WESTERN AREA POWER ADMINSTRATION
HYDRO CONDITIONS AND PURCHASE POWER REPORT
October 2023
Water Year 2023, Final Report

	Generation (Megawatt-Hours [MWh])				Purchase Power (MWh)	Purchase Power Expenses (Dollars)		
	Projected Dry	Most Probable	Average	Actual	Actual	Projected Dry	Most Probable	Actual
Oct 22	1,471,054	1,281,310	2,016,884	1,312,652	195,951	$ 15,852,897	$ 9,880,231	$ 13,903,450
Nov 22	1,134,982	1,182,145	1,855,262	1,276,441	322,030	$ 20,513,204	$ 15,163,852	$ 18,426,107
Dec 22	968,994	1,037,489	1,806,685	1,047,546	635,103	$ 25,803,693	$ 20,016,256	$ 63,857,632
Jan 23	1,008,125	1,262,843	1,908,943	1,146,877	513,689	$ 23,173,682	$ 19,950,358	$ 37,248,717
Feb 23	875,656	1,207,142	1,776,880	1,044,966	509,599	$ 19,250,749	$ 14,634,934	$ 19,262,212
Mar 23	1,230,683	1,427,195	1,963,860	1,312,317	374,996	$ 19,804,794	$ 16,136,382	$ 16,931,191
Apr 23	1,186,726	1,624,121	2,262,056	1,655,067	391,320	$ 19,463,826	$ 10,174,265	$ 11,525,291
May 23	2,014,600	2,386,734	2,647,509	2,344,144	168,466	$ 15,759,825	$ 7,971,028	$ 5,853,265
Jun 23	1,946,174	2,421,659	2,770,486	2,340,852	129,020	$ 19,288,762	$ 9,366,049	$ 6,027,226
Jul 23	2,211,547	2,640,946	3,044,787	2,555,465	130,304	$ 33,009,516	$ 14,625,305	$ 13,767,794
Aug 23	2,165,691	2,385,519	2,874,098	2,329,749	149,370	$ 36,754,068	$ 21,574,008	$ 17,587,435
Sep 23	1,762,349	1,807,963	2,336,042	1,886,267	182,393	$ 16,239,969	$ 18,128,207	$ 12,076,337
Total	17,976,581	20,665,066	27,263,492	20,252,343	3,702,241	$ 264,914,983	$ 177,620,875	$ 236,466,657
	Actual generation as a percentage of average:			74.3%			Cost per MWh:	$63.87

Western Area Power Administration (WAPA) generated a total of 20,252 gigawatt-hours (GWh) from October through September of fiscal year 2023, or 74.3 percent of average. WAPA's total actual purchase power data from October through September was 3,702 GWhs and total purchase power expenses were $236,466,657, which equates to $63.87 per MWh overall.

The following pages indicate WAPA's regional snowpack, lake/reservoir inflow and storage, generation, and purchase power expenses. Snowpack is reported as snow water equivalent, which is the depth of water that theoretically would result if the entire snowpack melted instantaneously.

Disclaimer: The monthly purchase power numbers in this report are used by WAPA's regions as a forecasting tool; therefore, they do not reflect energy imbalance transactions and other such information that cannot be forecasted. Furthermore, the purchase power numbers have not been verified for financial auditing purposes. Consequently, these numbers will vary from those reported in WAPA's year-end financial statements, and the latter should be considered the definitive source for WAPA's purchase power data.

