

# RECLAMATION

## *Managing Water in the West*

March 8, 2011

Dear Customer:

Attached are the monthly water supply outlook and projected reservoir and river operating plans as prepared in March. Mountain snowpack conditions in the Bighorn Basin on March 1 were 105 percent of average. Based on current hydrologic and climatic conditions and the planned releases out of Boysen and Buffalo Bill Reservoirs, the April-July runoff into Bighorn Lake is estimated to be about 1,204,300 acre-feet (108% 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  
 March 1, 2011

**Present Elevations & Storages:**

<u>Reservoir</u>	<u>Elevation</u>	<u>Storage</u>	<u>Percent of Average</u>	<u>Percent Full</u>
Boysen	4717.03	597,850	109	81
Buffalo Bill	5365.74	438,145	105	68
Bighorn Lake	3619.46	825,277	103	77

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

<u>Month</u>	<u>Inflow</u>	<u>Percent of Average</u>
January	134.4	101
February	120.8	89
March	137.7	81
April	121.4	74
May	340.9	138
June	761.3	184
July	280.8	97
August	122.7	77
September	119.6	70
<i>April-July, 2010</i>	<i>1,504.4</i>	<i>135</i>
<i>WY-2010 Total</i>	<i>2,573.5</i>	<i>109</i>
October	122.2	67
November	122.6	80
December	122.7	89
January	121.9	91
February	111.9	83

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

<u>Month</u>	<u>Gains</u>	<u>Percent of Average</u>
January	56.9	123
February	53.8	101
March	66.0	89
April	28.3	81
May	47.5	79
June	228.3	215
July	-50.8	---
August	-71.7	---
September	-9.7	---
<i>April-July, 2010</i>	<i>254.2</i>	<i>163</i>
<i>WY-2010 Total</i>	<i>513.9</i>	<i>107</i>
October	28.7	40
November	54.2	89
December	52.1	121
January	50.9	110
February	47.9	90

**March 1 Runoff Forecast (April-July Inflows - 1,000 Acre-Feet):**

<u>Agency</u>	<u>Inflows</u>	<u>Percent of Average</u>
<b>USBR</b>	<b>1,204.3</b>	<b>108</b>

