

# RECLAMATION

## *Managing Water in the West*

December 3, 2010

Dear Customer:

Attached are the monthly water supply outlook and projected reservoir and river operating plans as prepared in December. Mountain snowpack conditions in the Bighorn Basin on December 1 are 89 percent of average. Based on current hydrologic and climatic conditions and the planned releases out of Boysen and Buffalo Bill Reservoirs, the December runoff into Bighorn Lake is estimated to be about 109.7 acre-feet (80% 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  
 December 1, 2010

**Present Elevations & Storages:**

<u>Reservoir</u>	<u>Elevation</u>	<u>Storage</u>	<u>Percent of Normal</u>
Boysen	4718.47	621,834	105
Buffalo Bill	5368.23	455,551	110
Bighorn Lake	3626.24	924,910	94

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

<u>Month</u>	<u>Inflow</u>	<u>Percent of Normal</u>
November	141.4	92
December	111.8	81
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
<b>April-July, 2010</b>	<b>1,504.4</b>	<b>135</b>
<b>WY-2010 Total</b>	<b>2,573.5</b>	<b>109</b>
October	122.2	67
November	122.6	80

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

<u>Month</u>	<u>Gains</u>	<u>Percent of Normal</u>
November	61.1	98
December	34.2	79
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	---
<b>April-July, 2010</b>	<b>254.2</b>	<b>163</b>
<b>WY-2010 Total</b>	<b>513.9</b>	<b>107</b>
October	28.7	40
November	54.2	89

**December 1 Runoff Forecast (December Flows - 1,000 Acre-Feet):**

<u>Agency</u>	<u>Inflows</u>	<u>Percent of Normal</u>
<b>USBR</b>	<b>109.7</b>	<b>80</b>

**Snowpack Conditions:**

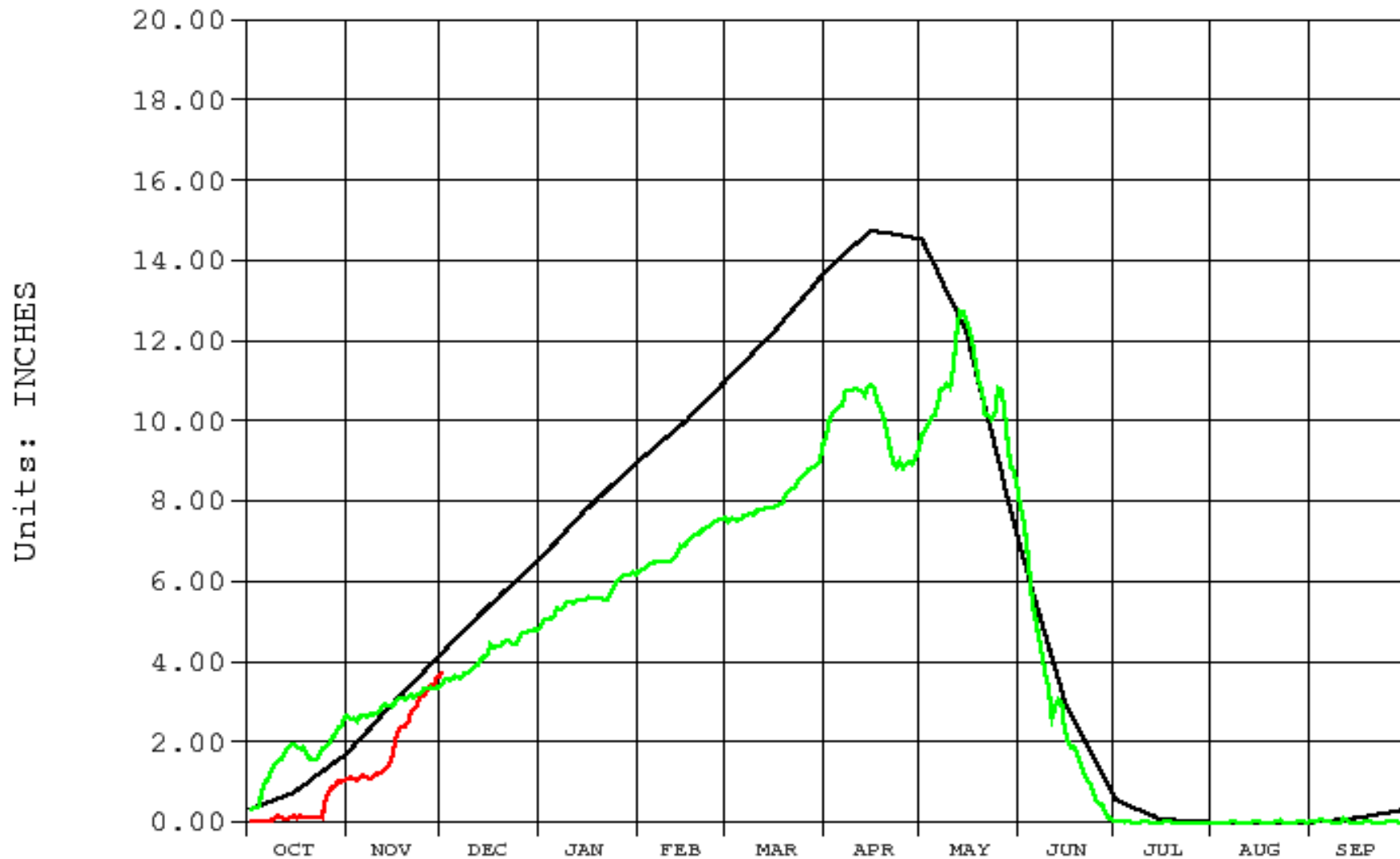
S N O W - P R E C I P I T A T I O N    U P D A T E  
 Based on Mountain Data from NRCS SNOTEL Sites  
 As of TUESDAY: NOVEMBER 30 , 2010