Colorado River Storage Project

	Snowpack (Inches in Snow Water Equivalent)		Lake/Reservoir Inflow (Thousand Acre-Feet)		Lake/Reservoir Content (Million Acre-Feet)		Generation (MWh)				Purchase Power (MWh)	Purchase Power Expenses (Dollars)		
	Median	Actual	Average	Actual	Average	Actual	Projected Dry	Most Probable	Average	Actual	Actual	Projected Dry	Most Probable	Actual
Oct 22	1.00	1.20	514.42	437.00	15.01	5.83	218,843	271,947	392,070	250,183	16,261	$ 0	$ 0	$ 886,454
Nov 22	4.30	3.80	474.23	349.00	14.91	5.72	115,541	232,979	379,493	225,788	12,799	$ 0	$ 0	$ 854,554
Dec 22	7.80	8.80	362.96	281.00	14.86	5.53	143,368	265,055	449,721	253,334	24,410	$ 0	$ 0	$ 5,147,050
Jan 23	11.20	15.10	361.45	361.00	14.98	5.45	46,967	306,090	457,656	237,467	17,955	$ 0	$ 0	$ 2,199,458
Feb 23	14.80	18.50	392.01	270.00	15.99	5.32	42,649	269,775	389,089	201,464	13,140	$ 0	$ 0	$ 697,832
Mar 23	18.30	25.10	666.27	573.00	16.77	5.38	44,385	225,422	412,640	210,998	20,366	$ 0	$ 0	$ 1,019,519
Apr 23	18.70	24.70	1,057.14	1,399.00	16.74	5.54	67,300	396,922	413,625	336,409	640	$ 0	$ 0	$ 21,162
May 23	7.20	7.90	2,337.68	4,520.00	16.30	7.89	220,846	571,306	493,255	541,872	1,034	$ 0	$ 0	$ 37,862
Jun 23	0.00	0.00	2,668.50	3,646.00	16.00	9.57	281,336	610,781	541,219	624,607	170	$ 0	$ 0	$ 2,929
Jul 23	0.00	0.00	1,093.88	1,054.00	15.88	9.33	351,494	642,343	581,235	656,584	419	$ 0	$ 0	$ 18,380
Aug 23	0.00	0.00	496.08	307.00	15.68	8.88	347,250	521,456	560,126	529,825	41,984	$ 0	$ 4,345,238	$ 2,607,274
Sep 23	0.00	0.00	405.88	224.00	15.38	8.80	239,362	306,032	432,354	317,260	86,228	$ 0	$ 10,171,475	$ 3,384,399
Total							2,119,341	4,620,108	5,502,483	4,385,791	235,406	$ 0	$ 14,516,713	$ 16,876,873
							Actual generation as a percentage of average:			79.7%			Cost per MWh:	$71.69

Lake/Reservoir Levels

End of September storage volume for Lake Powell was 8.79 million acre-feet (MAF) or about 38 percent of capacity. Lake Powell reservoir inflow for September was 0.22 MAF or 65 percent of average. Lake Powell's elevation at the end of September was about 3,574 feet, or about 126 feet from maximum reservoir level and 84 feet from the minimum generation level. The release volume from Glen Canyon Dam for water year (WY) 2024 will be 7.48 million acre-feet.

Weather and Other Conditions

Because of the requirement to "balance" Lake Powell and Lake Mead in WY 2023, releases from Glen Canyon Dam were reduced considerably in August and September resulting in significant energy purchases. Fortunately, high forecasted energy prices never materialized resulting in lower than anticipated costs.

Desert Southwest Region

	Snowpack (Inches in Snow Water Equivalent)		Lake/Reservoir Inflow (Thousand Acre-Feet)		Lake/Reservoir Content (Million Acre-Feet)		Generation (MWh)				Purchase Power (MWh)	Purchase Power Expenses (Dollars)		
	Median	Actual	Average	Actual	Average	Actual	Projected Dry	Most Probable	Average	Actual	Actual	Projected Dry	Most Probable	Actual
Oct 22	1.00	1.20	60.81	94.00	19.94	9.44	403,200	143,050	374,715	226,279	26,405	$ 2,587,690	$ 2,587,690	$ 2,636,428
Nov 22	4.30	3.80	54.39	18.00	19.94	9.37	315,600	252,200	361,456	328,466	17,711	$ 2,208,802	$ 2,208,802	$ 1,753,563
Dec 22	7.80	8.80	72.64	63.00	20.01	9.49	209,550	145,820	362,198	216,036	45,046	$ 3,847,693	$ 3,847,693	$ 13,754,290
Jan 23	11.20	15.10	92.45	104.00	19.90	9.70	222,150	191,405	385,753	196,764	64,390	$ 4,018,823	$ 4,018,823	$ 13,275,199
Feb 23	14.80	18.50	105.16	46.00	19.93	9.74	236,250	243,135	384,361	245,324	38,964	$ 1,951,269	$ 1,951,269	$ 4,259,534
Mar 23	18.30	25.10	105.02	226.00	19.86	9.72	454,900	382,850	524,515	380,126	57,084	$ 6,133,050	$ 6,133,050	$ 5,599,155
Apr 23	18.70	24.70	85.83	243.00	19.78	9.93	435,900	435,285	567,347	431,994	37,878	$ 2,428,320	$ 2,428,320	$ 3,298,166
May 23	7.20	7.90	59.95	185.00	19.64	10.21	494,400	456,450	569,244	445,215	32,915	$ 1,883,104	$ 1,883,104	$ 1,342,840
Jun 23	0.00	0.00	26.77	61.00	19.82	10.44	455,950	456,540	533,900	452,793	25,712	$ 3,679,675	$ 3,679,675	$ 1,474,582
Jul 23	0.00	0.00	66.29	61.00	19.73	10.79	401,200	404,075	541,666	396,787	42,352	$ 9,447,935	$ 9,447,935	$ 7,075,690
Aug 23	0.00	0.00	99.60	114.00	19.62	11.11	351,750	295,185	502,905	301,083	55,997	$ 12,890,681	$ 12,890,681	$ 9,961,644
Sep 23	0.00	0.00	87.17	128.00	19.48	11.04	276,750	270,845	425,710	271,033	41,573	$ 4,096,736	$ 4,096,736	$ 4,424,740
Total							4,257,600	3,676,840	5,533,770	3,891,900	486,027	$ 55,173,779	$ 55,173,779	$ 68,855,831
							Actual generation as a percentage of average:			70.3%			Cost per MWh:	$141.67