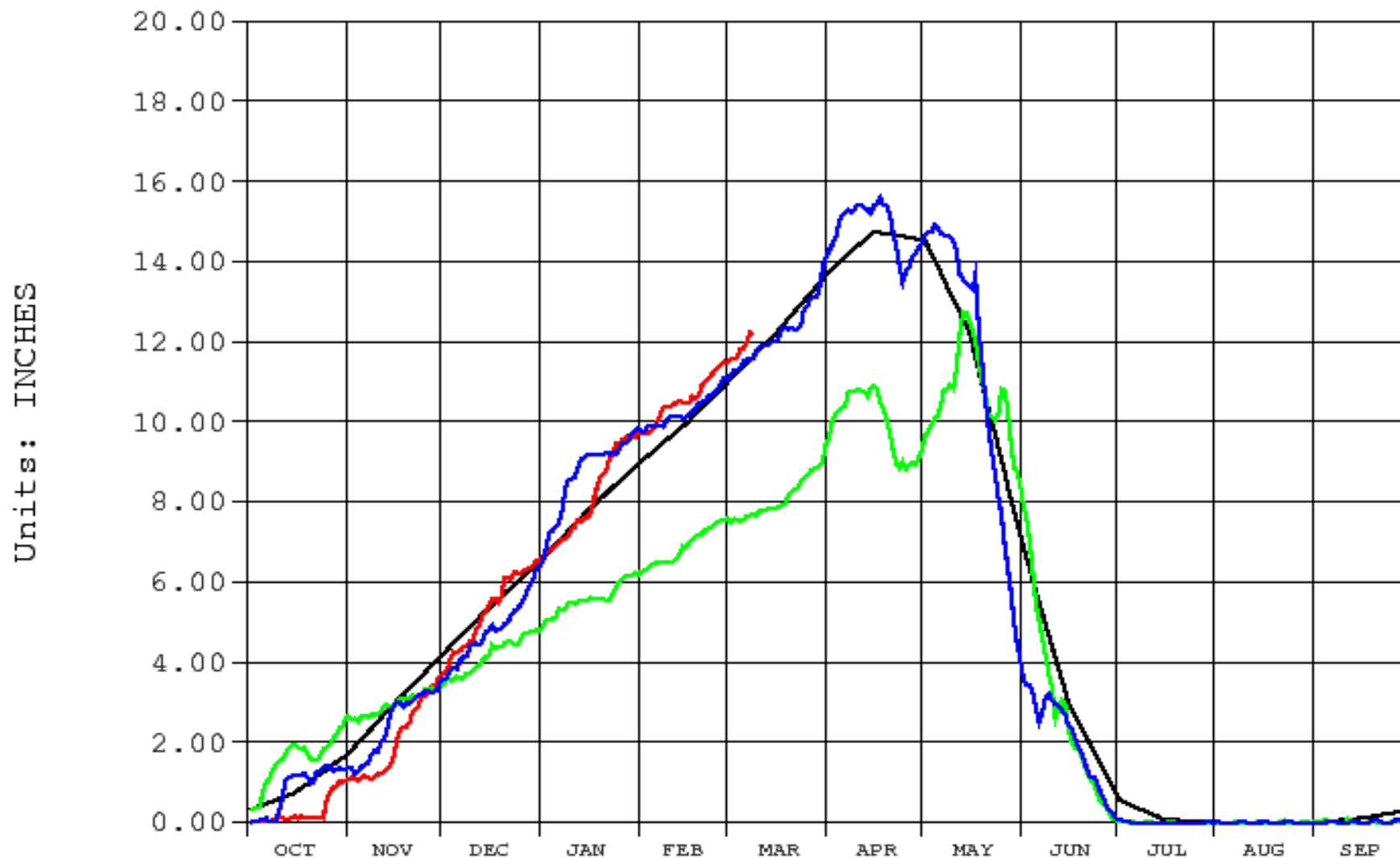
**Snowpack Conditions:**

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 TUESDAY: MARCH 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	20.7	19.7	105	19.8	17.1	116

