Utah Water Supply Outlook Report

April 1, 2019

East Fork Blacks Fork Guard Station

SNOTEL rain gage

Photo by Kent Sutcliffe

Water Supply Outlook Reports
and Federal - State - Private Cooperative Snow Surveys

For more water supply and resource management information, contact: your local Natural Resources Conservation Service Office or:
Snow Surveys
245 N Jimmy Doolittle Rd, SLC Utah, 84116. Phone (385)285-3114
Email Address: troy.brosten@ut.usda.gov

How forecasts are made

Most of the annual streamflow in the western United States originates as snowfall that has accumulated in the mountains during the winter and early spring. As the snowpack accumulates, hydrologists estimate the runoff that will occur when it melts. Measurements of snow water equivalent at selected manual snowcourses and automated SNOTEL sites, along with precipitation, antecedent streamflow, and indices of the El Niño / Southern Oscillation are used in statistical and simulation models to prepare runoff forecasts. Unless otherwise specified, all forecasts are for flows that would occur naturally without any upstream influences.

Forecasts of any kind, of course, are not perfect. Streamflow forecast uncertainty arises from three primary sources: (1) uncertain knowledge of future weather conditions, (2) uncertainty in the forecasting procedure, and (3) errors in the data. The forecast, therefore, must be interpreted not as a single value but rather as a range of values with specific probabilities of occurrence. The middle of the range is expressed by the 50% exceedance probability forecast, for which there is a 50% chance that the actual flow will be above, and a 50% chance that the actual flow will be below, this value. To describe the expected range around this 50% value, four other forecasts are provided, two smaller values (90% and 70% exceedance probability) and two larger values (30%, and 10% exceedance probability). For example, there is a 90% chance that the actual flow will be more than the 90% exceedance probability forecast. The others can be interpreted similarly.

The wider the spread among these values, the more uncertain the forecast. As the season progresses, forecasts become more accurate, primarily because a greater portion of the future weather conditions become known; this is reflected by a narrowing of the range around the 50% exceedance probability forecast. Users should take this uncertainty into consideration when making operational decisions by selecting forecasts corresponding to the level of risk they are willing to assume about the amount of water to be expected. If users anticipate receiving a lesser supply of water, or if they wish to increase their chances of having an adequate supply of water for their operations, they may want to base their decisions on the 90% or 70% exceedance probability forecasts, or something in between. On the other hand, if users are concerned about receiving too much water (for example, threat of flooding), they may want to base their decisions on the 30% or 10% exceedance probability forecasts, or something in between. Regardless of the forecast value users choose for operations, they should be prepared to deal with either more or less water. (Users should remember that even if the 90% exceedance probability forecast is used, there is still a 10% chance of receiving less than this amount.) By using the exceedance probability information, users can easily determine the chances of receiving more or less water.

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STATE OF UTAH GENERAL OUTLOOK
April 1, 2019

SUMMARY

It's official: Utah's snowpack is fantastic this year! April 1st is typically the peak of our snowpack accumulation season, and the snow water equivalent (SWE) is at 140% of normal. Statewide, this snowpack ranks substantially better than 2017, and almost as good as the banner years of 2005 and 2011. While the whole state is doing quite well, Southern Utah is having a particularly excellent winter: Southeastern and Southwestern Utah are at 203% and 190% of normal, respectively. The region with the lowest percent normal snowpack as of April 1 is Northeast Uinta, which is still above average at 115%. March was another outstanding month for precipitation at our SNOTEL sites at 146% of average, which is the equivalent of roughly 5 additional inches of water spread across Utah's mountains, bringing the water-year-to-date total accumulation to 24.9 inches. Individual SNOTEL sites gained significant amounts of SWE during March, most impressively along the Wasatch Front where the Snowbird and Ben Lomond Peak sites gained over 11" each, and the Farmington and Parrish Creek sites gained over 10" each. Southeastern Utah SNOTEL sites posted outstanding gains as well, with around 6" of additional SWE during March. Soil moisture levels vary regionally: whereas south-central Utah is at roughly 80% of normal, the soil moisture percent normal for the Lower Bear and Lower Sevier watersheds is around 115%. Where soils are drier, snowmelt runoff efficiency will be reduced. That said, every forecast point in Utah is predicted to have >100% runoff this year! Forecast streamflow for the April to July runoff period range from 105% for the Bear River at Stewart Dam to some amazing numbers: 233% for the Mill Ck at Sheley Tunnel nr Moab, 242% for the Sevier River nr Gunnison, and 293% for South Creek abv Reservoir nr Monticello. The National Oceanic and Atmospheric Administration (NOAA) 8-14-day outlook is cold and wet so we're likely to see high elevation SWE increases for at least the next week. We can all be thankful for the much-needed runoff!

For additional details and products, please visit the Utah Snow Survey website:
https://www.nrcs.usda.gov/wps/portal/nrcs/main/ut/snow/

SNOWPACK

Snowpack in Utah is above normal at 140% compared to 64% last year. Utah watersheds range from much above normal snow water equivalent in Southeastern Utah (203%), Southwestern Utah (190%), and the Upper Sevier (162%) to above normal in the Bear (118%) and Northeastern Uinta (115%) regions.