Lake/Reservoir Levels

Aggregate system storage for the Lower Colorado River Basin, or Lakes Mead, Mohave, and Havasu, was 11.04 MAF at the end of September, or 39 percent of the Lower Basin capacity. The observed Lower Basin tributary inflow into Lake Mead for September was 128,000 acre-feet, or 177 percent of the five-year average for the month. The total side inflow into Lake Mead for WY 2023 was 1.34 MAF, which represents a 70 percent increase over last year and 103 percent of the normal annual side inflow. Lake Mead's elevation at the end of September was 1,065.82 feet, or 153.82 feet below full storage elevation and 115.82 feet above the minimum generation elevation for Hoover Dam. For WY 2023, Lake Mead peaked at 1,065.52 feet in September 2023 and its minimum elevation of 1,043.02 feet occurred in November 2022.

Weather and Other Conditions

The Desert Southwest Region's hydrology, or the Lower Colorado River Basin, is mostly dependent on the Colorado River Basin snowpack and precipitation above Lake Powell. The precipitation is currently 92 percent of average.

Rocky Mountain Region

	Snowpack (Inches in Snow Water Equivalent)		Lake/Reservoir Inflow (Thousand Acre-Feet)		Lake/Reservoir Content (Million Acre-Feet)		Generation (MWh)				Purchase Power (MWh)	Purchase Power Expenses (Dollars)		
	Median	Actual	Average	Actual	Average	Actual	Projected Dry	Most Probable	Average	Actual	Actual	Projected Dry	Most Probable	Actual
Oct 22	0.00	0.20	142.20	127.20	3.90	3.71	46,425	61,900	97,400	50,264	105,370	$ 10,707,550	$ 4,716,720	$ 7,487,439
Nov 22	3.70	3.10	123.80	105.80	3.89	3.71	44,513	59,350	110,000	47,809	117,764	$ 10,119,341	$ 4,486,824	$ 8,815,650
Dec 22	11.80	11.00	101.70	95.40	3.90	3.64	67,688	90,250	123,500	54,084	120,394	$ 9,118,069	$ 3,379,154	$ 18,057,020
Jan 23	20.30	24.10	100.50	102.70	3.88	3.65	100,538	134,050	122,100	101,230	62,053	$ 5,914,777	$ 2,063,458	$ 7,586,960
Feb 23	29.00	36.70	98.30	87.40	3.88	3.62	88,275	117,700	111,600	103,126	32,334	$ 5,345,785	$ 1,135,538	$ 1,942,405
Mar 23	38.10	37.90	160.30	115.60	3.91	3.74	98,625	131,500	128,900	137,928	25,862	$ 4,324,615	$ 594,118	$ 1,242,921
Apr 23	46.80	58.80	251.70	322.60	3.94	3.64	99,863	133,150	144,600	186,653	47,766	$ 10,192,971	$ 1,708,072	$ 968,674
May 23	45.40	56.10	886.60	1,246.90	4.31	4.56	191,025	254,700	196,800	232,919	32,133	$ 8,178,225	$ 0	$ 572,997
Jun 23	0.00	0.00	1,192.80	1,498.30	4.89	5.54	215,100	286,800	246,200	199,804	17,786	$ 9,640,530	$ 0	$ 384,902
Jul 23	0.00	0.00	537.50	539.00	4.59	5.10	216,525	288,700	261,200	234,184	35,223	$ 18,098,929	$ 0	$ 2,087,890
Aug 23	0.00	0.00	237.50	185.60	4.10	4.67	194,513	259,350	214,800	214,800	3,709	$ 19,611,997	$ 0	$ 274,870
Sep 23	0.00	0.00	127.10	151.10	3.89	4.42	151,499	201,998	141,600	141,600	16,624	$ 8,288,302	$ 0	$ 550,260
Total							1,514,586	2,019,448	1,898,700	1,704,401	617,018	$ 119,541,088	$ 18,083,883	$ 49,971,988
							Actual generation as a percentage of average:			89.8%			Cost per MWh:	$80.99

Lake/Reservoir Content

At the end of September, reservoir inflows were 119 percent of average and storage was 114 percent of average.

