.16	3620.01	3636.48	
Net Change Content	kaf	-58.2	-36.3	-0.4	31.3	-12.9	-32.5	-28.4	-17.1	1.5	-18.7	40.1	149.0	17.4
Yellowtail Power	2016	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Turbine Release	kaf	162.1	161.0	147.2	137.0	141.6	146.3	146.3	132.2	146.3	153.8	221.2	252.0	1947.0
Generation	gwh	61.953	60.877	54.781	50.725	52.581	54.169	53.705	47.338	53.433	56.310	86.305	102.941	735.118
End-Month Power Cap	mw	277.1	273.1	273.0	276.5	275.1	271.4	267.8	265.5	265.7	263.0	268.5	284.2	
% Max Gen		29	28	26	24	25	25	25	24	25	27	40	50	
Ave kwh/af		382	378	372	370	371	370	367	358	365	366	390	408	378
Upstream Generation	gwh	30.224	30.020	23.159	18.520	10.781	11.087	10.987	8.988	11.296	13.671	28.817	33.887	231.437
Total Generation	gwh	92.177	90.897	77.940	69.245	63.362	65.256	64.692	56.326	64.729	69.981	115.122	136.828	966.555

BHXAOP V1.16 Run: 07-Jul-2016 16:42
 Based on Minimum Probable Inflow Forecast

BIGHORN LAKE MONTHLY OPERATIONS

Bighorn Reservoir	2016	Initial Cont Elev 3634.93 ft				Maximum Cont Elev 3657.00 ft				Minimum Cont Elev 3547.00 ft				Total
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Boysen Release	kaf	73.8	67.7	54.1	50.7	49.1	50.7	50.7	45.8	57.2	49.1	72.2	71.4	692.5
Boysen Release	cfs	1200	1101	909	825	825	825	825	825	930	825	1174	1200	
Buffalo Bill Release	kaf	119.9	112.9	83.3	28.3	12.2	12.6	12.6	11.4	12.6	58.7	107.9	111.6	684.0
Buffalo Bill Release	cfs	1950	1836	1400	460	205	205	205	205	205	986	1755	1876	
Station Gain	kaf	-121.3	-88.0	-18.3	41.9	46.8	29.4	33.4	38.3	57.0	20.3	10.0	1.3	50.8
Monthly Inflow	kaf	72.4	92.6	119.1	120.9	108.1	92.7	96.7	95.5	126.8	128.1	190.1	184.3	1427.3
Monthly Inflow	cfs	1177	1506	2002	1966	1817	1508	1573	1720	2062	2153	3092	3097	
Turbine Release	kaf	152.9	136.5	123.4	112.5	109.7	113.4	113.5	102.5	113.4	110.2	141.5	137.6	1467.1
Bypass/Spill/Waste	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Release	kaf	152.9	136.5	123.4	112.5	109.7	113.4	113.5	102.5	113.4	110.2	141.5	137.6	1467.1
Total Release	cfs	2487	2220	2074	1830	1844	1844	1846	1846	1844	1852	2301	2312	
Spring Flow	kaf	4.3	4.3	4.2	4.3	4.2	4.3	4.3	3.9	4.3	4.2	4.3	4.2	50.8
Irrigation Reqmnt	kaf	28.1	27.0	17.5	3.0	0.0	0.0	0.0	0.0	0.0	1.3	22.8	22.8	122.5
Afterbay Rels	kaf	157.2	140.8	127.6	116.8	113.9	117.7	117.8	106.4	117.7	114.4	145.8	141.8	1517.9
Afterbay Rels	cfs	2557	2290	2144	1900	1914	1914	1916	1916	1914	1923	2371	2383	
River Release	kaf	129.1	113.8	110.1	113.8	113.9	117.7	117.8	106.4	117.7	113.1	123.0	119.0	1395.4
River Release	cfs	2100	1851	1850	1851	1914	1914	1916	1916	1914	1901	2000	2000	
Min Release	kaf	129.1	113.8	110.1	113.8	89.3	92.2	92.2	83.3	92.2	113.1	123.0	119.0	1271.1
End-Month Content	kaf	880.4	836.5	832.2	840.6	839.0	818.3	801.5	794.5	807.9	825.8	874.4	921.1	
End-Month Elevation	ft	3626.48	3620.97	3620.40	3621.51	3621.30	3618.49	3616.05	3614.98	3617.00	3619.53	3625.76	3631.05	
Net Change Content	kaf	-80.5	-43.9	-4.3	8.4	-1.6	-20.7	-16.8	-7.0	13.4	17.9	48.6	46.7	-39.8
Yellowtail Power	2016	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Turbine Release	kaf	152.9	136.5	123.4	112.5	109.7	113.4	113.5	102.5	113.4	110.2	141.5	137.6	1467.1
Generation	gwh	57.519	49.658	43.952	39.420	38.220	39.527	39.347	34.703	39.392	38.276	52.396	51.288	523.698
End-Month Power Cap	mw	274.7	269.4	268.9	270.0	269.8	267.1	264.8	263.8	265.7	268.1	274.0	279.0	
% Max Gen		27	23	21	18	18	18	18	18	18	18	24	25	
Ave kwh/af		376	364	356	350	348	349	347	339	347	347	370	373	357
Upstream Generation	gwh	28.687	27.289	20.694	10.697	7.247	7.473	7.432	5.837	7.892	19.134	26.757	26.413	195.552
Total Generation	gwh	86.206	76.947	64.646	50.117	45.467	47.000	46.779	40.540	47.284	57.410	79.153	77.701	719.250