BOX CANYON	6670	12.0	8.5	141	13.2	10.2	129
BRACKETT CREEK	7320	19.3	17.0	114	24.0	20.6	117
BURNT MTN	5880	4.8	5.0	96	7.6	11.3	67
CANYON	7870	13.5	11.3	119	14.5	13.0	112
COLE CREEK	7850	8.0	12.0	67	6.9	12.4	56
EAST BOULDER MINE	6335	5.4	-M	*	10.3	-M	*
EVENING STAR	9200	25.6	25.0	102	28.2	21.8	129
FISHER CREEK	9100	32.6	29.6	110	31.3	30.6	102
MONUMENT PEAK	8850	21.5	17.2	125	23.1	17.7	131
NORTHEAST ENTRANCE	7350	11.1	9.7	114	12.5	10.8	116
PARKER PEAK	9400	23.2	18.2	127	20.6	13.7	150
PLACER BASIN	8830	17.1	14.2	120	17.8	15.1	118
PORCUPINE	6500	6.4	5.8	110	10.7	9.4	114
SACAJAWEA	6550	13.2	12.0	110	22.3	18.5	121
SHOWER FALLS	8100	18.8	17.4	108	21.4	19.1	112
S FORK SHIELDS	8100	13.6	13.6	100	20.1	15.8	127
SYLVAN LAKE	8420	19.5	18.8	104	22.8	17.9	127
SYLVAN ROAD	7120	13.4	11.4	118	17.1	15.6	110
THUMB DIVIDE	7980	16.5	15.4	107	16.3	16.0	102
TWO OCEAN PLATEAU	9240	26.1	23.3	112	22.1	23.4	94
WHITE MILL	8700	22.1	20.3	109	22.6	22.7	100
WOLVERINE	7650	12.4	10.6	117	12.0	11.2	107
YOUNTS PEAK	8350	13.7	14.6	94	11.8	13.6	87
Basin wide percent of average				110			111
WIND RIVER BASIN (WYOMING)							
BURROUGHS CREEK	8750	12.1	12.6	96	12.6	13.7	92
CASTLE CREEK	8400	5.5	-M	*	6.1	-M	*
COLD SPRINGS	9630	7.0	7.2	97	6.7	8.4	80
DEER PARK	9700	16.2	14.4	113	18.6	17.8	104
HOBBS PARK	10100	12.2	11.9	103	10.7	9.9	108
KIRWIN	9550	9.1	9.1	100	10.0	9.2	109
LITTLE WARM	9370	9.8	9.5	103	9.8	10.9	90
OWL CREEK	8975	4.5	4.1	110	4.5	4.4	102
SOUTH PASS	9040	15.1	14.0	108	13.1	15.0	87
ST. LAWRENCE ALT	8620	4.1	5.9	69	5.8	7.0	83
TOGWOTEE PASS	9580	23.2	20.7	112	24.6	20.7	119
TOWNSEND CREEK	8700	7.5	6.9	109	9.5	8.9	107
YOUNTS PEAK	8350	13.7	14.6	94	11.8	13.6	87
Basin wide percent of average				103			99
SHOSHONE RIVER BASIN (WYOMING)							
BLACKWATER	9780	20.7	20.4	101	20.2	17.2	117
EVENING STAR	9200	25.6	25.0	102	28.2	21.8	129
MARQUETTE	8760	2.0	6.9	29	5.2	7.5	69
SYLVAN LAKE	8420	19.5	18.8	104	22.8	17.9	127
SYLVAN ROAD	7120	13.4	11.4	118	17.1	15.6	110
YOUNTS PEAK	8350	13.7	14.6	94	11.8	13.6	87
Basin wide percent of average				98			113
BIGHORN RIVER BASIN (WYOMING)							
BALD MTN.	9380	19.4	16.0	121	15.8	14.1	112
BEAR TRAP MEADOW	8200	6.3	4.3	147	6.6	6.4	103
BLACKWATER	9780	20.7	20.4	101	20.2	17.2	117
BONE SPRINGS DIV	9350	15.7	13.2	119	12.9	11.6	111
EVENING STAR	9200	25.6	25.0	102	28.2	21.8	129
GRAVE SPRINGS	8550	6.6	7.3	90	6.8	7.8	87
KIRWIN	9550	9.1	9.1	100	10.0	9.2	109
MARQUETTE	8760	2.0	6.9	29	5.2	7.5	69
MIDDLE POWDER	7760	7.6	9.0	84	9.3	9.6	97
OWL CREEK	8975	4.5	4.1	110	4.5	4.4	102
POWDER RIVER PASS	9480	11.4	8.7	131	13.2	10.0	132
SHELL CREEK	9580	13.5	11.8	114	12.2	10.8	113
SYLVAN LAKE	8420	19.5	18.8	104	22.8	17.9	127
SYLVAN ROAD	7120	13.4	11.4	118	17.1	15.6	110
TIMBER CREEK	7950	3.1	4.2	74	3.7	5.4	69
YOUNTS PEAK	8350	13.7	14.6	94	11.8	13.6	87
Basin wide percent of average				104			110

Archive Data From 1-OCT Through 30-SEP  
 Plotted 03/08/2011 10:45



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

SE\_AVG Snow Water Equivalent Average (inches)

SE Snow Water Equivalent (inches)

