

# RECLAMATION

## *Managing Water in the West*

June 10, 2011

Dear Customer:

Attached are the monthly water supply outlook and projected reservoir and river operating plans as prepared in June. Mountain snowpack conditions in the Bighorn Basin on June 1 were 295 percent of average. Based on current hydrologic and climatic conditions and the planned releases out of Boysen and Buffalo Bill Reservoirs, the June-July runoff into Bighorn Lake is estimated to be about 1,800,000 acre-feet (252% of average). If you have any questions or concerns, please feel free to call me at (406) 247-7318.

Tim H. Felchle  
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

June 1, 2011

### Present Elevations & Storages:

<u>Reservoir</u>	<u>Elevation</u>	<u>Storage</u>	<u>Percent of Average</u>	<u>Percent Full</u>
Boysen	4707.82	463,262	84	62
Buffalo Bill	5346.01	313,936	71	49
Bighorn Lake	3631.31	923,610	111	86

### Actual Inflows (1,000 Acre-Feet):

<u>Month</u>	<u>Inflow</u>	<u>Percent of Average</u>
May	340.9	138
June	761.3	184
July	280.8	97
August	122.7	77
September	119.6	70
<b><i>April-July, 2010</i></b>	<b><i>1,504.4</i></b>	<b><i>135</i></b>
<b><i>WY-2010 Total</i></b>	<b><i>2,573.5</i></b>	<b><i>109</i></b>
October	122.2	70
November	122.6	84
December	122.7	96
January	121.8	96
February	111.9	86
March	167.4	101
April	245.8	153
May	529.4	201

### Actual Gains Between Boysen and Buffalo Bill to Yellowtail (1,000 Acre-Feet):

<u>Month</u>	<u>Gains</u>	<u>Percent of Average</u>
May	47.5	79
June	228.3	215
July	-50.8	---
August	-71.7	---
September	-9.7	---
<b><i>April-July, 2010</i></b>	<b><i>254.2</i></b>	<b><i>163</i></b>
<b><i>WY-2010 Total</i></b>	<b><i>513.9</i></b>	<b><i>107</i></b>
October	28.7	40
November	54.2	89
December	52.1	121
January	50.9	110
February	47.9	90
March	95.6	128
April	47.7	137
May	168.3	280