<u>BASIN</u> Data Site Name	<u>ELEV.</u> (Ft)	<u>SNOW WATER EQUIVALENT</u>			<u>TOTAL PRECIPITATION</u>		
		<u>Current</u>	<u>Average</u>	<u>Avg %</u>	<u>Current</u>	<u>Average</u>	<u>Avg %</u>
-----							
UPPER YELLOWSTONE RIVER BASIN							
BEARTOOTH LAKE	9360	6.7	6.8	99	6.8	5.8	117
BOX CANYON	6670	3.7	2.1	176	6.0	3.7	162
BRACKETT CREEK	7320	6.2	4.8	129	10.3	7.2	143
BURNT MTN	5880	2.7	1.2	225	4.3	5.4	80

CANYON	7870	4.2	3.2	131	5.7	4.7	121
COLE CREEK	7850	4.0	5.3	75	4.0	5.8	69
EAST BOULDER MINE	6335	3.0	-M	*	5.0	-M	*
EVENING STAR	9200	7.6	8.2	93	9.0	8.0	113
FISHER CREEK	9100	9.5	8.9	107	10.5	9.6	109
MONUMENT PEAK	8850	7.7	5.8	133	9.0	6.3	143
NORTHEAST ENTRANCE	7350	2.7	2.4	113	5.0	3.9	128
PARKER PEAK	9400	7.5	6.5	115	8.5	5.4	157
PLACER BASIN	8830	7.4	5.5	135	8.4	6.4	131
PORCUPINE	6500	2.2	1.2	183	5.2	3.9	133
SACAJAWEA	6550	4.4	1.9	232	10.7	6.5	165
SHOWER FALLS	8100	8.0	6.2	129	9.8	7.6	129
S FORK SHIELDS	8100	4.7	4.4	107	8.8	6.2	142
SYLVAN LAKE	8420	5.7	6.2	92	8.1	6.9	117
SYLVAN ROAD	7120	3.2	3.5	91	5.7	6.5	88
THUMB DIVIDE	7980	5.6	3.9	144	6.7	5.3	126
TWO OCEAN PLATEAU	9240	10.7	8.1	132	8.6	8.0	108
WHITE MILL	8700	6.7	6.3	106	8.0	7.5	107
WOLVERINE	7650	3.6	2.8	129	4.5	4.4	102
YOUNTS PEAK	8350	4.9	4.6	107	4.6	5.1	90
Basin wide percent of average				118			120
WIND RIVER BASIN (WYOMING)							
BURROUGHS CREEK	8750	3.2	3.7	86	3.8	4.8	79
CASTLE CREEK	8400	1.7	-M	*	2.4	-M	*
COLD SPRINGS	9630	2.5	3.1	81	2.8	4.1	68
DEER PARK	9700	6.5	4.5	144	7.1	7.0	101
HOBBS PARK	10100	5.3	5.2	102	4.7	4.5	104
KIRWIN	9550	3.8	4.1	93	4.1	4.0	103
LITTLE WARM	9370	3.5	3.3	106	3.4	4.5	76
OWL CREEK	8975	1.2	1.9	63	1.8	2.2	82
SOUTH PASS	9040	4.8	4.9	98	4.6	5.9	78
ST. LAWRENCE ALT	8620	1.7	2.7	63	2.5	3.5	71
TOGWOTEE PASS	9580	8.8	6.9	128	9.7	7.1	137
TOWNSEND CREEK	8700	3.0	2.9	103	4.9	4.4	111
YOUNTS PEAK	8350	4.9	4.6	107	4.6	5.1	90
Basin wide percent of average				103			95
SHOSHONE RIVER BASIN (WYOMING)							
BLACKWATER	9780	7.4	7.6	97	7.0	7.0	100
EVENING STAR	9200	7.6	8.2	93	9.0	8.0	113
MARQUETTE	8760	.9	3.7	24	2.2	4.1	54
SYLVAN LAKE	8420	5.7	6.2	92	8.1	6.9	117
SYLVAN ROAD	7120	3.2	3.5	91	5.7	6.5	88
YOUNTS PEAK	8350	4.9	4.6	107	4.6	5.1	90
Basin wide percent of average				88			97
BIGHORN RIVER BASIN (WYOMING)							
BALD MTN.	9380	6.6	5.8	114	6.0	5.2	115
BEAR TRAP MEADOW	8200	1.2	1.6	75	2.8	3.4	82
BLACKWATER	9780	7.4	7.6	97	7.0	7.0	100
BONE SPRINGS DIV	9350	4.9	5.2	94	3.9	4.8	81
EVENING STAR	9200	7.6	8.2	93	9.0	8.0	113
GRAVE SPRINGS	8550	2.6	2.7	96	3.2	3.6	89
KIRWIN	9550	3.8	4.1	93	4.1	4.0	103
MARQUETTE	8760	.9	3.7	24	2.2	4.1	54
MIDDLE POWDER	7760	3.6	3.5	103	2.9	4.9	59
OWL CREEK	8975	1.2	1.9	63	1.8	2.2	82
POWDER RIVER PASS	9480	3.8	3.3	115	4.7	4.0	118
SHELL CREEK	9580	4.7	5.0	94	4.8	4.4	109
SYLVAN LAKE	8420	5.7	6.2	92	8.1	6.9	117
SYLVAN ROAD	7120	3.2	3.5	91	5.7	6.5	88
TIMBER CREEK	7950	1.4	2.3	61	1.9	3.0	63
YOUNTS PEAK	8350	4.9	4.6	107	4.6	5.1	90
Basin wide percent of average				92			94

Archive Data From 1-OCT Through 30-SEP

Plotted 12/01/2010 11:08



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

SE\_AVG Snow Water Equivalent Average (inches)

2011

SE Snow Water Equivalent (inches)