2011

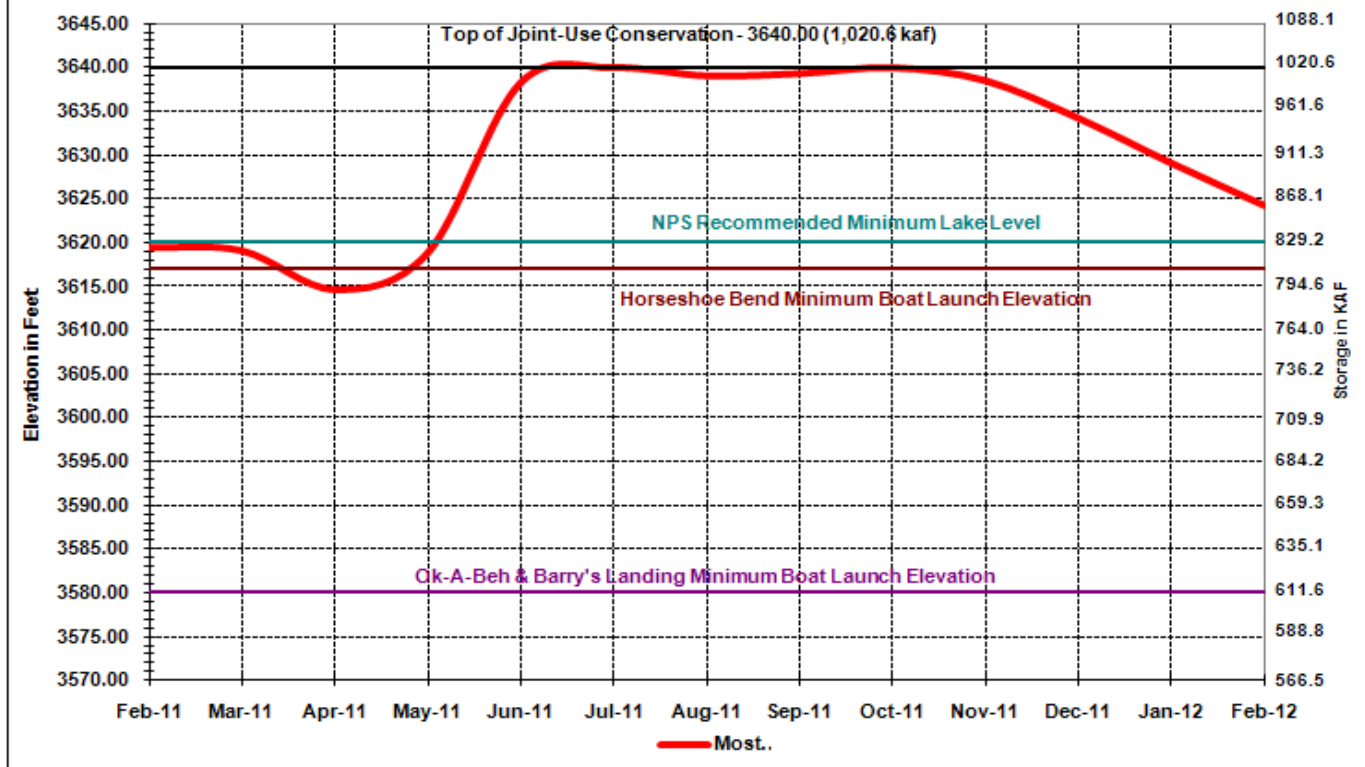
2011 2010 2009

BIGHORN LAKE MONTHLY OPERATIONS

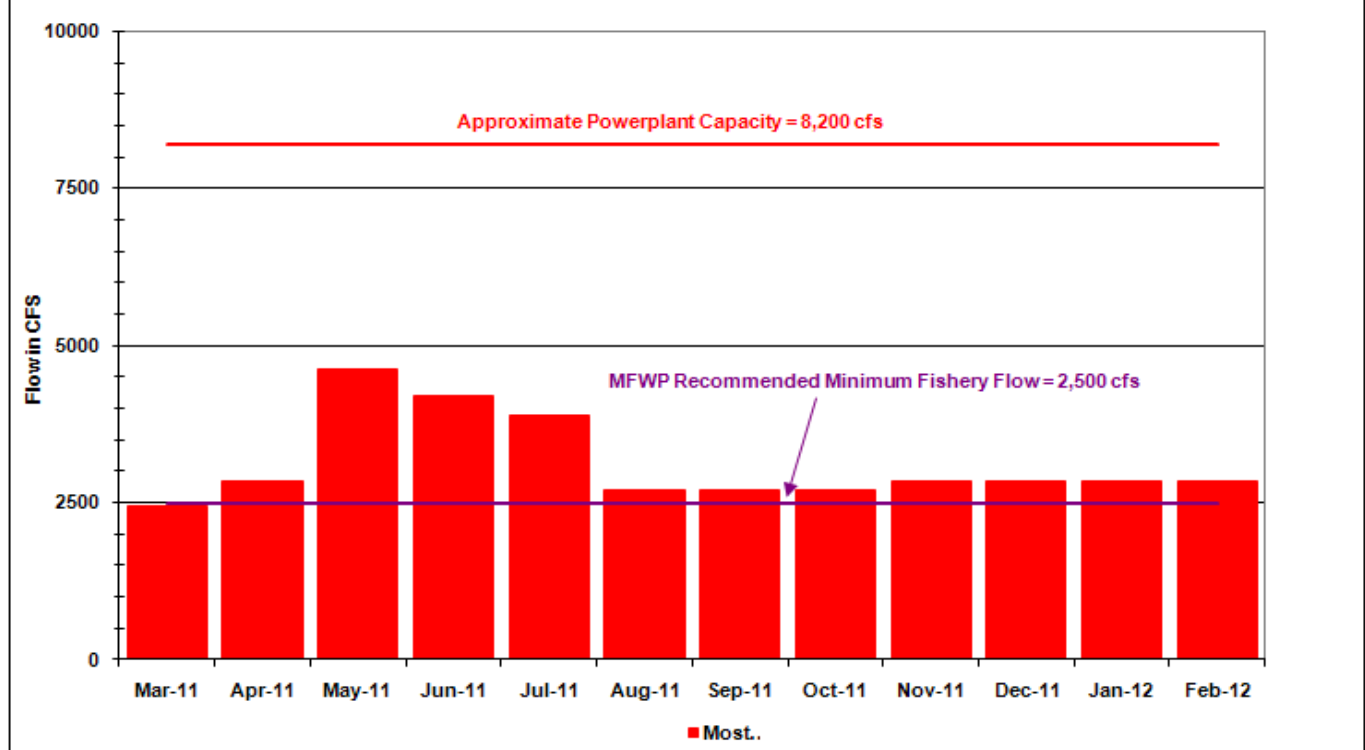
Bighorn Reservoir		Initial Cont 825.3 kaf Elev 3619.46 ft				Maximum Cont 1278.9 kaf Elev 3657.00 ft				Minimum Cont 469.9 kaf Elev 3547.00 ft				Total
	2011	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	
Boysen Release	kaf	56.2	67.6	140.9	131.7	121.9	96.9	59.6	61.5	59.6	61.5	61.5	57.6	976.5
Boysen Release	cfs	914	1136	2292	2213	1983	1576	1002	1000	1002	1000	1000	1001	
Buffalo Bill Riv Flo	kaf	21.8	31.7	135.5	210.9	206.1	122.2	98.8	40.1	31.1	21.8	21.8	20.4	962.2
Buffalo Bill Riv Flo	cfs	355	533	2204	3544	3352	1987	1660	652	523	355	355	355	
Station Gain	kaf	65.8	36.7	56.5	108.9	-44.1	-41.5	20.5	69.0	56.5	38.6	37.5	40.8	445.2
Monthly Inflow	kaf	143.8	136.0	332.9	451.5	283.9	177.6	178.9	170.6	147.2	121.9	120.8	118.8	2383.9
Monthly Inflow	cfs	2339	2286	5414	7588	4617	2888	3007	2775	2474	1983	1965	2065	