### June 1 Runoff Forecast (June-July Inflows - 1,000 Acre-Feet):

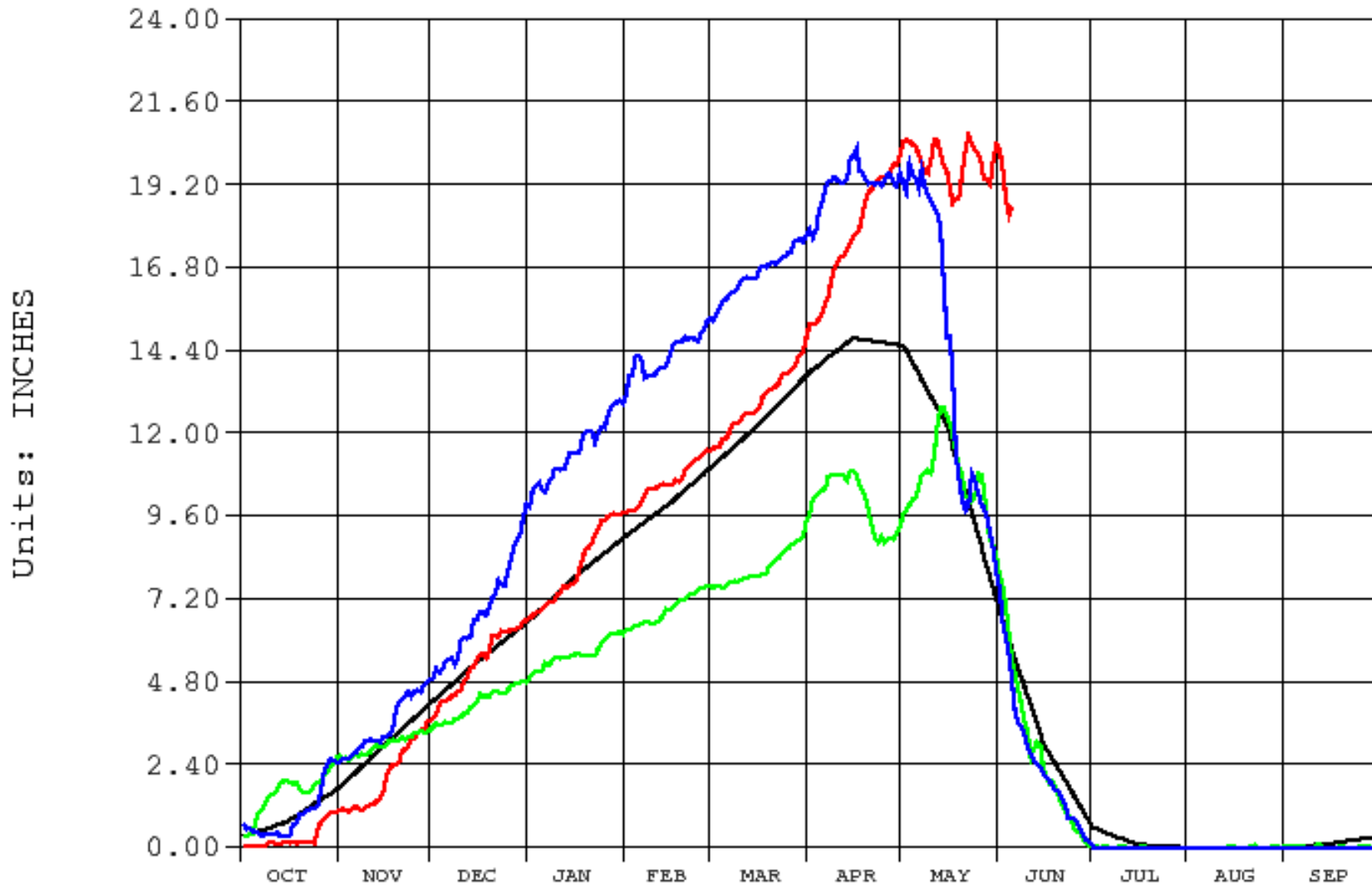
<u>Agency</u>	<u>Inflows</u>	<u>Percent of Average</u>
<b>USBR</b>	<b>1,800.0</b>	<b>252</b>

### Snowpack Conditions:

S N O W - P R E C I P I T A T I O N    U P D A T E  
 Based on Mountain Data from NRCS SNOTEL Sites  
 As of WEDNESDAY: JUNE 1 , 2011

