

# Utah Climate and Water Report

September 1, 2023



Miller Flat Reservoir
Photo by Dave Eiriksson

## Utah General Summary September 1, 2023

<u>Valley Conditions (SCAN) as of September 1<sup>st</sup>:</u> After a disappointing July for precipitation, things turned around in August! Utah received 1.9 inches of precipitation in our valley locations, which was well above normal (213%). Western Utah fared particularly well, with 319% of normal precipitation received for the month. Statewide, the August precipitation brings Utah's water-year-to-date value for valley locations to 136% of median. While we have focused much attention on our historic winter, in general this summer has provided significant moisture across the state as well. It is therefore not surprising that statewide soil moisture at Utah's SCAN sites ended the month well above normal at 43% of saturation, which was 6% higher than last year and in the top 10<sup>th</sup> percentile of all observations for that date.

Mountain Conditions (SNOTEL) as of September 1<sup>st</sup>: The month of August provided Utah's mountains with well above normal precipitation as well. The state's SNOTEL sites received 3.2" of rainfall, which was 215% of normal. Utah's water-year-to-date precipitation was 139% of median by the end of August, which was a boost of 3% compared with the beginning of the month, reflecting the frequency and intensity of our August storms. As a result of all that rainfall, statewide soil moisture in Utah's mountains was also well above normal by September 1<sup>st</sup> at 44% of saturation, which is 6% higher than last year's value at this time. Utah's reservoir storage has remained high; as of September 1<sup>st</sup> the state was at 77% of capacity, which was 31% higher than last year's value.

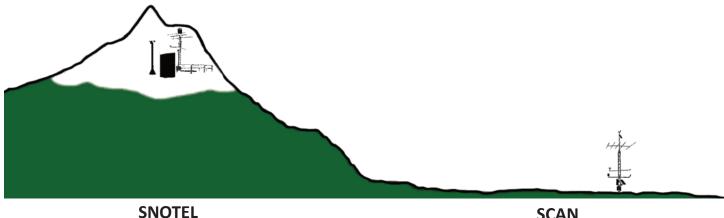
Water Availability Indices (WAIs) for Utah basins combine current reservoir conditions with observed streamflow for each region. WAIs are in the top 20<sup>th</sup> percentile for 13 of Utah's 18 major basins, again reflecting the statewide benefit of our record-breaking snowpack last winter. That said, despite all the positive conditions described above, we express herein our ongoing concerns about water levels in our largest water bodies (Bear Lake, Great Salt Lake, and Lake Powell) where it will take (at least) an additional above-normal snowpack season this winter to see lake levels increase enough to approach 'normal' conditions. As we have noted in previous reports, it continues to be critically important to conserve Utah's precious water resources.

This report is organized to reflect two distinct geographic areas being monitored – the low elevation valley sites (Soil Climate Analysis Network) that are critical for agricultural production and operations, and the high elevation mountainous areas where water supply is generated (SNOw TELemetry).

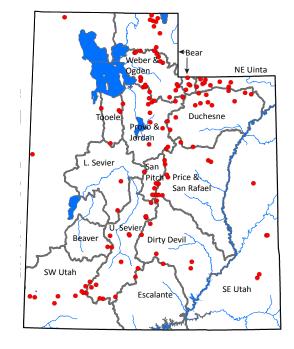
Questions, comments and suggestions are welcome and should be directed to jordan.clayton@usda.gov.

#### **Utah Climate and Water Report**

The purpose of the Climate and Water Report is to provide a snapshot of current and immediate past climatic conditions and other information useful to agricultural and water user interests in Utah. The report utilizes data from several sources that represent specific parameters (streamflow data from the United States Geological Survey, reservoir data from the Bureau of Reclamation, and other sources), geography including high elevation United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) Snowpack Telemetry (SNOTEL) data, and agriculturally important data from the USDA-NRCS Soil Climate Analysis Network (SCAN). Data on precipitation, soil moisture, soil temperature, reservoir storage, and streamflow are analyzed and presented. These data analyses can be used to increase irrigation efficiency and agricultural production. As with all data and analyses, there are limitations due to data quality, quantity, and spatial application.

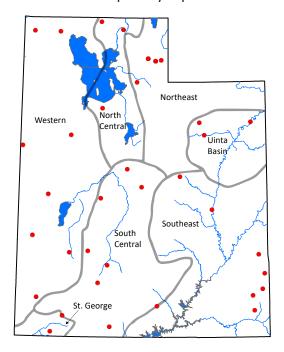


- Mountainous areas
- High elevation (>6,000 ft)
- Water supply forecasting
- Installed where snow pack represents the water supply



#### **SCAN**

- Agricultural and range lands
- Mid elevation (3 7,000 ft).
- Irrigation efficiency and rangeland productivity
- Installed on spatially representative soils



Sept 1, 2023 | Utah Reservoir Summary

Watershed/Region	Current Storage (Basinwide KAF)	Reservoir Capacity (Basinwide KAF)	Last Yr % Capacity (Basinwide)	This Yr % Capacity (Basinwide)
Utah (Statewide)	4211	5465	46	77
Utah (Statewide) Incl. Flaming G. & Lk. Powell	16381	33536	33	48
Bear	877	1389	32	63
Weber-Ogden	462	547	46	84
Northeastern Uintas	3372	3852	72	87
Tooele Valley	2	4	29	57
Duchesne	1212	1379	70	87
Provo	1180	1334	48	88
San Pitch	8	20	0	43
Price	138	158	42	87
Upper Sevier	132	382	4	34
Southeast UT	2	2	82	103
Beaver	15	23	5	65
Southwest Utah	98	118	57	83

Red (green) shading indicates >5% decrease (increase) in % capacity from this time last year.

Reservoir	Current Storage (KAF)	Reservoir Capacity (KAF)	Last Yr % Capacity	This Yr % Capacity
Bear Lake	799	1302	33	61
Big Sand Wash Reservoir	15	25	12	59
Causey Reservoir	5	7	55	81
Cleveland Lake	4	5	51	79
Currant Creek Reservoir	15	15	94	98
Deer Creek Reservoir	136	149	52	91
East Canyon Reservoir	42	49	57	85
Echo Reservoir	53	73	58	72
Flaming Gorge Reservoir	3291	3749	72	87
Grantsville Reservoir	1	3	33	57
Gunlock	7	10	45	74
Gunnison Reservoir	8	20	0	43
Huntington North Reservoir	3	4	50	78
Hyrum Reservoir	8	15	35	58
Joes Valley Reservoir	53	61	53	86
Jordanelle Reservoir	274	314	66	87
Ken's Lake	2	2	82	103
Kolob Reservoir	5	5	96	100
Lake Powell	8878	24322	24	36
Lost Creek Reservoir	18	22	44	80
Lower Enterprise	0	2	24	19
Meeks Cabin Reservoir	21	32	39	65
Miller Flat Reservoir	3	5	25	72
Millsite	14	16	67	86
Minersville Reservoir	15	23	5	65
Moon Lake Reservoir	22	35	42	63
Otter Creek Reservoir	44	52	9	84
Panguitch Lake	21	22	27	94
Pineview Reservoir	93	110	41	84
Piute Reservoir	35	71	0	49
Porcupine Reservoir	10	11	59	89
Quail Creek	29	40	61	72
Red Fleet Reservoir	21	25	37	84
Rockport Reservoir	50	60	69	83
Sand Hollow Reservoir	47	50	64	95
Scofield Reservoir	59	65	25	89
Settlement Canyon Reservoir	0	1	17	56
Sevier Bridge Reservoir	31	236	1	13
Smith and Morehouse	7	8	80	96
Starvation Reservoir	146	164	64	89
Stateline Reservoir	10	12	61	85
Steinaker Reservoir	27	33	33	81
Strawberry Reservoir	986	1105	73	89
Upper Enterprise	7	10	5	79
Upper Stillwater Reservoir	25	32	76	78
Utah Lake	769	870	41	88
Willard Bay	190	215	33	88
Woodruff Creek	1	4	38	49
Woodruff Narrows Reservoir	56	57	20	98

Red (green) shading indicates >5% decrease (increase) in % capacity from this time last year.