Turbine Release	kaf	146.7	166.2	304.4	272.5	263.0	189.1	175.8	162.2	165.4	171.0	170.9	159.9	2347.1
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	146.7	166.2	304.4	272.5	263.0	189.1	175.8	162.2	165.4	171.0	170.9	159.9	2347.1
Total Release	cfs	2386	2793	4951	4580	4277	3075	2954	2638	2780	2781	2779	2780	
Spring Flow	kaf	4.3	4.2	4.3	4.2	4.3	4.3	4.2	4.3	4.2	4.3	4.3	4.0	50.9
Irrigation Reqmnt	kaf	0.0	0.6	24.6	26.8	27.7	26.8	18.8	0.0	0.0	0.0	0.0	0.0	125.3
Afterbay Rels	kaf	151.0	170.4	308.7	276.7	267.3	193.4	180.0	166.5	169.6	175.3	175.2	163.9	2398.0
Afterbay Rels	cfs	2456	2864	5021	4650	4347	3145	3025	2708	2850	2851	2849	2849	
River Release	kaf	151.0	169.8	284.1	249.9	239.6	166.6	161.2	166.5	169.6	175.3	175.2	163.9	2272.7
River Release	cfs	2456	2854	4620	4200	3897	2709	2709	2708	2850	2851	2849	2849	
Min Release	kaf	151.0	148.8	153.7	148.8	153.7	153.7	148.8	153.7	148.8	153.7	145.7	136.3	1796.7
End-Month Targets	kaf					1020.6			1020.6					
End-Month Content	kaf	822.4	792.2	820.7	999.7	1020.6	1009.1	1012.2	1020.6	1002.4	953.3	903.2	862.1	