BASIN Data Site Name	ELEV. (Ft)	SNOW WATER EQUIVALENT			TOTAL PRECIPITATION		
		Current	Average	Avg %	Current	Average	Avg %
UPPER YELLOWSTONE RIVER BASIN							
BEARTOOTH LAKE	9360	33.6	20.1	167	37.0	27.0	137
BOX CANYON	6670	.0	.0	100*	24.3	18.2	134
BRACKETT CREEK	7320	28.1	5.1	551	44.4	36.8	121
BURNT MTN	5880	.0	.0	100*	28.4	25.3	112
CANYON	7870	13.9	1.3	1069*	27.2	20.5	133
COLE CREEK	7850	25.5	11.0	232	25.8	27.4	94
EAST BOULDER MINE	6335	.0	-M	*	26.3	-M	*
EVENING STAR	9200	42.5	26.7	159	51.9	34.4	151
FISHER CREEK	9100	53.9	30.1	179	56.2	46.7	120
MONUMENT PEAK	8850	30.3	15.9	191	39.3	29.0	136
NORTHEAST ENTRANCE	7350	.0	.4	0*	23.3	17.6	132
PARKER PEAK	9400	41.6	18.5	225	42.0	23.2	181
PLACER BASIN	8830	34.1	14.6	234	39.2	29.0	135
PORCUPINE	6500	.0	.0	100*	23.4	18.8	124
SACAJAWEA	6550	9.7	.0	*	40.2	33.1	121
SHOWER FALLS	8100	37.0	20.5	180	44.2	36.8	120
S FORK SHIELDS	8100	27.2	12.3	221	41.8	31.2	134
SYLVAN LAKE	8420	28.1	11.4	246	42.2	29.0	146
SYLVAN ROAD	7120	.0	.0	100*	31.3	23.3	134
THUMB DIVIDE	7980	15.7	1.9	826*	31.0	24.8	125
TWO OCEAN PLATEAU	9240	54.3	25.2	215	45.7	36.3	126
WHITE MILL	8700	35.1	18.0	195	41.0	35.2	116
WOLVERINE	7650	2.4	.0	*	22.1	18.3	121
YOUNTS PEAK	8350	20.4	7.0	291	25.5	22.1	115
Basin wide percent of average				222	128		
WIND RIVER BASIN (WYOMING)							
BURROUGHS CREEK	8750	20.3	3.4	597	28.8	22.6	127
CASTLE CREEK	8400	.0	-M	*	14.4	-M	*
COLD SPRINGS	9630	10.5	1.1	955	20.2	17.1	118
DEER PARK	9700	25.4	8.0	318	34.2	30.9	111
HOBBS PARK	10100	25.8	10.1	255	27.4	21.0	130
KIRWIN	9550	18.6	5.5	338	24.2	17.5	138
LITTLE WARM	9370	15.7	1.9	826	22.5	20.0	113
OWL CREEK	8975	1.8	.5	360*	14.9	11.1	134
SOUTH PASS	9040	20.5	6.3	325	26.2	26.0	101
ST. LAWRENCE ALT	8620	1.7	.7	243*	19.8	15.2	130
TOGWOTEE PASS	9580	42.6	21.9	195	46.3	32.7	142
TOWNSEND CREEK	8700	7.6	1.7	447	22.2	18.8	118
YOUNTS PEAK	8350	20.4	7.0	291	25.5	22.1	115
Basin wide percent of average				310	122		
SHOSHONE RIVER BASIN (WYOMING)							
BLACKWATER	9780	43.1	24.7	174	41.8	28.9	145
EVENING STAR	9200	42.5	26.7	159	51.9	34.4	151
MARQUETTE	8760	14.6	-M	*	20.1	18.0	112
SYLVAN LAKE	8420	28.1	11.4	246	42.2	29.0	146
SYLVAN ROAD	7120	.0	.0	100*	31.3	23.3	134
YOUNTS PEAK	8350	20.4	7.0	291	25.5	22.1	115
Basin wide percent of average				192	137		
BIGHORN RIVER BASIN (WYOMING)							
BALD MTN.	9380	41.1	16.7	246	34.3	25.3	136
BEAR TRAP MEADOW	8200	7.5	.0	*	19.7	14.2	139
BLACKWATER	9780	43.1	24.7	174	41.8	28.9	145
BONE SPRINGS DIV	9350	33.2	8.2	405	29.8	22.3	134
EVENING STAR	9200	42.5	26.7	159	51.9	34.4	151
GRAVE SPRINGS	8550	12.4	1.8	689	21.0	16.1	130
KIRWIN	9550	18.6	5.5	338	24.2	17.5	138
MARQUETTE	8760	14.6	-M	*	20.1	18.0	112
MIDDLE POWDER	7760	12.1	2.6	465	21.4	19.1	112
OWL CREEK	8975	1.8	.5	360*	14.9	11.1	134
POWDER RIVER PASS	9480	22.8	2.3	991	30.5	19.6	156
SHELL CREEK	9580	29.5	10.4	284	29.6	20.5	144
SYLVAN LAKE	8420	28.1	11.4	246	42.2	29.0	146
SYLVAN ROAD	7120	.0	.0	100*	31.3	23.3	134
TIMBER CREEK	7950	1.6	.5	320*	16.3	14.4	113
YOUNTS PEAK	8350	20.4	7.0	291	25.5	22.1	115
Basin wide percent of average				266	135		

Archive Data From 1-OCT Through 30-SEP  
 Plotted 06/05/2011 14:03



BHR Bighorn Lake (Yellowtail), Bighorn River near Fort Smith, MT

SE\_AVG Snow Water Equivalent Average (inches)