Sept 1, 2023 | Water Availability Index (WAI)

Basin or	Reservoir	Monthly Flow	Flow +	WAI <sup>3</sup>	Percentile⁴	Similar Years
Region	Storage <sup>1</sup> (KAF) <sup>2</sup>		Storage (KAF) <sup>2</sup>		(%)	
Bear	799.5	8.6	808.2	0.95	61	[2000, 2012]
Woodruff Narrows	56.7	3.8	60.5	3.41	91	[1995, 2011]
Little Bear	8.9	2.3	11.3	2.86	84	[1999, 2017]
Ogden	98.9	4.1	103.1	3.6	93	[1984, 2011]
Weber	172.8	17.9	190.8	3.24	89	[1993, 1999]
Provo	411.2	6.1	417.4	2.86	84	[1997, 2019]
Western Uintas	194.7	18.7	213.4	2.27	77	[1982, 1993]
Eastern Uintas	49.1	11.2	60.3	1.89	73	[1982, 1997]
Blacks Fork	21.1	9.0	30.1	3.15	88	[1986, 1998]
Smiths Fork	10.3	4.4	14.7	2.74	83	[1999, 2019]
Price	59.0	1.0	60.0	3.6	93	[1984, 2011]
Joes Valley	53.4	6.6	60.0	2.46	80	[1985, 2019]
Ferron Creek	14.5	2.4	16.8	3.41	91	[1996, 2005]
Moab	2.4	0.7	3.1	3.72	95	[1995, 2005]
Upper Sevier	80.0	7.3	87.3	3.03	86	[1982, 1995]
San Pitch	8.8	1.3	10.0	1.33	66	[1997, 2010]
Lower Sevier	31.4	2.7	34.1	-2.08	25	[2015, 2020]
Beaver River	15.3	4.5	19.8	2.65	82	[1997, 2005]
Virgin River	36.8	7.3	44.1	2.6	81	[2000, 2016]

<sup>&</sup>lt;sup>1</sup> End of Month Reservoir Storage; <sup>2</sup> KAF, Thousand Acre-Feet; <sup>3</sup> WAI, Water Availability Index; <sup>4</sup> Threshold for coloring: >75% Green, <25% Red

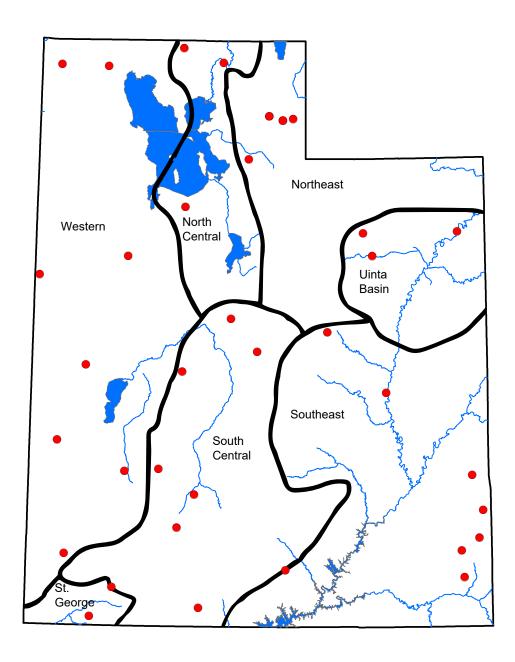
#### What is a Water Availability Index?

The Water Availability Index (WAI) is an observed hydrologic indicator of current surface water availability within a watershed. The index is calculated by combining current reservoir storage with the previous month's streamflow. Note that starting in June, 2022, un-adjusted streamflow values are used in this calculation. Prior to this date, 'naturalized' or 'adjusted' values were used. Please contact Jordan Clayton for details and rationale concerning this methodological change. See Appendix A for details on specific stream gauges and reservoirs used in WAI calculations.

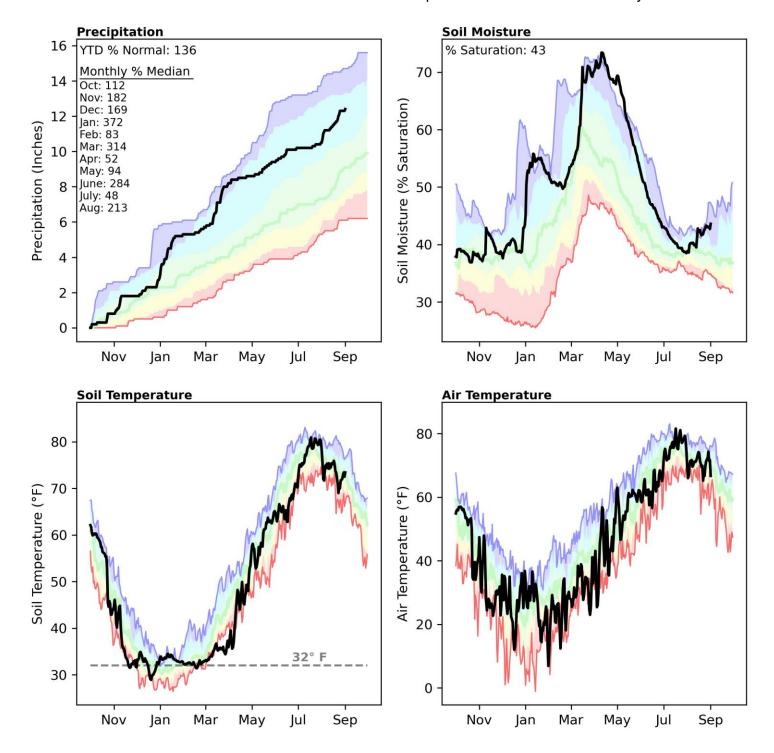
WAI values are scaled from +4.1 (abundant supply) to -4.1 (extremely dry) with a value of zero (0) indicating median water supply as compared to historical analysis. WAI's are calculated in this fashion to be consistent with other hydroclimatic indicators such as the Palmer Drought Index and the Precipitation index.

The Utah Snow Survey has also chosen to display the WAI value as well as a PERCENT CHANCE OF NON-EXCEEDANCE. While this is a cumbersome name, it has a simple application. It can be best thought of as a scale of 1 to 99 with 1 being the drought of record (driest possible conditions) and 99 being the flood of record (wettest possible conditions) and a value of 50 representing average conditions. This rating scale is a percentile rating as well, for example a WAI of 75% means that this years water supply is greater than 75% of all historical events and that only 25% of the time has it been exceeded. Conversely a WAI of 10% means that 90% of historical events have been greater than this one and that only 10% have had less total water supply. This scale is comparable between basins: a WAI of 50% means the same relative ranking on watershed A as it does on watershed B, which may not be strictly true of the +4 to -4 scale.

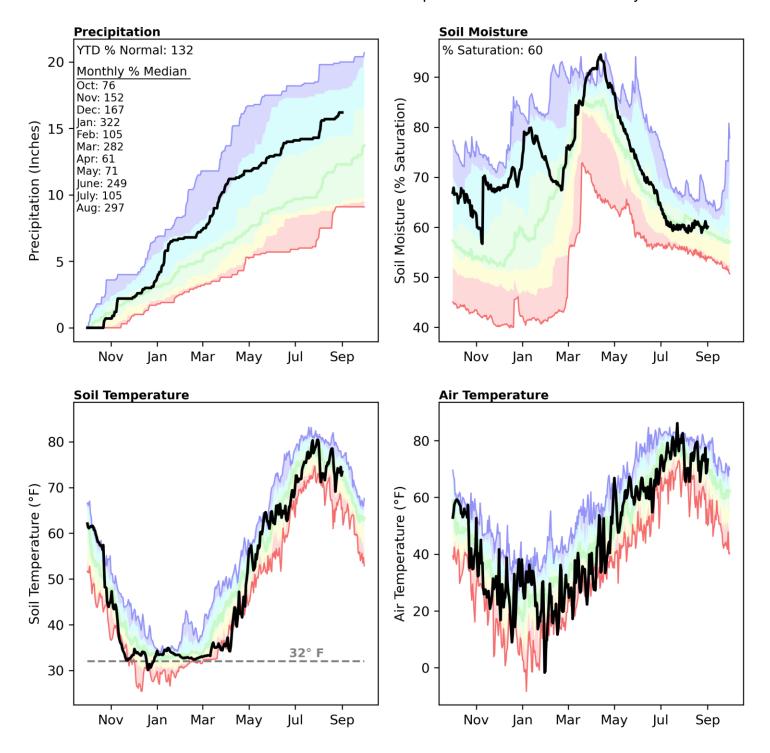
## **SCAN** portion of report



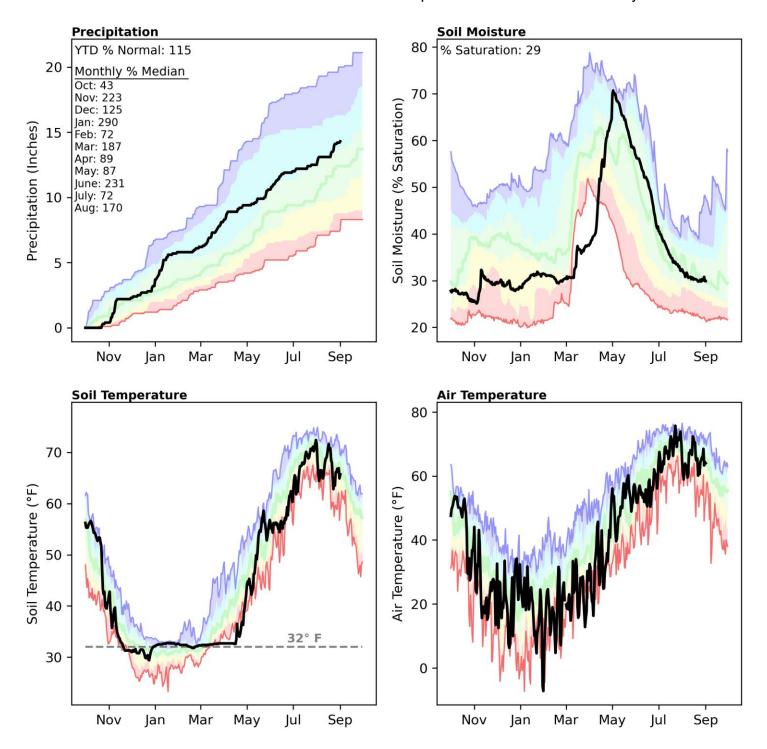
Precipitation in August was well above normal, with an average of 1.9" falling region-wide (213% of normal). This brings the water year accumulation (October-August) to 136% of median. Depth averaged soil moisture was calculated to be 43% of saturation compared to 37% at this time last year.