2011 2010

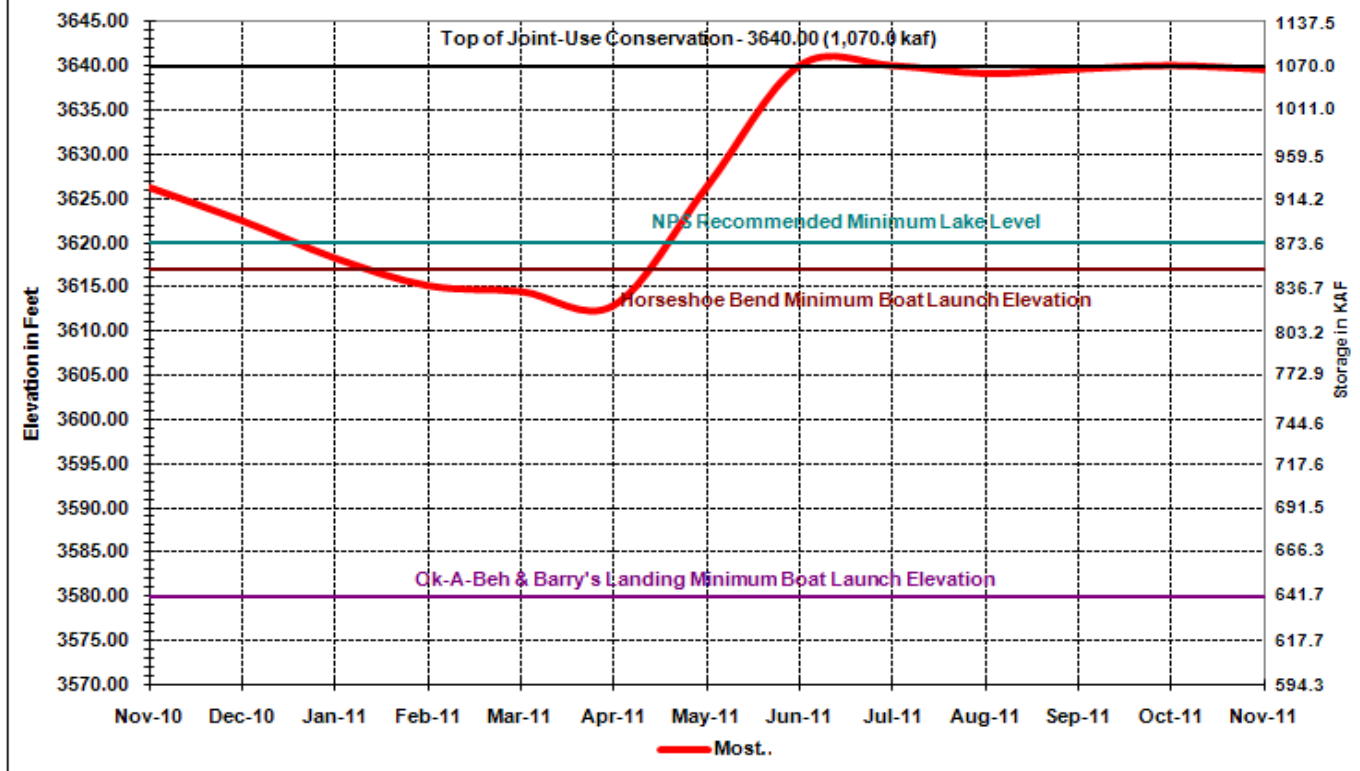
BHXAOP V1.12 Run: 03-Dec-2010 14:10  
 Based on Most Probable Inflow Forecast