Weather and Other Conditions

Hydrologic conditions within the Loveland Area Projects can vary from one river basin and watershed to another. The latest National Weather Service forecast indicates November through January temperatures have an equal chance of being above average or below average in northern Colorado and will lean toward above average in Wyoming and lower Montana. The same forecast indicates precipitation has an equal chance of being above or below average for the Colorado and Wyoming areas and will lean toward below average in the Montana area. Fall/winter generation in the Colorado River Basin, North Platte Basin, and Bighorn Basin is forecasted to be average.

Sierra Nevada Region

	Snowpack (Inches in Snow Water Equivalent)		Lake/Reservoir Inflow (Thousand Acre-Feet)		Lake/Reservoir Content (Million Acre-Feet)		Generation (MWh)				Purchase Power (MWh)	Purchase Power Expenses (Dollars)		
	Median	Actual	Average	Actual	Average	Actual	Projected Dry	Most Probable	Average	Actual	Actual	Projected Dry	Most Probable	Actual
Oct 22	N/A	N/A	322.00	189.00	4.94	2.82	63,000	68,000	163,000	56,344	38,052	$ 2,102,450	$ 2,102,450	$ 2,162,501
Nov 22	N/A	N/A	398.00	243.00	4.92	2.76	30,000	15,000	104,000	22,059	38,127	$ 2,036,081	$ 2,036,081	$ 2,185,091
Dec 22	26.25	14.70	822.00	891.00	5.25	3.34	13,000	0	143,000	19,020	44,132	$ 2,102,450	$ 2,102,450	$ 3,658,267
Jan 23	26.33	33.70	1,121.00	2,356.00	5.65	4.82	0	0	163,000	25,336	43,928	$ 2,874,940	$ 2,874,940	$ 3,667,261
Feb 23	25.93	42.00	1,114.00	842.00	6.28	5.20	0	49,000	195,000	8,361	45,937	$ 4,072,080	$ 4,072,080	$ 4,241,556
Mar 23	25.85	61.00	1,519.00	2,483.00	7.01	6.74	0	90,000	207,000	14,410	44,578	$ 3,486,068	$ 3,486,068	$ 3,505,072
Apr 23	26.02	51.00	1,319.00	1,945.00	7.45	7.64	137,000	127,000	288,000	214,226	36,087	$ 2,027,700	$ 2,027,700	$ 2,049,670
May 23	23.23	23.00	1,111.00	2,400.00	7.82	8.08	437,000	457,000	442,000	436,394	36,437	$ 2,095,080	$ 2,095,080	$ 2,090,208
Jun 23	23.08	3.00	759.00	1,319.00	7.10	8.67	347,000	382,000	440,000	329,387	35,940	$ 2,026,440	$ 2,026,440	$ 2,047,244
Jul 23	N/A	N/A	427.00	706.00	6.41	8.18	325,000	345,000	524,000	337,517	38,077	$ 3,752,040	$ 3,752,040	$ 3,815,336
Aug 23	N/A	N/A	336.00	436.00	5.79	7.52	206,000	256,000	402,000	324,456	37,608	$ 3,819,480	$ 3,819,480	$ 3,839,304
Sep 23	N/A	N/A	309.00	479.00	5.39	7.17	117,000	62,000	269,000	193,987	36,076	$ 3,658,200	$ 3,658,200	$ 3,662,145
Total							1,675,000	1,851,000	3,340,000	1,981,498	474,979	$ 34,053,009	$ 34,053,009	$ 36,923,654
							Actual generation as a percentage of average:			59.3%			Cost per MWh:	$77.74

Lake/Reservoir Content

As of September 30, reservoir storage was 100 percent of the 15-year average for Trinity, 139 percent for Shasta, 145 percent for Folsom, and 149 percent for New Melones. Accumulated inflow was 146 percent of the 15-year average for Trinity, 118 percent for Shasta, 178 percent for Folsom, and 216 percent for New Melones.

Weather and Other Conditions

August had 0.94 inches of precipitation and September had 1.59 inches of precipitation, and the cumulative total for WY 2023 was 66.64 inches or 132 percent of average. Based on May 1 conditions, the Sacramento Valley 40-30-30 index at the 50 percent exceedence level is "wet" while the 90 percent exceedence level is "above normal."