SE Snow Water Equivalent (inches)

2011

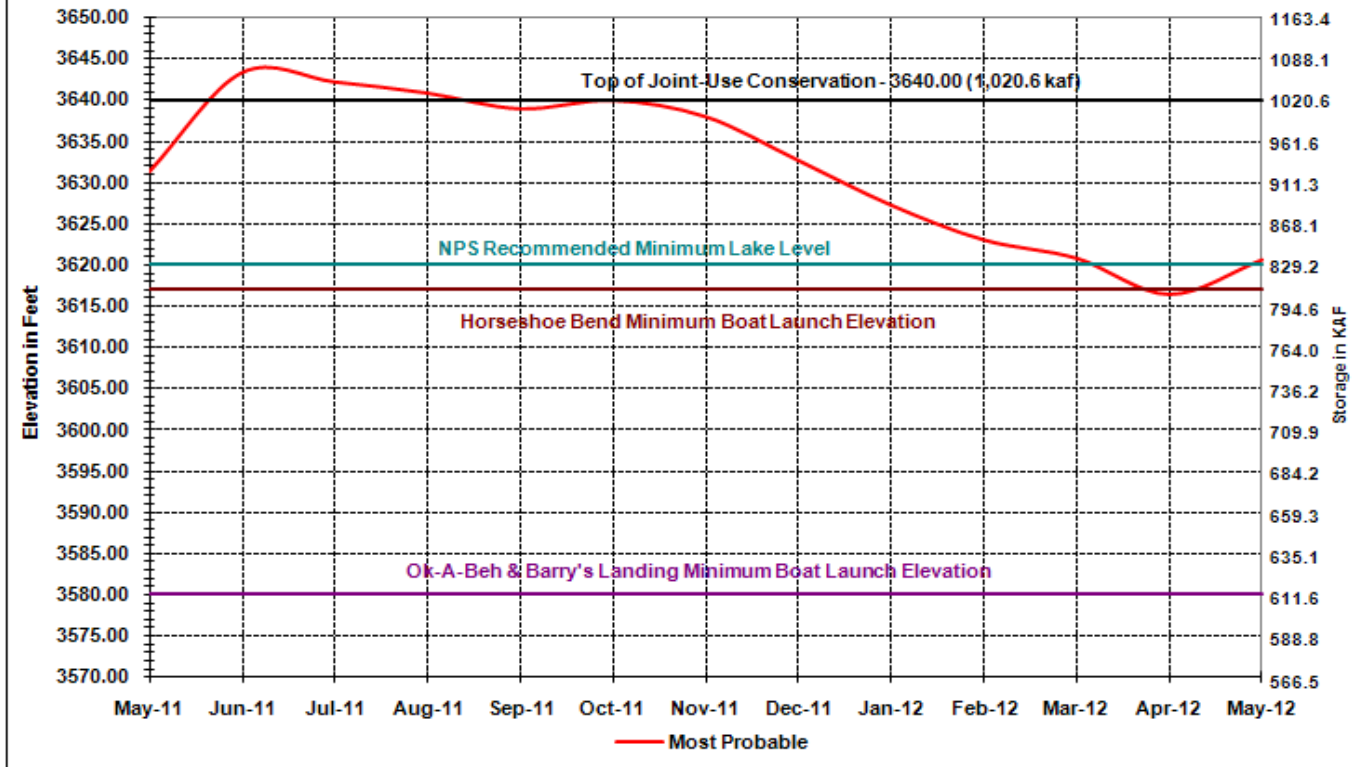
2011 2010 1997

BIGHORN LAKE MONTHLY OPERATIONS

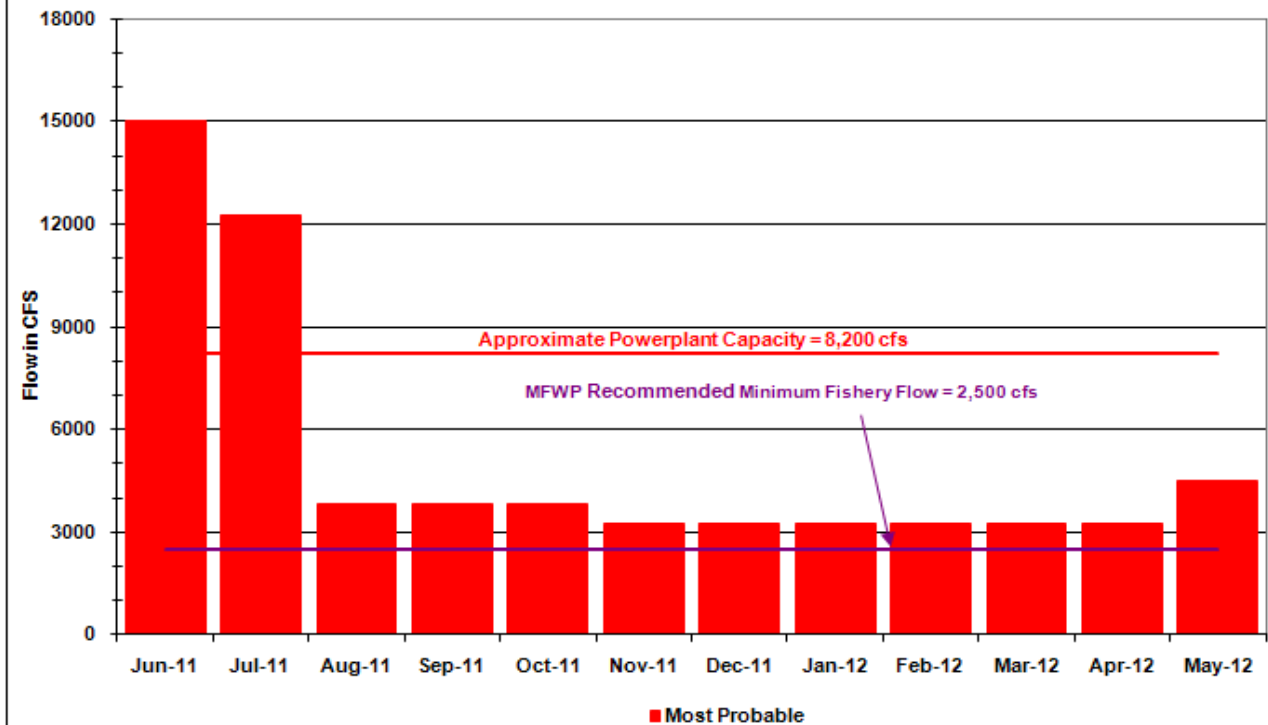
Bighorn Reservoir		Initial Cont Elev 3631.30 ft				Maximum Cont Elev 3657.00 ft				Minimum Cont Elev 3547.00 ft				Total
	2011	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Total
Boysen Release	kaf	419.3	365.7	110.7	59.5	61.5	59.6	61.5	61.6	57.6	61.5	65.7	137.0	1521.2
Boysen Release	cfs	7047	5948	1800	1000	1000	1002	1000	1002	1001	1000	1104	2228	
Buffalo Bill Riv Flo	kaf	295.2	317.3	123.3	111.6	46.5	24.7	21.8	21.8	20.4	21.8	48.8	101.2	1154.4
Buffalo Bill Riv Flo	cfs	4961	5160	2005	1876	756	415	355	355	355	355	820	1646	
Station Gain	kaf	325.0	78.0	5.9	47.4	135.9	79.9	52.7	61.3	69.5	94.6	43.4	87.3	1080.9
Monthly Inflow	kaf	1039.5	761.0	239.9	218.5	243.9	164.2	136.0	144.7	147.5	177.9	157.9	325.5	3756.5
Monthly Inflow	cfs	17469	12376	3902	3672	3967	2759	2212	2353	2564	2893	2654	5294	