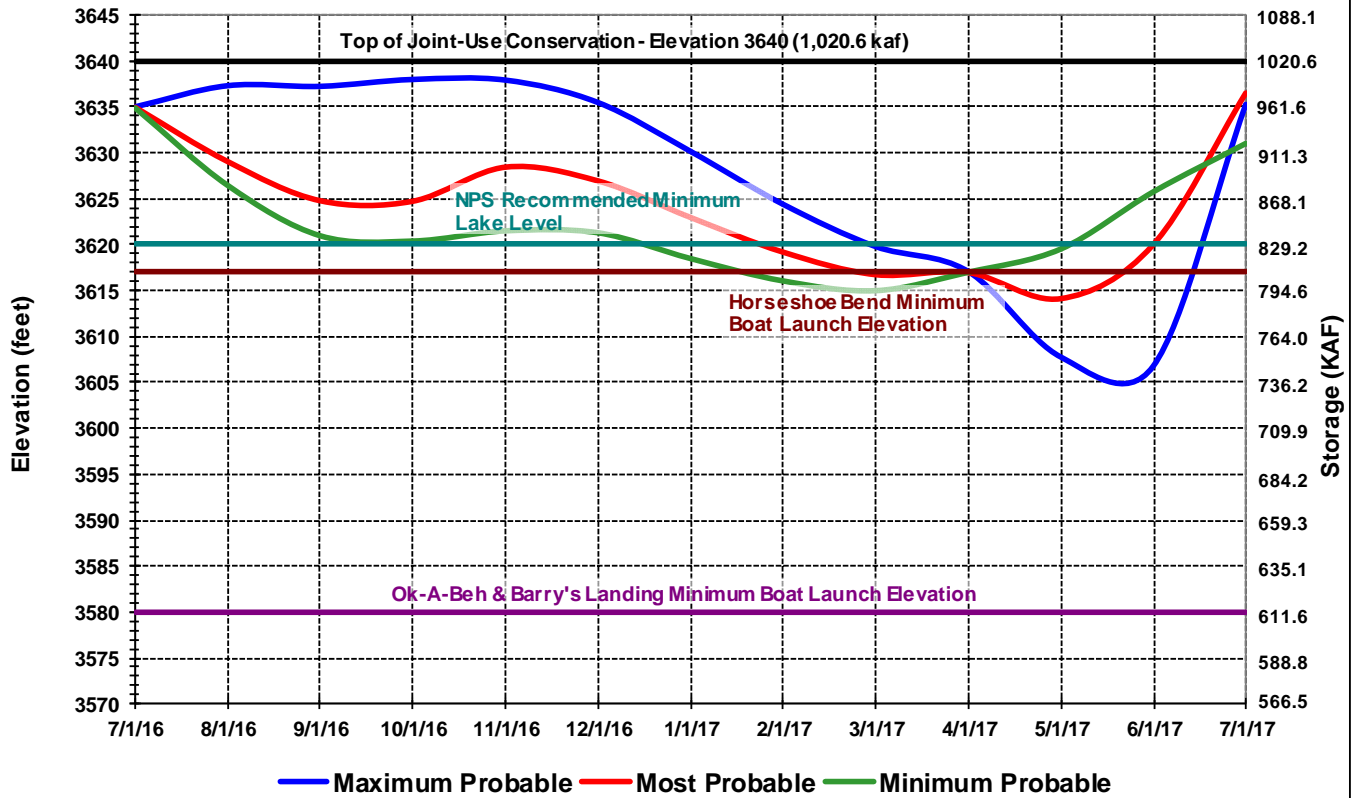
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BIGHORN LAKE MONTHLY OPERATIONS