Note: The Sierra Nevada Region's average generation is based upon long-term modeling done for its "Green Book." The region does not project purchase power expenses for dry conditions, and its most probable expenses are based upon term purchases of 35 to 65 percent of projected power needs, with the difference being left to day-ahead markets after project pumping and generation have been scheduled.

Upper Great Plains Region

	Snowpack (Inches in Snow Water Equivalent)		Lake/Reservoir Inflow (Thousand Acre-Feet)		Lake/Reservoir Content (Million Acre-Feet)		Generation (MWh)				Purchase Power (MWh)	Purchase Power Expenses (Dollars)		
	Median	Actual	Average	Actual	Average	Actual	Projected Dry	Most Probable	Average	Actual	Actual	Projected Dry	Most Probable	Actual
Oct 22	1.20	0.00	7,972.00	6,662.59	56.14	48.67	739,586	736,413	989,699	729,582	9,863	$ 455,207	$ 473,370	$ 730,628
Nov 22	3.80	4.10	7,334.00	5,908.08	55.06	47.47	629,328	622,616	900,312	652,319	135,629	$ 6,148,980	$ 6,432,145	$ 4,817,249
Dec 22	7.10	7.90	6,422.00	4,608.00	54.46	47.01	535,389	536,364	728,266	505,072	401,121	$ 10,735,481	$ 10,686,959	$ 23,241,005
Jan 23	10.30	10.50	6,664.00	5,662.09	54.34	47.16	638,471	631,298	780,434	586,079	325,363	$ 10,365,142	$ 10,993,137	$ 10,519,839
Feb 23	13.10	12.90	6,297.00	4,791.31	54.63	47.38	508,482	527,532	696,830	486,691	379,224	$ 7,881,615	$ 7,476,047	$ 8,120,885
Mar 23	15.80	17.90	8,247.00	6,106.99	56.39	47.90	632,773	597,423	690,806	568,854	227,106	$ 5,861,062	$ 5,923,147	$ 5,564,524
Apr 23	14.90	16.90	8,205.00	7,629.62	57.24	50.93	446,664	531,764	848,484	485,785	268,949	$ 4,814,835	$ 4,010,173	$ 5,187,619
May 23	6.30	2.90	9,841.00	9,488.65	58.55	53.80	671,329	647,278	946,211	687,744	65,947	$ 3,603,417	$ 3,992,844	$ 1,809,358
Jun 23	0.50	0.00	11,857.00	11,136.28	60.71	57.52	646,788	685,538	1,009,167	734,261	49,412	$ 3,942,117	$ 3,659,934	$ 2,117,569
Jul 23	0.00	0.00	10,840.00	9,632.31	60.66	58.11	917,328	960,828	1,136,686	930,393	14,233	$ 1,710,611	$ 1,425,330	$ 770,498
Aug 23	0.00	0.00	9,862.00	8,704.35	59.06	57.20	1,066,178	1,053,528	1,194,267	959,586	10,072	$ 431,910	$ 518,609	$ 904,343
Sep 23	0.09	0.00	8,816.00	9,003.65	57.48	55.89	977,738	967,088	1,067,378	962,387	1,892	$ 196,731	$ 201,796	$ 54,793
Total							8,410,054	8,497,670	10,988,539	8,288,753	1,888,811	$ 56,147,108	$ 55,793,491	$ 63,838,310
							Actual generation as a percentage of average:			75.4%			Cost per MWh:	$33.80

Lake/Reservoir Content

The yearly runoff forecast for the Missouri River Basin as of October 1 was 29.1 MAF or 113 percent of average. September 2023 runoff above Sioux City was 1.3 MAF or 109 percent of average. As of October 17, system storage was 53.7 MAF.

Weather and Other Conditions

On June 25, the mountain snow water equivalent in the total above Fort Peck reach was 0 inches, and the mountain snow water equivalent in the Fort Peck to Garrison reach was 0 inches. Drought conditions improved in northwestern North Dakota and northeastern South Dakota where more than one inch of precipitation occurred during a recent week. Small improvements were also warranted in central Nebraska given the wet start to October. The 90- to 180- day temperature averages outlook shows equal chances for above or below normal temperatures for much of the region, and equal chances for above or below precipitation.

Note: The Upper Great Plains Region reports its 50 percent share of Yellowtail Dam generation while the Rocky Mountain Region reports the snowpack, inflow, content, and remaining share of generation. Asterisks indicate that actual purchase power data is not available.