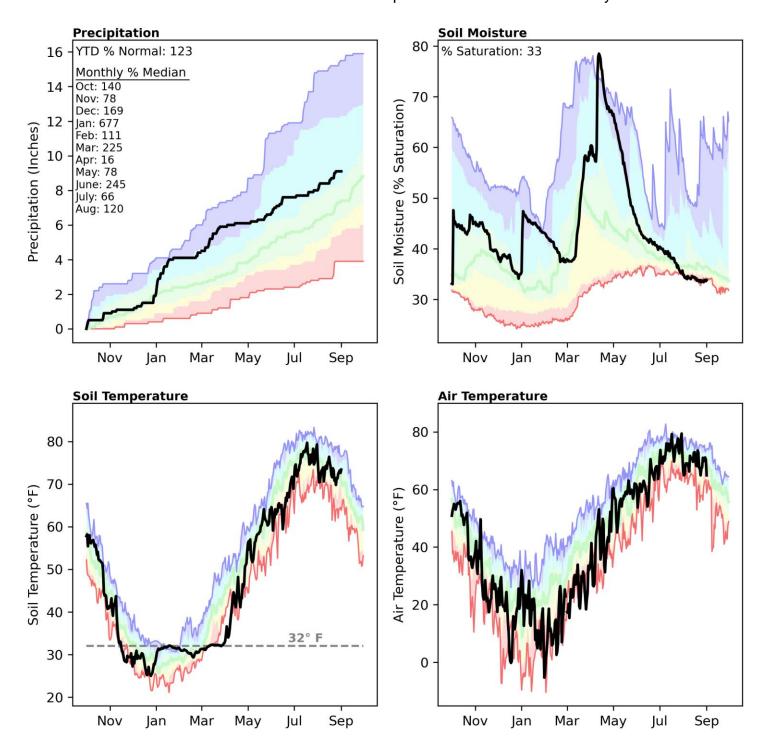
Precipitation in August was well above normal, with an average of 1.8" falling region-wide (297% of normal). This brings the water year accumulation (October-August) to 132% of median. Depth averaged soil moisture was calculated to be 60% of saturation compared to 59% at this time last year.



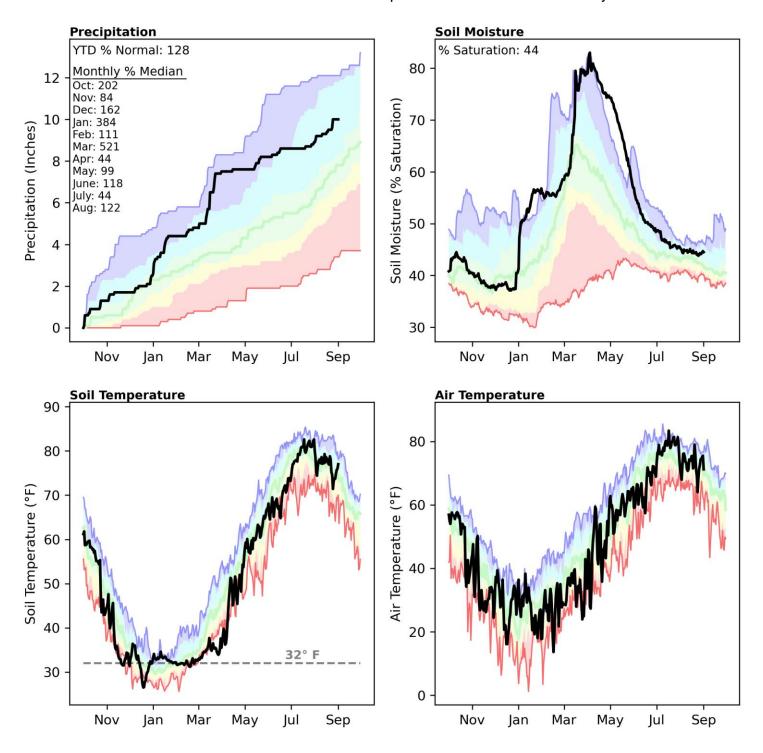
Precipitation in August was well above normal, with an average of 1.8" falling region-wide (170% of normal). This brings the water year accumulation (October-August) to 115% of median. Depth averaged soil moisture was calculated to be 29% of saturation compared to 30% at this time last year.



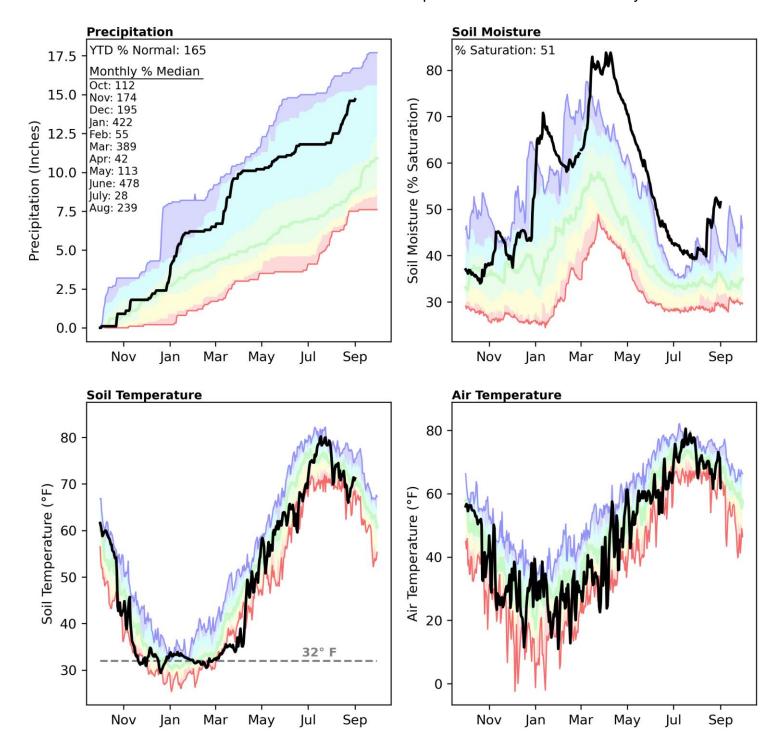
Precipitation in August was above normal, with an average of 1.1" falling region-wide (120% of normal). This brings the water year accumulation (October-August) to 123% of median. Depth averaged soil moisture was calculated to be 33% of saturation compared to 34% at this time last year.



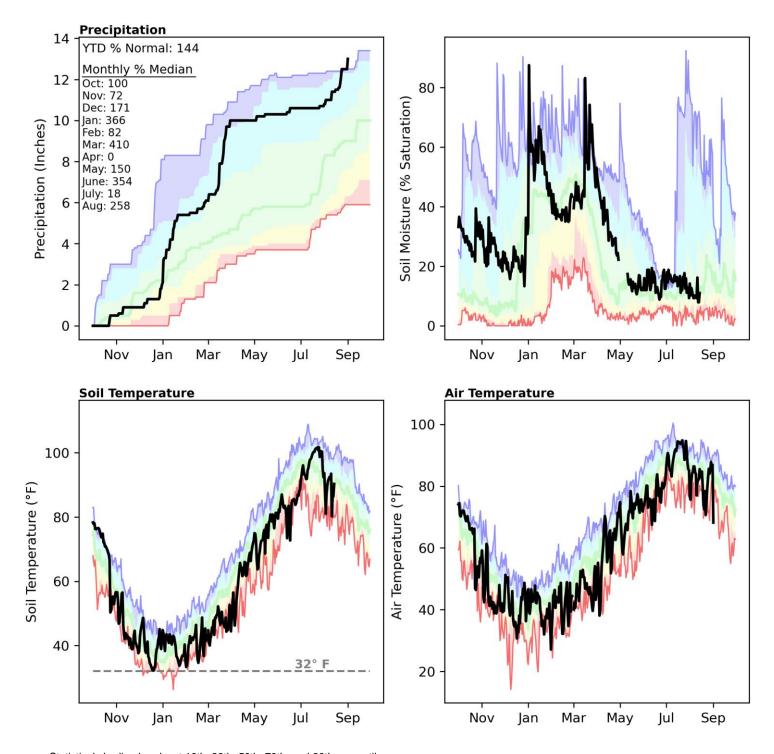
Precipitation in August was above normal, with an average of 1.1" falling region-wide (122% of normal). This brings the water year accumulation (October-August) to 128% of median. Depth averaged soil moisture was calculated to be 44% of saturation compared to 43% at this time last year.