BIGHORN LAKE MONTHLY OPERATIONS

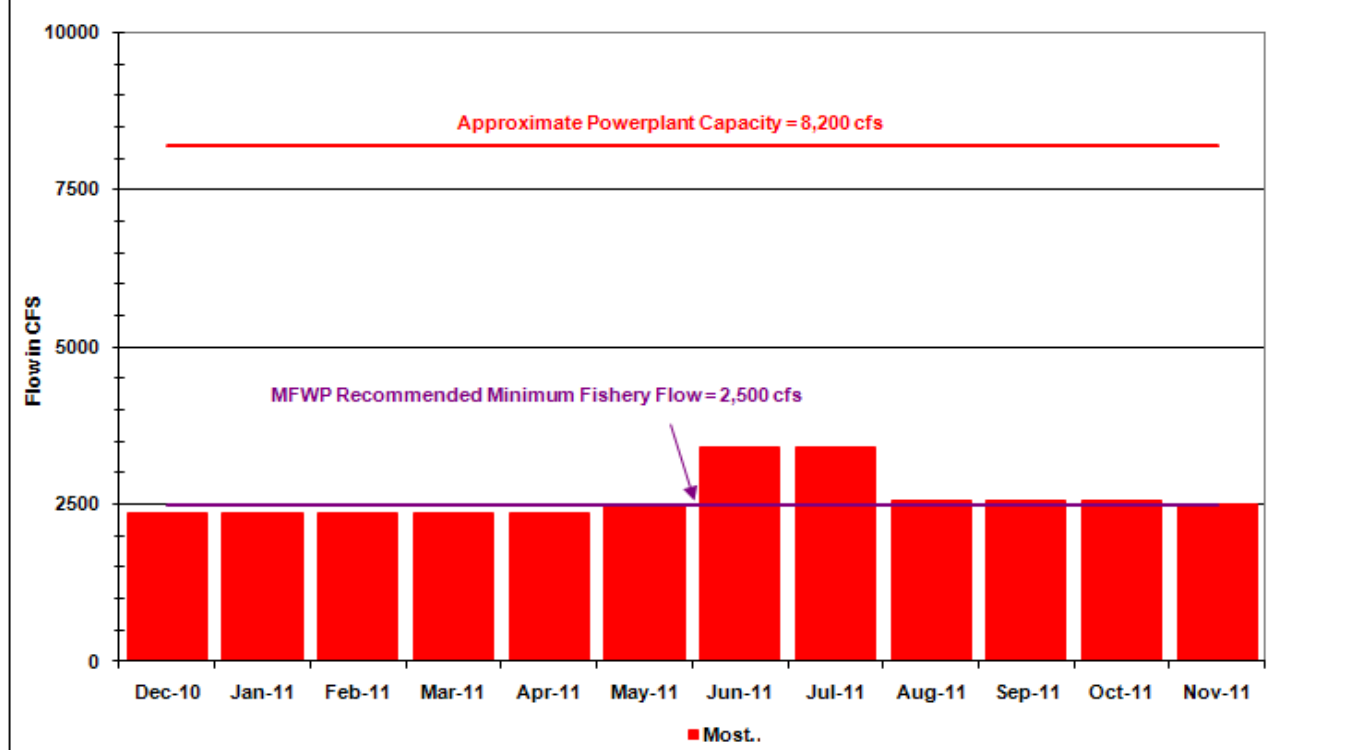
Bighorn Reservoir		Initial Cont 924.9 kaf Elev 3626.24 ft				Maximum Cont 1328.4 kaf Elev 3657.00 ft				Minimum Cont 493.6 kaf Elev 3547.00 ft				Total
	2010	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
Boysen Release	kaf	49.2	49.2	44.4	49.2	66.2	130.7	132.1	120.0	96.9	59.5	49.2	47.6	894.2
Boysen Release	cfs	800	800	799	800	1113	2126	2220	1952	1576	1000	800	800	
Buffalo Bill Riv Flo	kaf	21.8	21.8	19.7	21.8	31.7	108.2	163.5	173.5	122.2	98.8	40.1	31.1	854.2
Buffalo Bill Riv Flo	cfs	355	355	355	355	533	1760	2748	2822	1987	1660	652	523	
Station Gain	kaf	38.7	37.6	40.9	65.8	28.6	38.0	74.5	-60.8	-49.8	15.7	69.4	60.4	359.0
Monthly Inflow	kaf	109.7	108.6	105.0	136.8	126.5	276.9	370.1	232.7	169.3	174.0	158.7	139.1	2107.4
Monthly Inflow	cfs	1784	1766	1891	2225	2126	4503	6220	3785	2753	2924	2581	2338	
Turbine Release	kaf	141.4	141.4	127.7	141.4	137.4	174.0	225.2	232.7	180.6	167.6	153.8	144.6	1967.8
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	141.4	141.4	127.7	141.4	137.4	174.0	225.2	232.7	180.6	167.6	153.8	144.6	1967.8
Total Release	cfs	2300	2300	2299	2300	2309	2830	3785	3785	2937	2817	2501	2430	
Spring Flow	kaf	4.3	4.3	3.9	4.3	4.2	4.3	4.2	4.3	4.3	4.2	4.3	4.2	50.8
Irrigation Reqmnt	kaf	0.0	0.0	0.0	0.0	0.6	24.6	26.8	27.7	26.8	18.8	0.0	0.0	125.3
Afterbay Rels	kaf	145.7	145.7	131.6	145.7	141.6	178.3	229.4	237.0	184.9	171.8	158.1	148.8	2018.6