Turbine Release	kaf	504.8	521.8	258.0	242.5	231.2	188.7	195.0	195.0	182.4	195.0	189.2	295.6	3199.2
Bypass/Spill/Waste	kaf	392.8	254.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	647.5
Total Release	kaf	897.6	776.5	258.0	242.5	231.2	188.7	195.0	195.0	182.4	195.0	189.2	295.6	3846.7
Total Release	cfs	15085	12629	4196	4075	3760	3171	3171	3171	3171	3171	3180	4807	
Spring Flow	kaf	4.2	4.3	4.3	4.2	4.3	4.2	4.3	4.3	4.0	4.3	4.2	4.3	50.9
Irrigation Reqmnt	kaf	9.0	27.7	26.8	18.8	0.0	0.0	0.0	0.0	0.0	0.0	0.6	24.6	107.5
Afterbay Rels	kaf	901.8	780.8	262.3	246.7	235.5	192.9	199.3	199.3	186.4	199.3	193.4	299.9	3897.6
Afterbay Rels	cfs	15155	12698	4266	4146	3830	3242	3241	3241	3241	3241	3250	4877	
River Release	kaf	892.8	753.1	235.5	227.9	235.5	192.9	199.3	199.3	186.4	199.3	192.8	275.3	3790.1
River Release	cfs	15004	12248	3830	3830	3830	3242	3241	3241	3241	3241	3240	4477	
Min Release	kaf	148.8	153.7	153.7	148.8	153.7	148.8	153.7	153.7	143.8	153.7	148.8	153.7	1814.9
End-Month Targets	kaf		1050.0			1020.6					834.8			