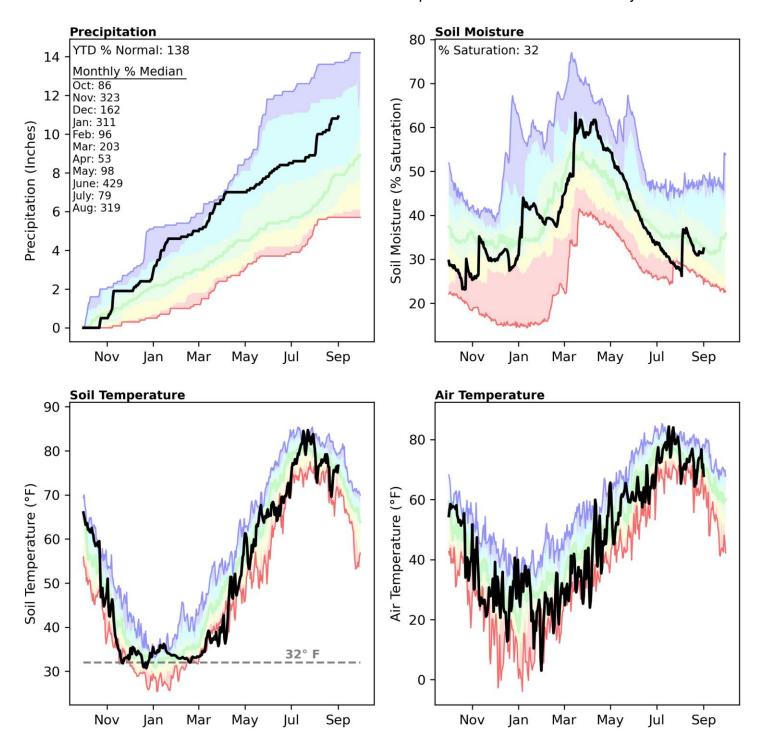
Precipitation in August was well above normal, with an average of 2.6" falling region-wide (239% of normal). This brings the water year accumulation (October-August) to 165% of median. Depth averaged soil moisture was calculated to be 51% of saturation compared to 36% at this time last year.



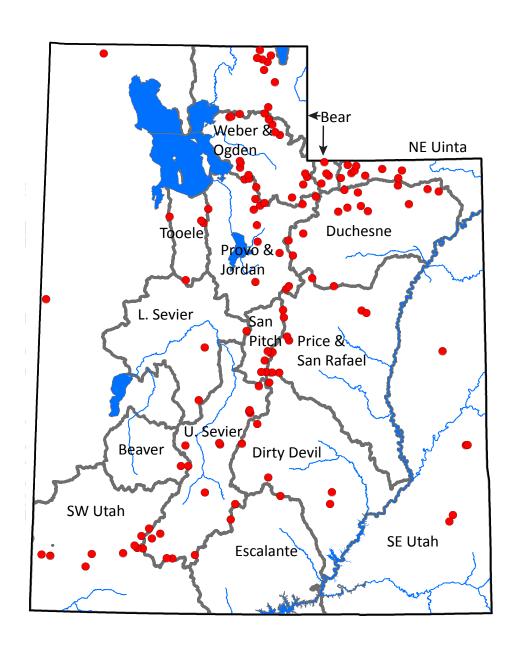
Precipitation in August was well above normal, with an average of 2.2" falling region-wide (258% of normal). This brings the water year accumulation (October-August) to 144% of median.



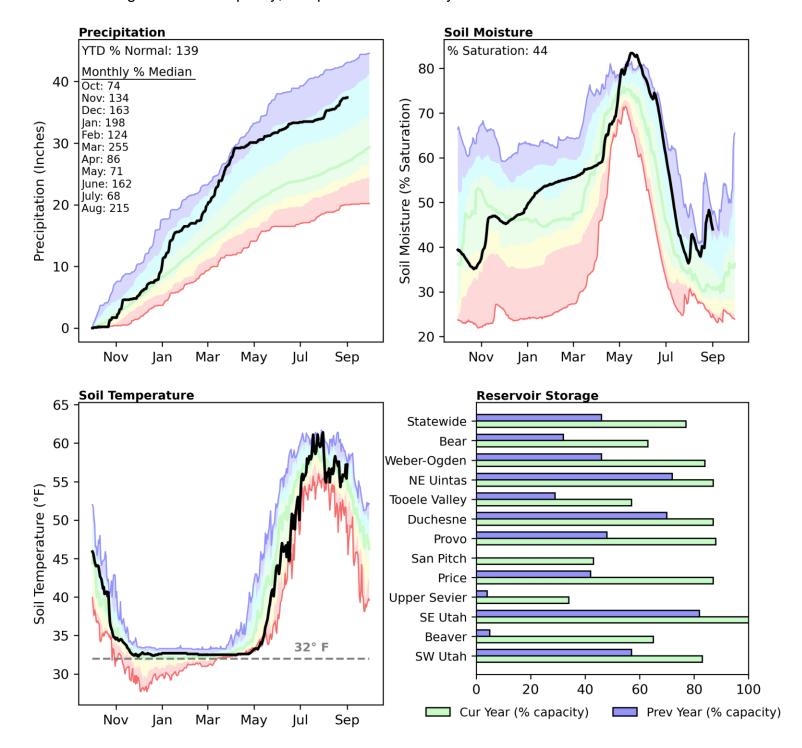
Precipitation in August was well above normal, with an average of 1.9" falling region-wide (319% of normal). This brings the water year accumulation (October-August) to 138% of median. Depth averaged soil moisture was calculated to be 32% of saturation compared to 32% at this time last year.



## **SNOTEL** portion of report

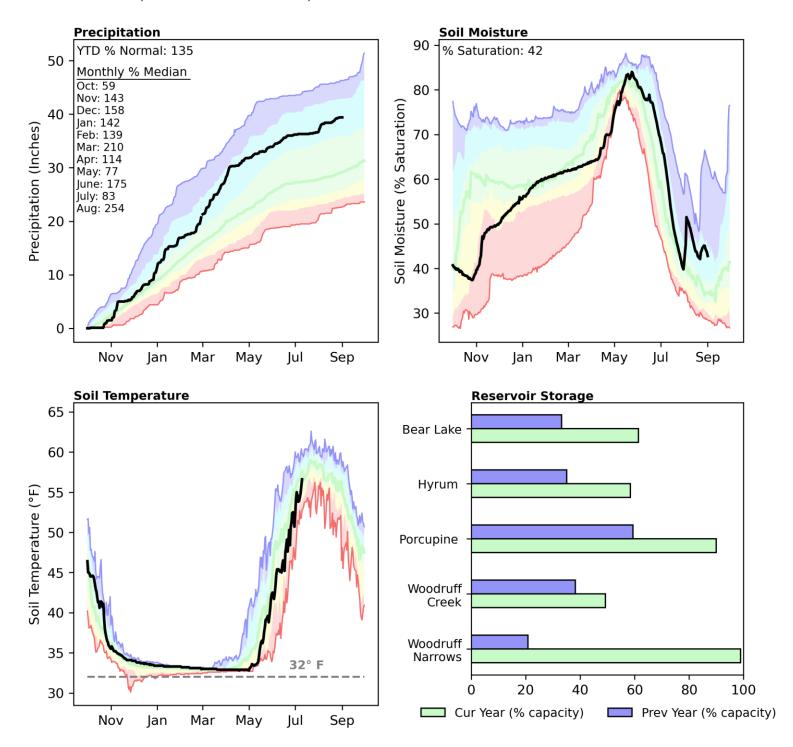


Precipitation in August was well above normal, with an average of 3.2" falling region-wide (215% of normal). This brings the water year accumulation (October-August) to 139% of median. Depth averaged soil moisture was calculated to be 44% of saturation compared to 38% at this time last year. Statewide, reservoir storage is 77% of capacity, compared to 46% last year<sup>1</sup>.