End-Month Elevation	ft	3619.06	3614.62	3618.82	3638.30	3640.00	3639.08	3639.33	3640.00	3638.53	3634.23	3629.10	3624.26	
Net Change Content	kaf	-2.9	-30.2	28.5	179.0	20.9	-11.5	3.1	8.4	-18.2	-49.1	-50.1	-41.1	36.8
Yellowtail Power	2011	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Total
Turbine Release	kaf	146.7	166.2	304.4	272.5	263.0	189.1	175.8	162.2	165.4	171.0	170.9	159.9	2347.1
Generation	gwh	55.430	62.401	114.251	106.222	105.914	76.264	70.808	65.446	66.637	68.168	67.028	61.734	920.303
End-Month Power Cap	mw	261.7	257.4	261.4	281.5	283.4	282.3	282.6	283.4	281.7	277.0	271.7	266.8	
% Max Gen		26	30	53	51	49	36	34	31	32	32	31	31	
Ave kwh/af		378	375	375	390	403	403	403	403	403	399	392	386	392
Upstream Generation	gwh	10.477	13.118	34.508	33.755	34.311	32.064	25.848	15.554	13.749	11.212	11.133	10.332	246.061
Total Generation	gwh	65.907	75.519	148.759	139.977	140.225	108.328	96.656	81.000	80.386	79.380	78.161	72.066	1166.364