End-Month Content	kaf	1065.5	1050.0	1031.9	1007.9	1020.6	996.1	937.1	886.8	851.9	834.8	803.5	833.4	
End-Month Elevation	ft	3643.40	3642.26	3640.89	3638.98	3640.00	3638.01	3632.67	3627.23	3622.98	3620.75	3616.34	3620.56	
Net Change Content	kaf	141.9	-15.5	-18.1	-24.0	12.7	-24.5	-59.0	-50.3	-34.9	-17.1	-31.3	29.9	-90.2
Yellowtail Power	2011	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Total
Turbine Release	kaf	504.8	521.8	258.0	242.5	231.2	188.7	195.0	195.0	182.4	195.0	189.2	295.6	3199.2
Generation	gwh	202.321	213.169	104.880	97.952	93.225	75.950	77.455	76.058	70.087	74.221	71.360	111.462	1268.140
End-Month Power Cap	mw	287.1	285.9	284.3	282.2	283.4	281.1	275.3	269.8	265.5	263.3	259.1	263.2	
% Max Gen		98	99	49	47	44	37	36	35	35	35	34	52	
Ave kwh/af		401	409	407	404	403	402	397	390	384	381	377	377	396
Upstream Generation	gwh	31.243	35.034	33.284	27.822	11.811	6.614	5.772	5.758	5.359	5.722	17.990	29.455	215.864
Total Generation	gwh	233.564	248.203	138.164	125.774	105.036	82.564	83.227	81.816	75.446	79.943	89.350	140.917	1484.004