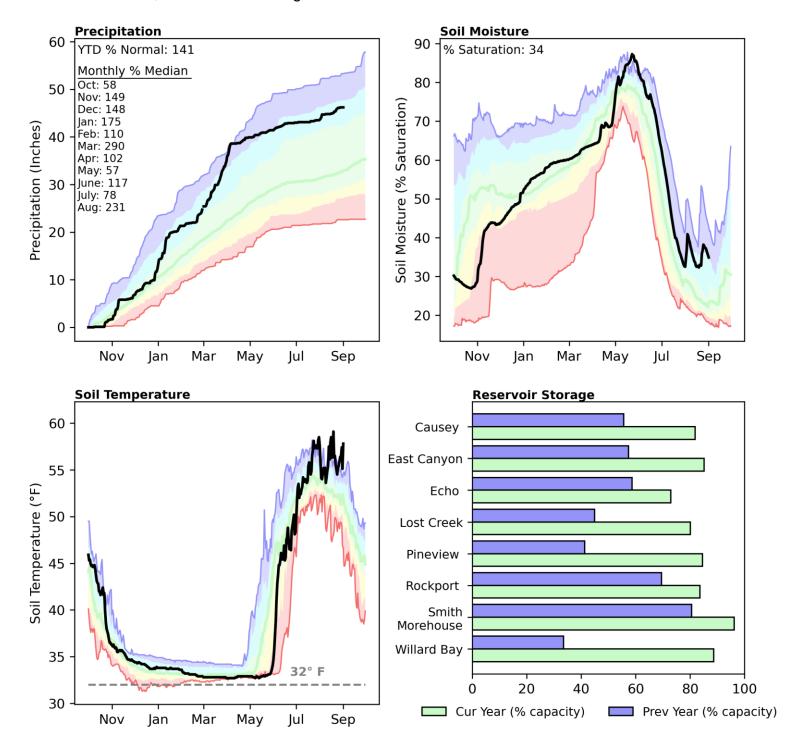


<sup>&</sup>lt;sup>1</sup>Statewide reservoir percentages exclude Lake Powell and Flaming Gorge Reservoirs.

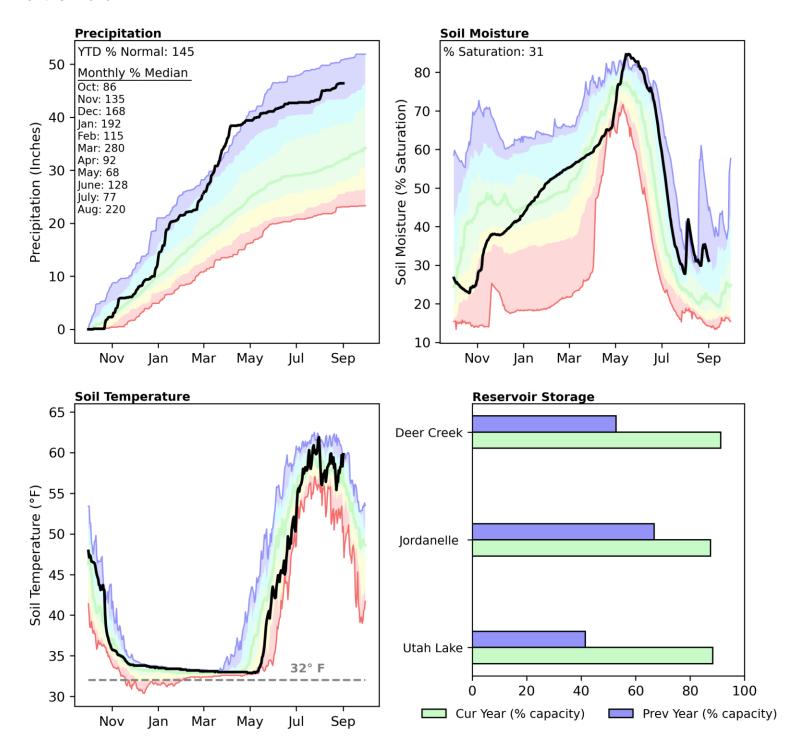
Precipitation in August was well above normal, with an average of 2.6" falling region-wide (254% of normal). This brings the water year accumulation (October-August) to 135% of median. Depth averaged soil moisture was calculated to be 42% of saturation compared to 37% at this time last year. Reservoir storage is 63% of capacity, compared to 32% last year. The Water Availability Index percentiles are 61% for the Bear, 84% for the Little Bear, and 91% for Woodruff Narrows.



Precipitation in August was well above normal, with an average of 2.6" falling region-wide (231% of normal). This brings the water year accumulation (October-August) to 141% of median. Depth averaged soil moisture was calculated to be 34% of saturation compared to 30% at this time last year. Reservoir storage is 84% of capacity, compared to 46% last year. The Water Availability Index percentiles are 89% for the Weber, and 93% for the Ogden.

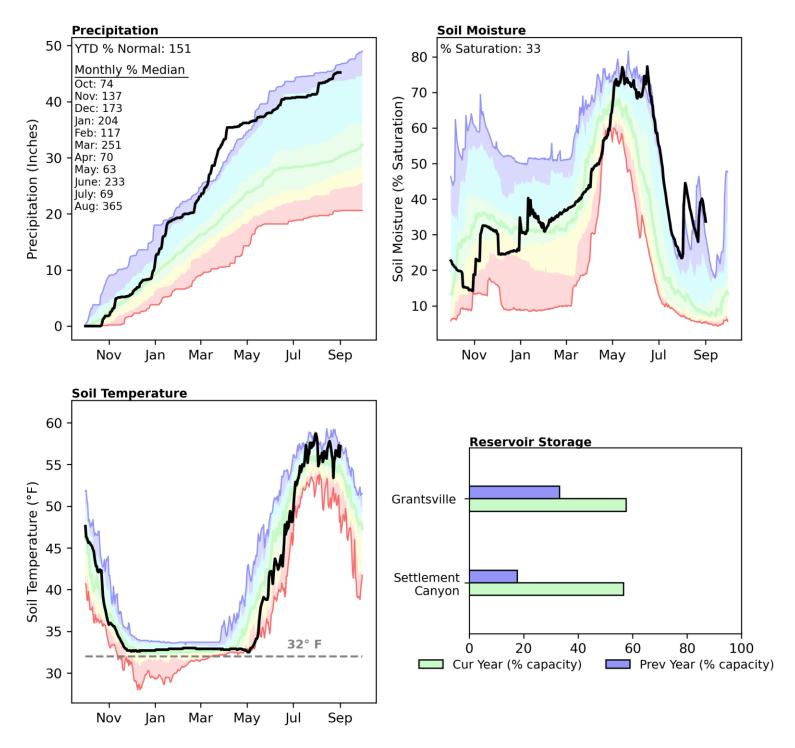


Precipitation in August was well above normal, with an average of 3.0" falling region-wide (220% of normal). This brings the water year accumulation (October-August) to 145% of median. Depth averaged soil moisture was calculated to be 31% of saturation compared to 26% at this time last year. Reservoir storage is 88% of capacity, compared to 48% last year. The Water Availability Index percentile is 84% for the Provo.