Afterbay Rels	cfs	2370	2370	2370	2370	2380	2900	3855	3854	3007	2887	2571	2501	
River Release	kaf	145.7	145.7	131.6	145.7	141.0	153.7	202.6	209.3	158.1	153.0	158.1	148.8	1893.3
River Release	cfs	2370	2370	2370	2370	2370	2500	3405	3404	2571	2571	2571	2501	
Min Release	kaf	145.7	145.7	131.6	145.7	141.0	153.7	148.8	153.7	153.7	148.8	153.7	148.8	1770.9
End-Month Targets	kaf				858.5			1070.0	1070.0			1070.0		
End-Month Content	kaf	893.2	860.4	837.7	833.1	822.2	925.1	1070.0	1070.0	1058.7	1065.1	1070.0	1064.5	
End-Month Elevation	ft	3622.48	3618.26	3615.14	3614.49	3612.90	3626.26	3640.00	3640.00	3639.09	3639.60	3640.00	3639.56	
Net Change Content	kaf	-31.7	-32.8	-22.7	-4.6	-10.9	102.9	144.9	0.0	-11.3	6.4	4.9	-5.5	139.6
Yellowtail Power	2010	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Total
Turbine Release	kaf	141.4	141.4	127.7	141.4	137.4	174.0	225.2	232.7	180.6	167.6	153.8	144.6	1967.8
Generation	gwh	55.097	54.478	48.707	53.660	51.991	66.963	90.336	95.413	73.928	68.557	63.017	59.242	781.389
End-Month Power Cap	mw	270.5	266.6	263.7	263.1	261.7	274.1	287.5	287.5	286.6	287.1	287.5	287.1	
% Max Gen		26	25	25	25	25	31	44	45	35	33	29	29	
Ave kwh/af		390	385	381	379	378	385	401	410	409	409	410	410	397
Upstream Generation	gwh	9.994	9.953	8.393	9.891	13.004	31.858	33.842	34.158	32.064	25.839	14.480	12.733	236.209
Total Generation	gwh	65.091	64.431	57.100	63.551	64.995	98.821	124.178	129.571	105.992	94.396	77.497	71.975	1017.598