# BIGHORN LAKE

## BIGHORN LAKE ELEVATION



## BIGHORN RIVER FLOW BELOW AFTERBAY



WATER YEAR 2011

# Supplemental Information

BHXAOP V1.12 Run: 09-Jun-2011 18:44  
 Based on Minimum Probable Inflow Forecast

BIGHORN LAKE MONTHLY OPERATIONS

Bighorn Reservoir		Initial Cont 923.6 kaf Elev 3631.30 ft				Maximum Cont 1278.9 kaf Elev 3657.00 ft				Minimum Cont 469.9 kaf Elev 3547.00 ft				Total
	2011	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	
Boysen Release	kaf	323.2	311.8	91.3	59.5	61.5	59.5	61.5	61.5	57.5	61.5	56.6	67.6	1273.0
Boysen Release	cfs	5432	5071	1485	1000	1000	1000	1000	1000	1000	1000	951	1099	
Buffalo Bill Riv Flo	kaf	283.9	228.6	116.5	105.0	44.7	23.6	21.8	21.8	20.4	21.8	31.7	101.2	1021.0
Buffalo Bill Riv Flo	cfs	4771	3718	1895	1765	727	397	355	355	355	355	533	1646	
Station Gain	kaf	276.5	31.2	5.2	42.7	96.3	71.8	47.4	55.1	62.5	85.1	36.9	74.2	884.9
Monthly Inflow	kaf	883.6	571.6	213.0	207.2	202.5	154.9	130.7	138.4	140.4	168.4	125.2	243.0	3178.9
Monthly Inflow	cfs	14849	9296	3464	3482	3293	2603	2126	2251	2441	2739	2104	3952	
Turbine Release	kaf	504.8	521.8	221.3	206.9	194.5	181.3	187.3	187.4	175.3	187.3	181.8	211.9	2961.6
Bypass/Spill/Waste	kaf	252.2	79.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	331.6
Total Release	kaf	757.0	601.2	221.3	206.9	194.5	181.3	187.3	187.4	175.3	187.3	181.8	211.9	3293.2
Total Release	cfs	12722	9778	3599	3477	3163	3047	3046	3048	3048	3046	3055	3446	
Spring Flow	kaf	4.2	4.3	4.3	4.2	4.3	4.2	4.3	4.3	4.0	4.3	4.2	4.3	50.9
Irrigation Reqmnt	kaf	9.0	27.7	26.8	18.8	0.0	0.0	0.0	0.0	0.0	0.0	0.6	24.6	107.5
Afterbay Rels	kaf	761.2	605.5	225.6	211.1	198.8	185.5	191.6	191.7	179.3	191.6	186.0	216.2	3344.1
Afterbay Rels	cfs	12792	9848	3669	3548	3233	3117	3116	3118	3117	3116	3126	3516	
River Release	kaf	752.2	577.8	198.8	192.3	198.8	185.5	191.6	191.7	179.3	191.6	185.4	191.6	3236.6
River Release	cfs	12641	9397	3233	3232	3233	3117	3116	3118	3117	3116	3116	3116	
Min Release	kaf	148.8	153.7	153.7	148.8	153.7	119.0	123.0	123.0	115.0	123.0	148.8	153.7	1664.2
End-Month Targets	kaf		1020.6			1020.6					834.8			
End-Month Content	kaf	1050.2	1020.6	1012.3	1012.6	1020.6	994.2	937.6	888.6	853.7	834.8	778.2	809.3	
End-Month Elevation	ft	3642.28	3640.00	3639.33	3639.36	3640.00	3637.85	3632.72	3627.44	3623.21	3620.75	3612.39	3617.20	
Net Change Content	kaf	126.6	-29.6	-8.3	0.3	8.0	-26.4	-56.6	-49.0	-34.9	-18.9	-56.6	31.1	-114.3
Yellowtail Power	2011	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Total
Turbine Release	kaf	504.8	521.8	221.3	206.9	194.5	181.3	187.3	187.4	175.3	187.3	181.8	211.9	2961.6
Generation	gwh	201.806	211.775	89.294	83.381	78.484	72.950	74.379	73.122	67.403	71.314	68.237	79.139	1171.284
End-Month Power Cap	mw	285.9	283.4	282.6	282.6	283.4	281.0	275.4	270.0	265.8	263.3	255.3	259.9	
% Max Gen		97	99	42	40	37	35	35	34	34	33	33	37	
Ave kwh/af		400	406	403	403	404	402	397	390	385	381	375	373	395
Upstream Generation	gwh	31.300	34.941	31.257	27.188	11.168	6.299	5.768	5.745	5.341	5.700	12.142	23.648	200.497
Total Generation	gwh	233.106	246.716	120.551	110.569	89.652	79.249	80.147	78.867	72.744	77.014	80.379	102.787	1371.781



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 Based on Maximum Probable Inflow Forecast