# BIGHORN LAKE

## BIGHORN LAKE ELEVATION



## BIGHORN RIVER FLOW BELOW AFTERBAY



# WATER YEAR 2011

# Supplemental Information

BHXAOP V1.12 Run: 08-Mar-2011 17:24  
 Based on Minimum Probable Inflow Forecast

BIGHORN LAKE MONTHLY OPERATIONS

Bighorn Reservoir		Initial Cont 825.3 kaf Elev 3619.46 ft				Maximum Cont 1278.9 kaf Elev 3657.00 ft				Minimum Cont 469.9 kaf Elev 3547.00 ft				Total
	2011	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	
Boysen Release	kaf	56.2	47.6	67.6	69.9	76.9	69.2	59.5	46.1	44.6	46.1	46.1	43.2	673.0
Boysen Release	cfs	914	800	1099	1175	1251	1125	1000	750	750	750	750	751	
Buffalo Bill Riv Flo	kaf	21.8	31.7	118.0	122.9	171.4	104.3	82.5	42.6	25.7	21.8	21.8	20.4	784.9
Buffalo Bill Riv Flo	cfs	355	533	1919	2065	2788	1696	1386	693	432	355	355	355	
Station Gain	kaf	60.2	21.4	21.6	16.5	-60.2	-41.9	6.5	50.9	51.1	34.9	33.9	36.9	231.8
Monthly Inflow	kaf	138.2	100.7	207.2	209.3	188.1	131.6	148.5	139.6	121.4	102.8	101.8	100.5	1689.7
Monthly Inflow	cfs	2248	1692	3370	3517	3059	2140	2496	2270	2040	1672	1656	1747	
Turbine Release	kaf	146.7	130.3	143.3	141.6	146.4	145.5	133.6	118.7	144.3	149.2	149.2	139.6	1688.4
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	146.7	130.3	143.3	141.6	146.4	145.5	133.6	118.7	144.3	149.2	149.2	139.6	1688.4
Total Release	cfs	2386	2190	2331	2380	2381	2366	2245	1930	2425	2427	2427	2427	
Spring Flow	kaf	4.3	4.2	4.3	4.2	4.3	4.3	4.2	4.3	4.2	4.3	4.3	4.0	50.9
Irrigation Reqmnt	kaf	0.0	0.6	24.6	26.8	27.7	26.8	18.8	0.0	0.0	0.0	0.0	0.0	125.3
Afterbay Rels	kaf	151.0	134.5	147.6	145.8	150.7	149.8	137.8	123.0	148.5	153.5	153.5	143.6	1739.3
Afterbay Rels	cfs	2456	2260	2400	2450	2451	2436	2316	2000	2496	2496	2496	2496	
River Release	kaf	151.0	133.9	123.0	119.0	123.0	123.0	119.0	123.0	148.5	153.5	153.5	143.6	1614.0
River Release	cfs	2456	2250	2000	2000	2000	2000	2000	2000	2496	2496	2496	2496	
Min Release	kaf	151.0	133.9	123.0	119.0	123.0	123.0	119.0	123.0	119.0	123.0	123.0	136.3	1516.2
End-Month Targets	kaf					1020.6			1020.6					
End-Month Content	kaf	816.8	787.2	851.1	918.8	960.5	946.6	961.5	982.4	959.5	913.1	865.7	826.6	
End-Month Elevation	ft	3618.28	3613.84	3622.88	3630.80	3634.90	3633.60	3634.99	3636.84	3634.80	3630.19	3624.71	3619.64	
Net Change Content	kaf	-8.5	-29.6	63.9	67.7	41.7	-13.9	14.9	20.9	-22.9	-46.4	-47.4	-39.1	1.3
Yellowtail Power	2011	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Total
Turbine Release	kaf	146.7	130.3	143.3	141.6	146.4	145.5	133.6	118.7	144.3	149.2	149.2	139.6	1688.4
Generation	gwh	55.371	48.821	54.048	54.713	57.639	57.548	52.850	47.229	57.397	58.675	57.740	53.189	655.220
End-Month Power Cap	mw	260.9	256.7	265.4	273.4	277.7	276.3	277.8	279.9	277.6	272.8	267.3	262.2	
% Max Gen		26	24	25	26	27	27	25	22	28	27	27	27	
Ave kwh/af		377	375	377	386	394	396	396	398	398	393	387	381	388
Upstream Generation	gwh	10.467	11.426	28.483	28.462	30.331	25.641	21.738	14.648	10.816	9.802	9.752	9.069	210.635
Total Generation	gwh	65.838	60.247	82.531	83.175	87.970	83.189	74.588	61.877	68.213	68.477	67.492	62.258	865.855