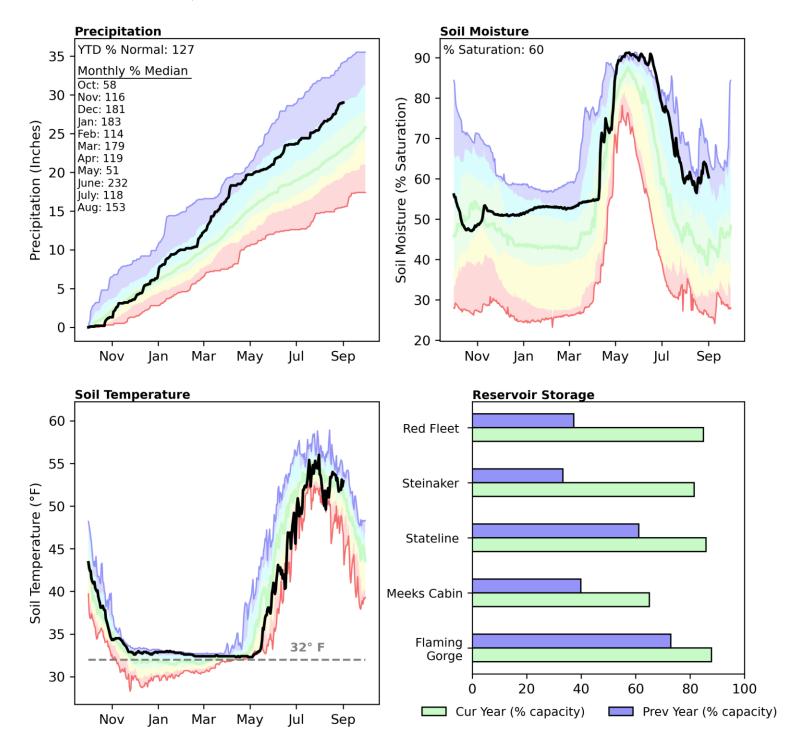


### Tooele Valley-Vernon Creek | September 1, 2023

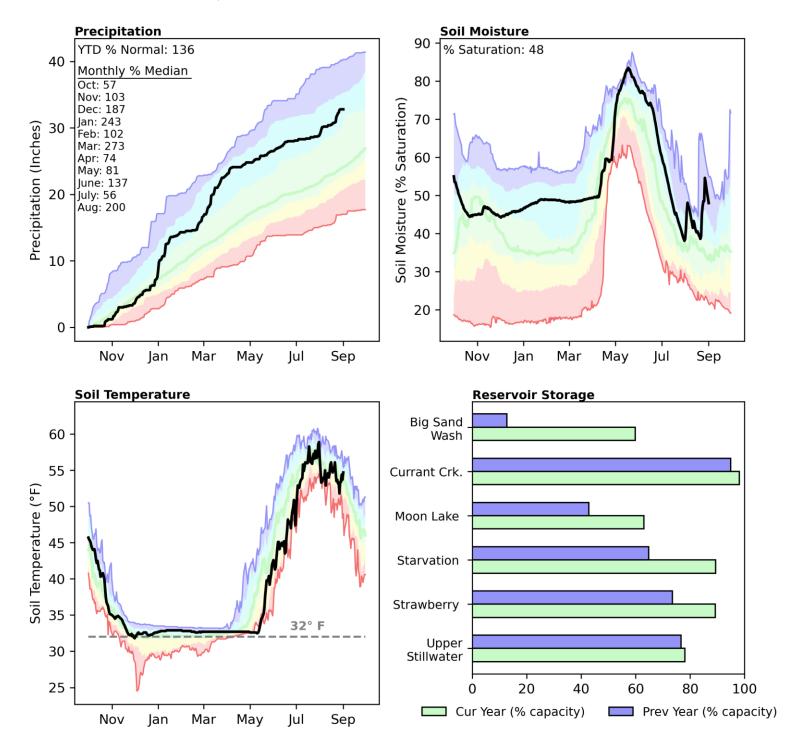
Precipitation in August was well above normal, with an average of 3.8" falling region-wide (365% of normal). This brings the water year accumulation (October-August) to 151% of median. Depth averaged soil moisture was calculated to be 33% of saturation compared to 23% at this time last year. Reservoir storage is 57% of capacity, compared to 29% last year.



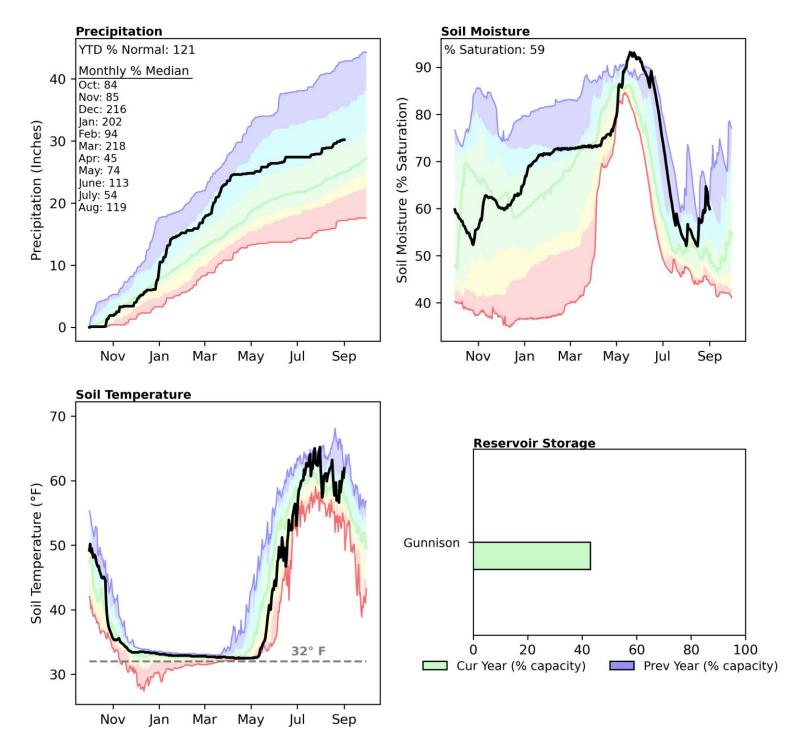
Precipitation in August was well above normal, with an average of 3.2" falling region-wide (153% of normal). This brings the water year accumulation (October-August) to 127% of median. Depth averaged soil moisture was calculated to be 60% of saturation compared to 47% at this time last year. Reservoir storage is 87% of capacity, compared to 72% last year. The Water Availability Index percentiles are 88% for the Blacks Fork, and 83% for the Smiths Fork.



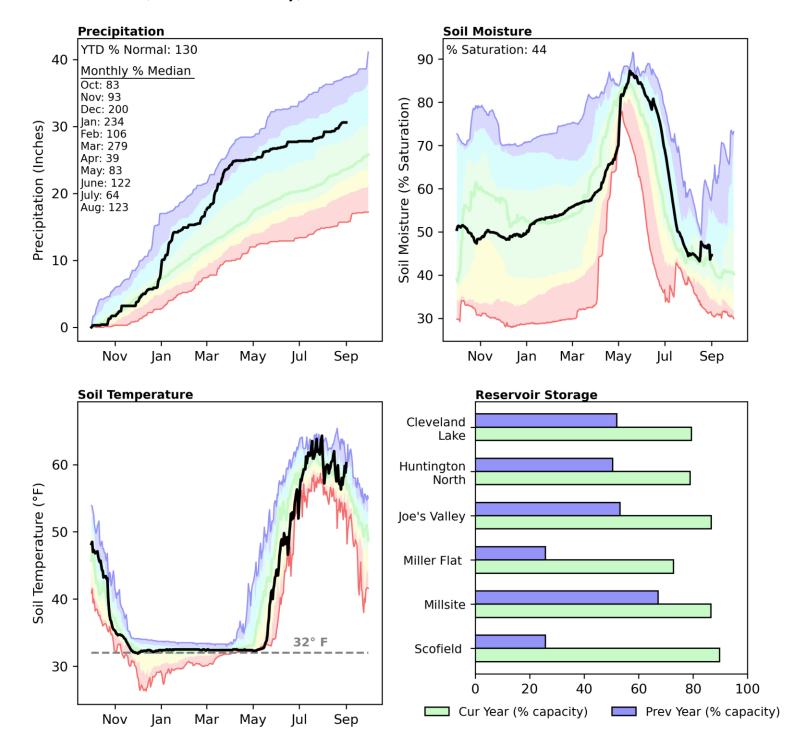
Precipitation in August was well above normal, with an average of 3.8" falling region-wide (200% of normal). This brings the water year accumulation (October-August) to 136% of median. Depth averaged soil moisture was calculated to be 48% of saturation compared to 41% at this time last year. Reservoir storage is 87% of capacity, compared to 70% last year. The Water Availability Index percentiles are 77% for the Western Uintas, and 73% for the Eastern Uintas.



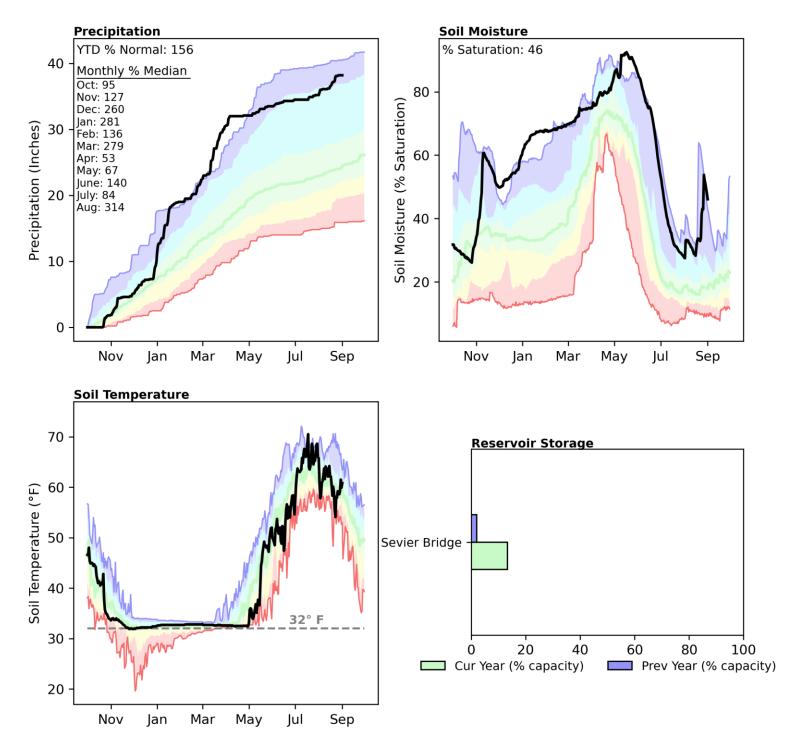
Precipitation in August was above normal, with an average of 2.2" falling region-wide (119% of normal). This brings the water year accumulation (October-August) to 121% of median. Depth averaged soil moisture was calculated to be 59% of saturation compared to 53% at this time last year. Reservoir storage is 43% of capacity, compared to 0% last year. The Water Availability Index percentile is 66% for the San Pitch.