BIGHORN LAKE MONTHLY OPERATIONS

Bighorn Reservoir		Initial Cont 923.6 kaf Elev 3631.30 ft					Maximum Cont 1278.9 kaf Elev 3657.00 ft					Minimum Cont 469.9 kaf Elev 3547.00 ft			Total
2011		Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May		
Boysen Release	kaf	486.1	398.9	114.3	81.4	61.5	59.5	61.5	61.5	57.5	61.5	78.8	169.0	1691.5	
Boysen Release	cfs	8169	6487	1859	1368	1000	1000	1000	1000	1000	1000	1324	2749		
Buffalo Bill Riv Flo	kaf	351.5	361.0	136.2	111.9	48.4	26.0	21.8	21.8	20.4	21.8	76.5	161.0	1358.3	
Buffalo Bill Riv Flo	cfs	5907	5871	2215	1881	787	437	355	355	355	355	1286	2618		
Station Gain	kaf	355.0	111.0	23.4	52.1	159.2	86.8	57.2	66.5	75.5	102.7	52.1	104.8	1246.3	
Monthly Inflow	kaf	1192.6	870.9	273.9	245.4	269.1	172.3	140.5	149.8	153.4	186.0	207.4	434.8	4296.1	
Monthly Inflow	cfs	20042	14164	4455	4124	4376	2896	2285	2436	2667	3025	3485	7071		
Turbine Release	kaf	505.0	516.7	292.7	269.2	265.9	194.9	201.5	201.5	188.5	201.4	257.9	454.9	3550.1	
Bypass/Spill/Waste	kaf	452.4	453.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	905.4	
Total Release	kaf	957.4	969.7	292.7	269.2	265.9	194.9	201.5	201.5	188.5	201.4	257.9	454.9	4455.5	
Total Release	cfs	16090	15771	4760	4524	4324	3275	3277	3277	3277	3275	4334	7398		
Spring Flow	kaf	4.2	4.3	4.3	4.2	4.3	4.2	4.3	4.3	4.0	4.3	4.2	4.3	50.9	
Irrigation Reqmnt	kaf	9.0	27.7	26.8	11.9	0.0	0.0	0.0	0.0	0.0	0.0	0.5	11.2	87.1	
Afterbay Rels	kaf	961.6	974.0	297.0	273.4	270.2	199.1	205.8	205.8	192.5	205.7	262.1	459.2	4506.4	
Afterbay Rels	cfs	16160	15841	4830	4595	4394	3346	3347	3347	3347	3345	4405	7468		
River Release	kaf	952.6	946.3	270.2	261.5	270.2	199.1	205.8	205.8	192.5	205.7	261.6	448.0	4419.3	
River Release	cfs	16009	15390	4394	4395	4394	3346	3347	3347	3347	3345	4396	7286		
Min Release	kaf	148.8	153.7	153.7	148.8	153.7	148.8	153.7	153.7	136.3	151.0	148.8	153.7	1804.7	
End-Month Targets	kaf		1060.0			1020.6					834.8				
End-Month Content	kaf	1158.8	1060.0	1041.2	1017.4	1020.6	998.0	937.0	885.3	850.2	834.8	784.3	764.2		
End-Month Elevation	ft	3649.71	3643.00	3641.60	3639.74	3640.00	3638.16	3632.66	3627.06	3622.76	3620.75	3613.38	3610.04		
Net Change Content	kaf	235.2	-98.8	-18.8	-23.8	3.2	-22.6	-61.0	-51.7	-35.1	-15.4	-50.5	-20.1	-159.4	
Yellowtail Power	2011	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Total	
Turbine Release	kaf	505.0	516.7	292.7	269.2	265.9	194.9	201.5	201.5	188.5	201.4	257.9	454.9	3550.1	
Generation	gwh	205.299	214.272	119.330	109.049	107.374	78.468	80.060	78.572	72.389	76.632	96.914	168.577	1406.936	
End-Month Power Cap	mw	288.0	286.7	285.1	283.1	283.4	281.3	275.3	269.6	265.3	263.3	256.3	253.2		
% Max Gen		99	100	56	53	50	38	37	37	36	36	47	79		
Ave kwh/af		407	415	408	405	404	403	397	390	384	380	376	371	396	
Upstream Generation	gwh	31.344	35.012	33.629	29.726	12.328	6.981	5.769	5.765	5.369	5.740	25.515	29.989	227.167	
Total Generation	gwh	236.643	249.284	152.959	138.775	119.702	85.449	85.829	84.337	77.758	82.372	122.429	198.566	1634.103	