BHXAOP V1.12 Run: 08-Mar-2011 17:24  
 Based on Maximum Probable Inflow Forecast

BIGHORN LAKE MONTHLY OPERATIONS

Bighorn Reservoir		Initial Cont 825.3 kaf Elev 3619.46 ft				Maximum Cont 1278.9 kaf Elev 3657.00 ft				Minimum Cont 469.9 kaf Elev 3547.00 ft				Total
2011		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Total
Boysen Release	kaf	56.2	85.1	205.9	210.8	165.2	114.5	73.9	64.1	59.5	61.5	61.5	57.5	1215.7
Boysen Release	cfs	914	1430	3349	3543	2687	1862	1242	1042	1000	1000	1000	1000	
Buffalo Bill Riv Flo	kaf	21.8	31.7	190.0	251.2	255.9	147.4	100.2	41.7	32.7	21.8	21.8	20.4	1136.6
Buffalo Bill Riv Flo	cfs	355	533	3090	4222	4162	2397	1684	678	550	355	355	355	
Station Gain	kaf	73.1	45.5	109.5	216.2	-2.1	-32.3	39.0	76.3	60.2	44.1	45.6	53.9	729.0
Monthly Inflow	kaf	151.1	162.3	505.4	678.2	419.0	229.6	213.1	182.1	152.4	127.4	128.9	131.8	3081.3
Monthly Inflow	cfs	2457	2728	8220	11398	6814	3734	3581	2962	2561	2072	2096	2291	
Turbine Release	kaf	146.7	214.9	510.3	439.7	387.2	233.4	211.9	179.5	173.3	179.1	179.0	167.5	3022.5
Bypass/Spill/Waste	kaf	0.0	0.0	21.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.9
Total Release	kaf	146.7	214.9	532.2	439.7	387.2	233.4	211.9	179.5	173.3	179.1	179.0	167.5	3044.4
Total Release	cfs	2386	3612	8655	7389	6297	3796	3561	2919	2912	2913	2911	2912	
Spring Flow	kaf	4.3	4.2	4.3	4.2	4.3	4.3	4.2	4.3	4.2	4.3	4.3	4.0	50.9
Irrigation Reqmnt	kaf	0.0	0.5	11.2	21.8	27.7	26.8	11.9	0.0	0.0	0.0	0.0	0.0	99.9
Afterbay Rels	kaf	151.0	219.1	536.5	443.9	391.5	237.7	216.1	183.8	177.5	183.4	183.3	171.5	3095.3
Afterbay Rels	cfs	2456	3682	8725	7460	6367	3866	3632	2989	2983	2983	2981	2982	
River Release	kaf	151.0	218.6	525.3	422.1	363.8	210.9	204.2	183.8	177.5	183.4	183.3	171.5	2995.4
River Release	cfs	2456	3674	8543	7094	5917	3430	3432	2989	2983	2983	2981	2982	
Min Release	kaf	151.0	148.8	153.7	148.8	153.7	153.7	148.8	153.7	148.8	153.7	153.7	136.3	1804.7
End-Month Targets	kaf					1020.6			1020.6					
End-Month Content	kaf	829.7	777.1	750.3	988.8	1020.6	1016.8	1018.0	1020.6	999.7	948.0	897.9	862.2	
End-Month Elevation	ft	3620.06	3612.21	3607.59	3637.39	3640.00	3639.70	3639.79	3640.00	3638.30	3633.73	3628.50	3624.27	
Net Change Content	kaf	4.4	-52.6	-26.8	238.5	31.8	-3.8	1.2	2.6	-20.9	-51.7	-50.1	-35.7	36.9
Yellowtail Power	2011	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Total
Turbine Release	kaf	146.7	214.9	510.3	439.7	387.2	233.4	211.9	179.5	173.3	179.1	179.0	167.5	3022.5
Generation	gwh	55.507	80.563	188.304	168.967	155.667	94.241	85.526	72.491	69.790	71.305	70.079	64.608	1177.048
End-Month Power Cap	mw	262.7	255.2	251.0	280.5	283.4	283.0	283.1	283.4	281.5	276.5	271.1	266.8	
% Max Gen		26	39	88	81	73	44	41	34	34	33	33	32	
Ave kwh/af		378	375	369	384	402	404	404	404	403	398	392	386	389
Upstream Generation	gwh	10.491	14.620	34.558	33.816	35.261	33.633	27.378	16.244	14.231	11.257	11.195	10.403	253.087
Total Generation	gwh	65.998	95.183	222.862	202.783	190.928	127.874	112.904	88.735	84.021	82.562	81.274	75.011	1430.135