# BIGHORN LAKE

## BIGHORN LAKE ELEVATION



## BIGHORN RIVER FLOW BELOW AFTERBAY



# WATER YEAR 2011

# **Supplemental Information**

BHXAOP V1.12 Run: 03-Dec-2010 14:11  
 Based on Minimum Probable Inflow Forecast

BIGHORN LAKE MONTHLY OPERATIONS

Bighorn Reservoir	2010	Initial Cont Elev 924.9 kaf 3626.24 ft			Maximum Cont Elev 1328.4 kaf 3657.00 ft				Minimum Cont Elev 300.0 kaf 3547.00 ft			Total		
		Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep		Oct	Nov
Boysen Release	kaf	49.2	49.2	44.4	49.2	47.6	67.6	69.9	76.9	69.2	59.5	46.1	29.8	658.6
Boysen Release	cfs	800	800	799	800	800	1099	1175	1251	1125	1000	750	501	
Buffalo Bill Riv Flo	kaf	21.8	21.8	19.7	21.8	31.7	101.2	105.0	118.7	104.3	82.3	26.7	12.2	667.2
Buffalo Bill Riv Flo	cfs	355	355	355	355	533	1646	1765	1930	1696	1383	434	205	
Station Gain	kaf	33.3	32.2	35.5	60.2	21.4	17.5	-3.4	-99.3	-70.0	5.1	38.4	56.5	127.4
Monthly Inflow	kaf	104.3	103.2	99.6	131.2	100.7	186.3	171.5	96.3	103.5	146.9	111.2	98.5	1453.2
Monthly Inflow	cfs	1696	1678	1793	2134	1692	3030	2882	1566	1683	2469	1808	1655	
Turbine Release	kaf	141.4	141.4	127.7	118.7	100.5	127.9	126.7	131.0	130.1	118.7	103.3	99.9	1467.3
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	141.4	141.4	127.7	118.7	100.5	127.9	126.7	131.0	130.1	118.7	103.3	99.9	1467.3
Total Release	cfs	2300	2300	2299	1930	1689	2080	2129	2131	2116	1995	1680	1679	
Spring Flow	kaf	4.3	4.3	3.9	4.3	4.2	4.3	4.2	4.3	4.3	4.2	4.3	4.2	50.8
Irrigation Reqmnt	kaf	0.0	0.0	0.0	0.0	0.6	24.6	26.8	27.7	26.8	18.8	0.0	0.0	125.3
Afterbay Rels	kaf	145.7	145.7	131.6	123.0	104.7	132.2	130.9	135.3	134.4	122.9	107.6	104.1	1518.1
Afterbay Rels	cfs	2370	2370	2370	2000	1760	2150	2200	2200	2186	2065	1750	1749	
River Release	kaf	145.7	145.7	131.6	123.0	104.1	107.6	104.1	107.6	107.6	104.1	107.6	104.1	1392.8
River Release	cfs	2370	2370	2370	2000	1749	1750	1749	1750	1750	1749	1750	1749	
Min Release	kaf	145.7	145.7	131.6	123.0	104.1	107.6	104.1	107.6	107.6	104.1	107.6	104.1	1392.8
End-Month Targets	kaf				858.5				1070.0			1070.0		
End-Month Content	kaf	887.8	849.6	821.5	834.0	834.2	892.6	937.4	902.7	876.1	904.3	912.2	910.8	
End-Month Elevation	ft	3621.81	3616.80	3612.80	3614.62	3614.65	3622.40	3627.63	3623.64	3620.32	3623.83	3624.77	3624.60	
Net Change Content	kaf	-37.1	-38.2	-28.1	12.5	0.2	58.4	44.8	-34.7	-26.6	28.2	7.9	-1.4	-14.1
Yellowtail Power	2010	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Total
Turbine Release	kaf	141.4	141.4	127.7	118.7	100.5	127.9	126.7	131.0	130.1	118.7	103.3	99.9	1467.3
Generation	gwh	55.046	54.320	48.464	44.916	38.121	49.040	49.470	51.237	50.349	45.950	40.240	38.959	566.112
End-Month Power Cap	mw	269.9	265.3	261.6	263.2	263.3	270.5	275.4	271.6	268.5	271.8	272.7	272.5	
% Max Gen		26	25	25	21	18	23	24	24	23	22	19	19	
Ave kwh/af		389	384	380	378	379	383	390	391	387	387	390	390	386
Upstream Generation	gwh	9.984	9.922	8.371	9.820	11.387	25.179	25.198	27.551	24.568	20.197	9.291	5.226	186.694
Total Generation	gwh	65.030	64.242	56.835	54.736	49.508	74.219	74.668	78.788	74.917	66.147	49.531	44.185	752.806