Bighorn Reservoir		Initial Cont Elev 3634.93 ft				Maximum Cont Elev 3657.00 ft				Minimum Cont Elev 3547.00 ft				Total	
		2016	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Boysen Release	kaf	128.8	113.4	71.4	61.5	59.5	61.5	61.5	55.6	104.5	130.9	184.5	208.3	1241.4	
Boysen Release	cfs	2095	1844	1200	1000	1000	1000	1000	1001	1700	2200	3001	3501		
Buffalo Bill Release	kaf	141.0	135.5	104.1	41.6	26.5	21.8	21.8	19.8	21.8	31.8	211.3	285.6	1062.6	
Buffalo Bill Release	cfs	2293	2204	1749	677	445	355	355	357	355	534	3436	4800		
Station Gain	kaf	-66.1	-55.0	13.4	66.8	50.5	32.6	36.9	42.7	61.1	51.0	128.9	266.4	629.2	
Monthly Inflow	kaf	203.7	193.9	188.9	169.9	136.5	115.9	120.2	118.1	187.4	213.7	524.7	760.3	2933.2	
Monthly Inflow	cfs	3313	3153	3175	2763	2294	1885	1955	2127	3048	3591	8533	12777		
Turbine Release	kaf	177.5	194.9	179.9	170.9	171.7	177.4	177.5	160.3	177.4	269.7	368.9	357.0	2583.1	
Bypass/Spill/Waste	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	162.5	184.6	347.1	
Total Release	kaf	177.5	194.9	179.9	170.9	171.7	177.4	177.5	160.3	177.4	269.7	531.4	541.6	2930.2	
Total Release	cfs	2887	3170	3023	2779	2886	2885	2887	2886	2885	4532	8642	9102		
Spring Flow	kaf	4.3	4.3	4.2	4.3	4.2	4.3	4.3	3.9	4.3	4.2	4.3	4.2	50.8	
Irrigation Reqmnt	kaf	28.1	27.0	17.5	3.0	0.0	0.0	0.0	0.0	0.0	1.3	11.9	22.8	111.6	
Afterbay Rels	kaf	181.8	199.2	184.1	175.2	175.9	181.7	181.8	164.2	181.7	273.9	535.7	545.8	2981.0	
Afterbay Rels	cfs	2957	3240	3094	2849	2956	2955	2957	2957	2955	4603	8712	9172		
River Release	kaf	153.7	172.2	166.6	172.2	175.9	181.7	181.8	164.2	181.7	272.6	523.8	523.0	2869.4	
River Release	cfs	2500	2801	2800	2801	2956	2955	2957	2957	2955	4581	8519	8789		
Min Release	kaf	153.7	172.2	166.6	172.2	89.3	92.2	92.2	83.3	92.2	214.2	153.7	119.0	1600.8	
End-Month Content	kaf	987.1	986.1	995.1	994.1	958.9	897.4	840.1	797.9	807.9	751.9	745.2	963.9		
End-Month Elevation	ft	3637.24	3637.16	3637.92	3637.84	3634.75	3628.45	3621.45	3615.50	3617.00	3607.87	3606.66	3635.20		
Net Change Content	kaf	26.2	-1.0	9.0	-1.0	-35.2	-61.5	-57.3	-42.2	10.0	-56.0	-6.7	218.7	3.0	
Yellowtail Power	2016	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total	
Turbine Release	kaf	177.5	194.9	179.9	170.9	171.7	177.4	177.5	160.3	177.4	269.7	368.9	357.0	2583.1	
Generation	gwh	70.087	77.946	71.282	67.178	67.084	68.687	67.652	59.295	66.922	103.458	150.660	145.800	1016.051	
End-Month Power Cap	mw	284.9	284.8	285.6	285.5	282.5	276.6	269.9	264.2	265.7	257.0	255.8	283.0		
% Max Gen		33	36	34	31	32	32	32	31	31	50	70	70		
Ave kwh/af		395	400	396	393	391	387	381	370	377	384	408	408	393	
Upstream Generation	gwh	34.802	33.192	27.437	15.737	12.211	10.967	10.891	8.941	14.103	17.307	32.185	33.320	251.093	
Total Generation	gwh	104.889	111.138	98.719	82.915	79.295	79.654	78.543	68.236	81.025	120.765	182.845	179.120	1267.144	

BIGHORN LAKE

BIGHORN LAKE ELEVATION



BIGHORN RIVER FLOW BELOW AFTERBAY