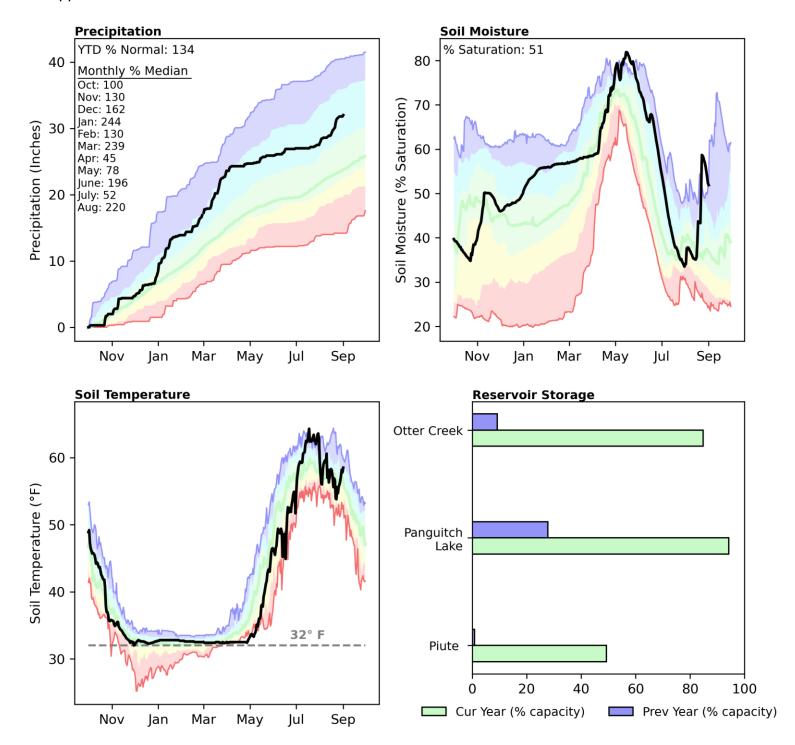
Precipitation in August was above normal, with an average of 2.1" falling region-wide (123% of normal). This brings the water year accumulation (October-August) to 130% of median. Depth averaged soil moisture was calculated to be 44% of saturation compared to 44% at this time last year. Reservoir storage is 87% of capacity, compared to 42% last year. The Water Availability Index percentiles are 93% for the Price, 80% for Joes Valley, and 91% for Ferron Creek.



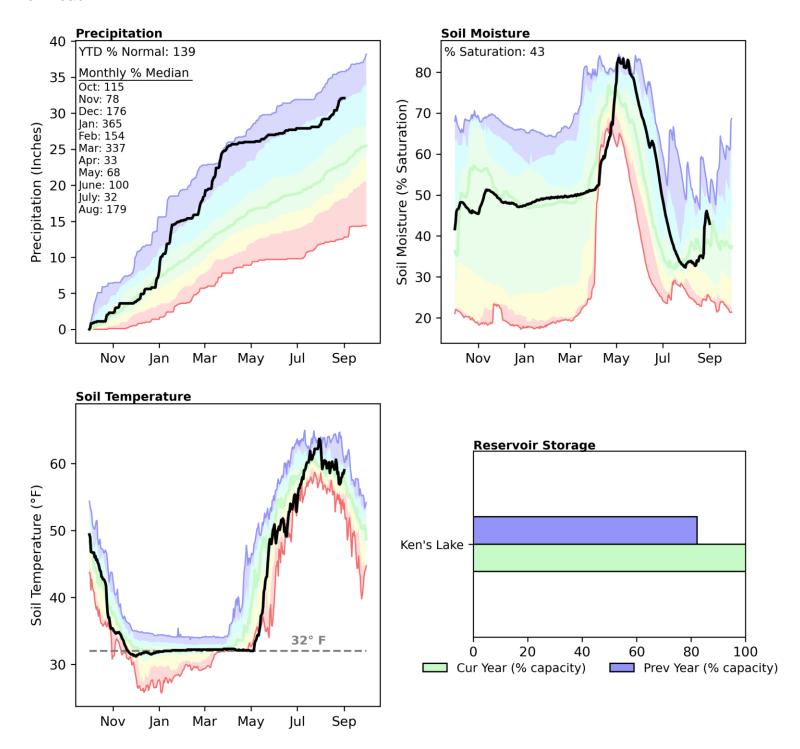
Precipitation in August was well above normal, with an average of 3.0" falling region-wide (314% of normal). This brings the water year accumulation (October-August) to 156% of median. Depth averaged soil moisture was calculated to be 46% of saturation compared to 26% at this time last year. Reservoir storage is 13% of capacity, compared to 1% last year. The Water Availability Index percentile is 25% for the Lower Sevier.



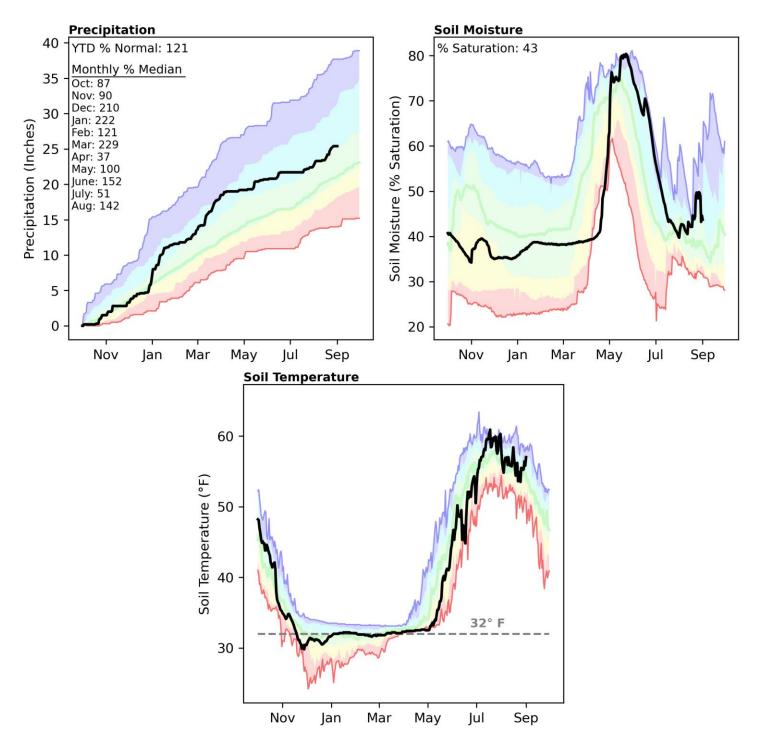
Precipitation in August was well above normal, with an average of 4.2" falling region-wide (220% of normal). This brings the water year accumulation (October-August) to 134% of median. Depth averaged soil moisture was calculated to be 51% of saturation compared to 45% at this time last year. Reservoir storage is 68% of capacity, compared to 7% last year. The Water Availability Index percentile is 86% for the Upper Sevier.



Precipitation in August was well above normal, with an average of 3.7" falling region-wide (179% of normal). This brings the water year accumulation (October-August) to 139% of median. Depth averaged soil moisture was calculated to be 43% of saturation compared to 46% at this time last year. Reservoir storage is 103% of capacity, compared to 82% last year. The Water Availability Index percentile is 95% for Moab.

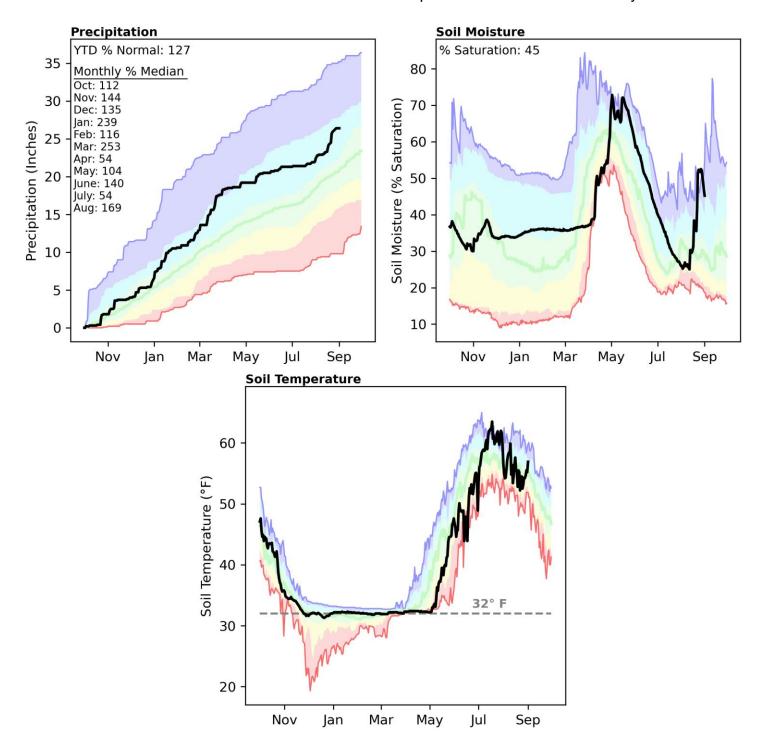


Precipitation in August was well above normal, with an average of 2.7" falling region-wide (142% of normal). This brings the water year accumulation (October-August) to 121% of median. Depth averaged soil moisture was calculated to be 43% of saturation compared to 42% at this time last year.