BHXAOP V1.12 Run: 03-Dec-2010 14:32  
 Based on Maximum Probable Inflow Forecast

BIGHORN LAKE MONTHLY OPERATIONS

Bighorn Reservoir	2010	Initial Cont 924.9 kaf Elev 3626.24 ft					Maximum Cont 1328.4 kaf Elev 3657.00 ft				Minimum Cont 493.6 kaf Elev 3547.00 ft			Total
		Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
Boysen Release	kaf	49.2	49.2	44.4	49.2	121.8	254.6	265.2	259.3	115.5	74.6	64.6	59.5	1407.1
Boysen Release	cfs	800	800	799	800	2047	4141	4457	4217	1878	1254	1051	1000	
Buffalo Bill Riv Flo	kaf	21.8	21.8	19.7	21.8	31.7	187.4	307.2	273.1	147.4	100.2	41.7	32.7	1206.5
Buffalo Bill Riv Flo	cfs	355	355	355	355	533	3048	5163	4442	2397	1684	678	550	
Station Gain	kaf	43.0	42.0	45.8	73.1	33.3	52.6	130.1	-14.1	-37.7	23.8	60.8	66.8	519.5
Monthly Inflow	kaf	114.0	113.0	109.9	144.1	186.8	494.6	702.5	518.3	225.2	198.6	167.1	159.0	3133.1
Monthly Inflow	cfs	1854	1838	1979	2344	3139	8044	11806	8429	3663	3338	2718	2672	
Turbine Release	kaf	141.4	141.4	127.7	141.4	237.2	507.0	423.7	518.3	225.4	198.8	166.7	161.2	2990.2
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	141.4	141.4	127.7	141.4	237.2	507.0	423.7	518.3	225.4	198.8	166.7	161.2	2990.2
Total Release	cfs	2300	2300	2299	2300	3986	8246	7121	8429	3666	3341	2711	2709	
Spring Flow	kaf	4.3	4.3	3.9	4.3	4.2	4.3	4.2	4.3	4.3	4.2	4.3	4.2	50.8
Irrigation Reqmnt	kaf	0.0	0.0	0.0	0.0	0.5	11.2	21.8	27.7	26.8	11.9	0.0	0.0	99.9
Afterbay Rels	kaf	145.7	145.7	131.6	145.7	241.4	511.3	427.9	522.6	229.7	203.0	171.0	165.4	3041.0
Afterbay Rels	cfs	2370	2370	2370	2370	4057	8315	7191	8499	3736	3412	2781	2780	
River Release	kaf	145.7	145.7	131.6	145.7	240.9	500.1	406.1	494.9	202.9	191.1	171.0	165.4	2941.1
River Release	cfs	2370	2370	2370	2370	4048	8133	6825	8049	3300	3212	2781	2780	
Min Release	kaf	145.7	145.7	131.6	145.7	148.8	153.7	148.8	153.7	153.7	148.8	153.7	148.8	1778.7
End-Month Targets	kaf				862.2			1070.0	1070.0			1070.0		
End-Month Content	kaf	897.5	869.1	851.3	854.0	803.6	791.2	1070.0	1070.0	1069.8	1069.6	1070.0	1067.8	
End-Month Elevation	ft	3623.01	3619.41	3617.03	3617.40	3610.06	3608.07	3640.00	3640.00	3639.98	3639.97	3640.00	3639.82	
Net Change Content	kaf	-27.4	-28.4	-17.8	2.7	-50.4	-12.4	278.8	0.0	-0.2	-0.2	0.4	-2.2	142.9
Yellowtail Power	2010	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Total
Turbine Release	kaf	141.4	141.4	127.7	141.4	237.2	507.0	423.7	518.3	225.4	198.8	166.7	161.2	2990.2
Generation	gwh	55.138	54.604	48.907	54.004	89.793	189.623	166.309	212.517	92.417	81.506	68.348	66.075	1179.241
End-Month Power Cap	mw	271.0	267.7	265.5	265.8	259.1	257.3	287.5	287.5	287.5	287.5	287.5	287.3	
% Max Gen		26	25	25	25	43	88	80	99	43	39	32	32	
Ave kwh/af		390	386	383	382	379	374	393	410	410	410	410	410	394
Upstream Generation	gwh	9.992	9.968	8.442	9.946	17.620	33.565	33.639	35.244	33.718	27.435	16.282	14.225	250.076
Total Generation	gwh	65.130	64.572	57.349	63.950	107.413	223.188	199.948	247.761	126.135	108.941	84.630	80.300	1429.317