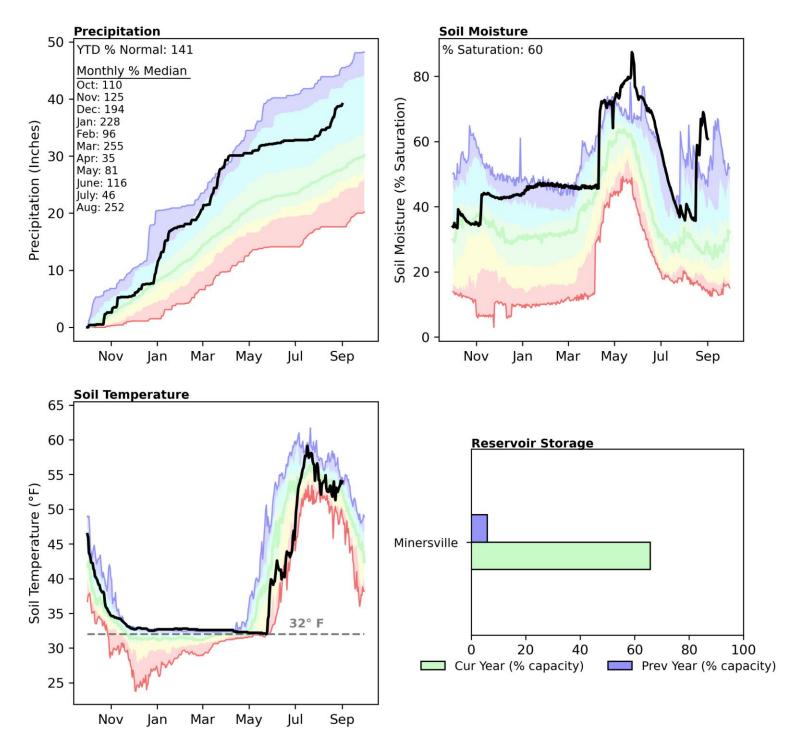


Statistical shading breaks at 10th, 30th, 50th, 70th, and 90th percentiles. For more information visit: 30 year normal calculation description

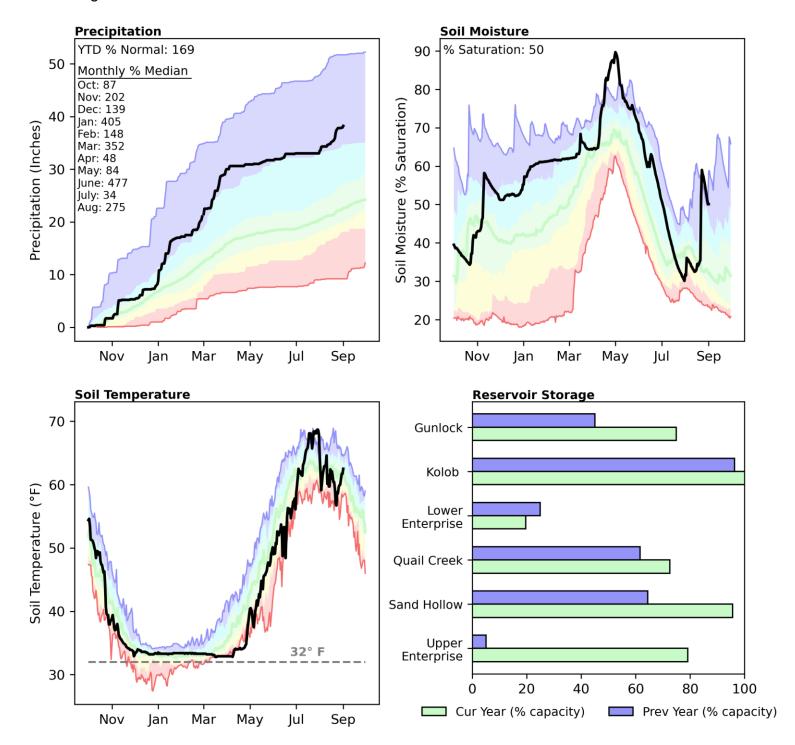
Precipitation in August was well above normal, with an average of 4.0" falling region-wide (169% of normal). This brings the water year accumulation (October-August) to 127% of median. Depth averaged soil moisture was calculated to be 45% of saturation compared to 38% at this time last year.



Precipitation in August was well above normal, with an average of 5.5" falling region-wide (252% of normal). This brings the water year accumulation (October-August) to 141% of median. Depth averaged soil moisture was calculated to be 60% of saturation compared to 37% at this time last year. Reservoir storage is 65% of capacity, compared to 5% last year. The Water Availability Index percentile is 82% for the Beaver River.



Precipitation in August was well above normal, with an average of 4.7" falling region-wide (275% of normal). This brings the water year accumulation (October-August) to 169% of median. Depth averaged soil moisture was calculated to be 50% of saturation compared to 43% at this time last year. Reservoir storage is 83% of capacity, compared to 57% last year. The Water Availability Index percentile is 81% for the Virgin River.



## Appendix A: Data used in WAI Calculations

Watershed/	USGS Gauging	Reservoir(s)	Start Date
Region Bear	Station(s)  Bear R nr Ut-Wy State Line	Bear Lake	1981
Woodruff Narrows	Bear R ab Resv nr Woodruff	Woodruff Narrows Reservoir	1981
Little Bear	Little Bear R at Paradise	Hyrum Reservoir	1993
Ogden	SF Ogden R nr Huntsville	Pineview Reservoir, Causey Reservoir	1981
Weber	Weber R nr Oakley, Chalk Ck at Coalville, East Canyon Ck nr Morgan	East Canyon Reservoir, Echo Reservoir, Lost Creek Reservoir, Rockport Reservoir, Smith And Morehouse Reservoir	1989
Provo	Provo R at Woodland	Deer Creek Reservoir, Jordanelle Reservoir	1993
Western Uintas	Lake Fk R ab Moon Lk nr Mountain Home, Rock Ck nr Mountain Home, Yellowstone R nr Altonah	Starvation Reservoir, Moon Lake Reservoir, Upper Stillwater Reservoir	1988
Eastern Uintas	Big Brush Ck ab Red Fleet Reservoir, Ashley Ck nr Vernal, Whiterocks R nr Whiterocks	Red Fleet Reservoir, Steinaker Reservoir	1981
Blacks Fork	Blacks Fk nr Robertson	Meeks Cabin Reservoir	1984
Smiths Fork	EF of Smiths Fork nr Robertson	Stateline Reservoir	1984
Price	Fish Ck ab Reservoir nr Scofield	Scofield Reservoir	1981
Joes Valley	Seely Ck bl Joes Valley Resv	Joes Valley Reservoir	1981
Ferron Creek	Ferron Ck Upper Station nr Ferron	Millsite	1981
Moab	Mill Ck at Sheley Tunnel nr Moab	Ken's Lake	1988
Upper Sevier	Sevier R nr Kingston	Piute Reservoir, Otter Creek Reservoir	1981
San Pitch	Manti Ck bl Dugway Ck nr Manti	Gunnison Reservoir	1981
Lower Sevier	Sevier R nr Gunnison	Sevier Bridge Reservoir	1981
Beaver River	Beaver R nr Beaver	Minersville Reservoir	1981
Virgin River	Virgin R at Virgin, Santa Clara R nr Pine Valley	Quail Creek, Gunlock	1993

Issued by

Terry Cosby
Chief, Natural Resources Conservation Service
U.S. Department of Agriculture

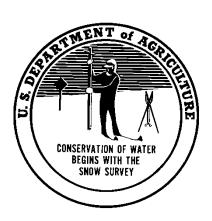
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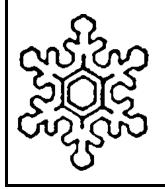
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## Utah Water Supply Outlook Report

Natural Resources Conservation Service Salt Lake City, UT