PRECIPITATION

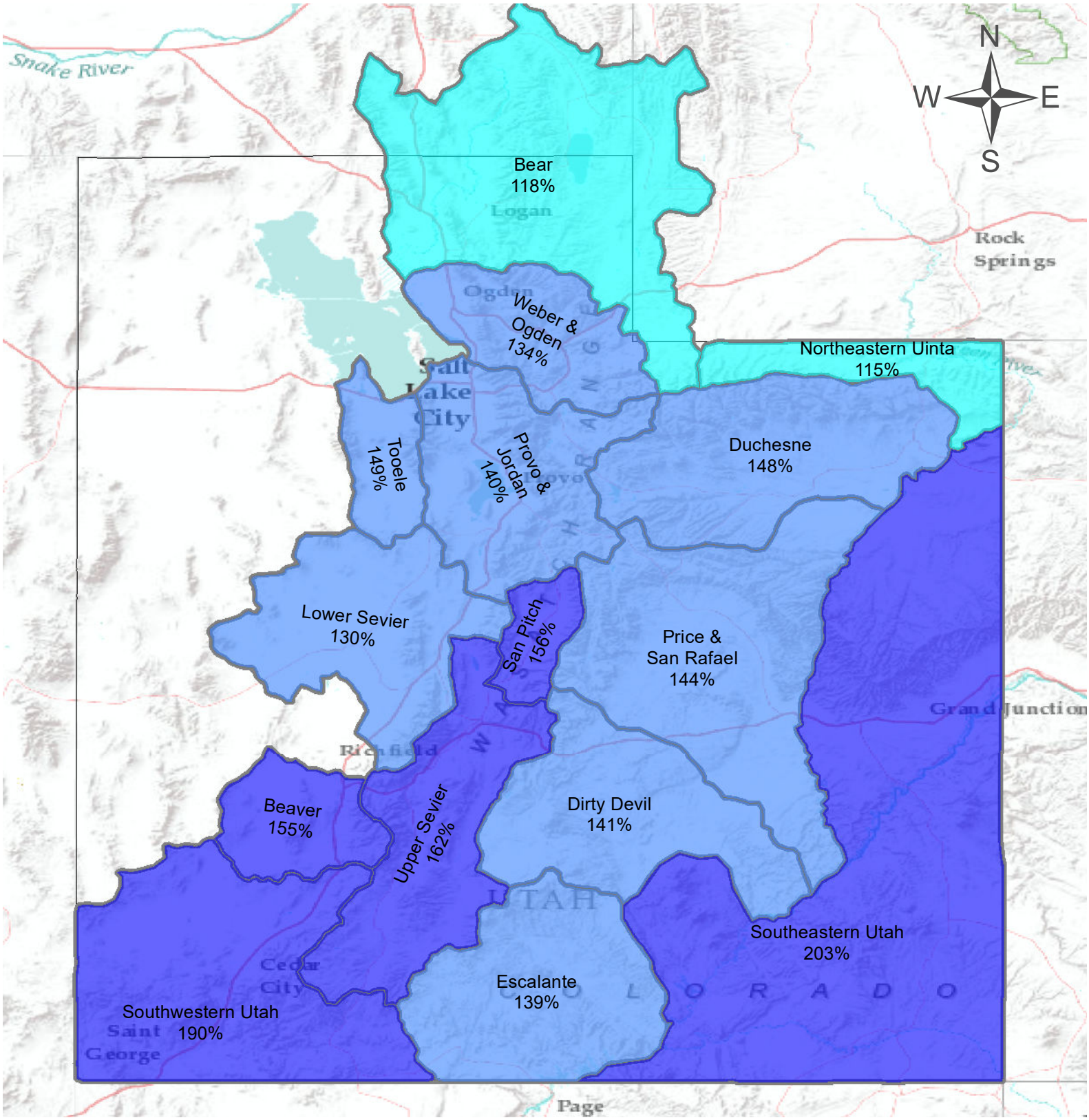
Precipitation across Utah in March was 146% of average bringing the seasonal accumulation (Oct-Feb) to 127% of normal. March precipitation ranged from nearly 160% in Southeastern Utah to 108% for the Bear watershed.

RESERVOIRS

Reservoir storage has improved 3% from last month and is at 65% of capacity compared to 77% last year. Our streamflow runoff forecasts suggest that there is a very good chance that most small to medium-size reservoirs will fill this year, and we can expect substantial improvement in water storage at our larger reservoirs.

STREAMFLOW

Forecast streamflows are above average to much above average. While most of the basins in Utah are predicted to have around 120 to 140% normal runoff, the forecasts for the Bear River watershed range between 105% - 115%. The Duchesne basin and several watersheds in southeastern Utah are forecast to produce around 140 to >200% normal runoff, depending on the individual forecast point. We can be confident in these very promising runoff predictions given that the April 1 forecasts are significantly more reliable than previous months' forecasts each year.



Statewide Snow Water Equivalent

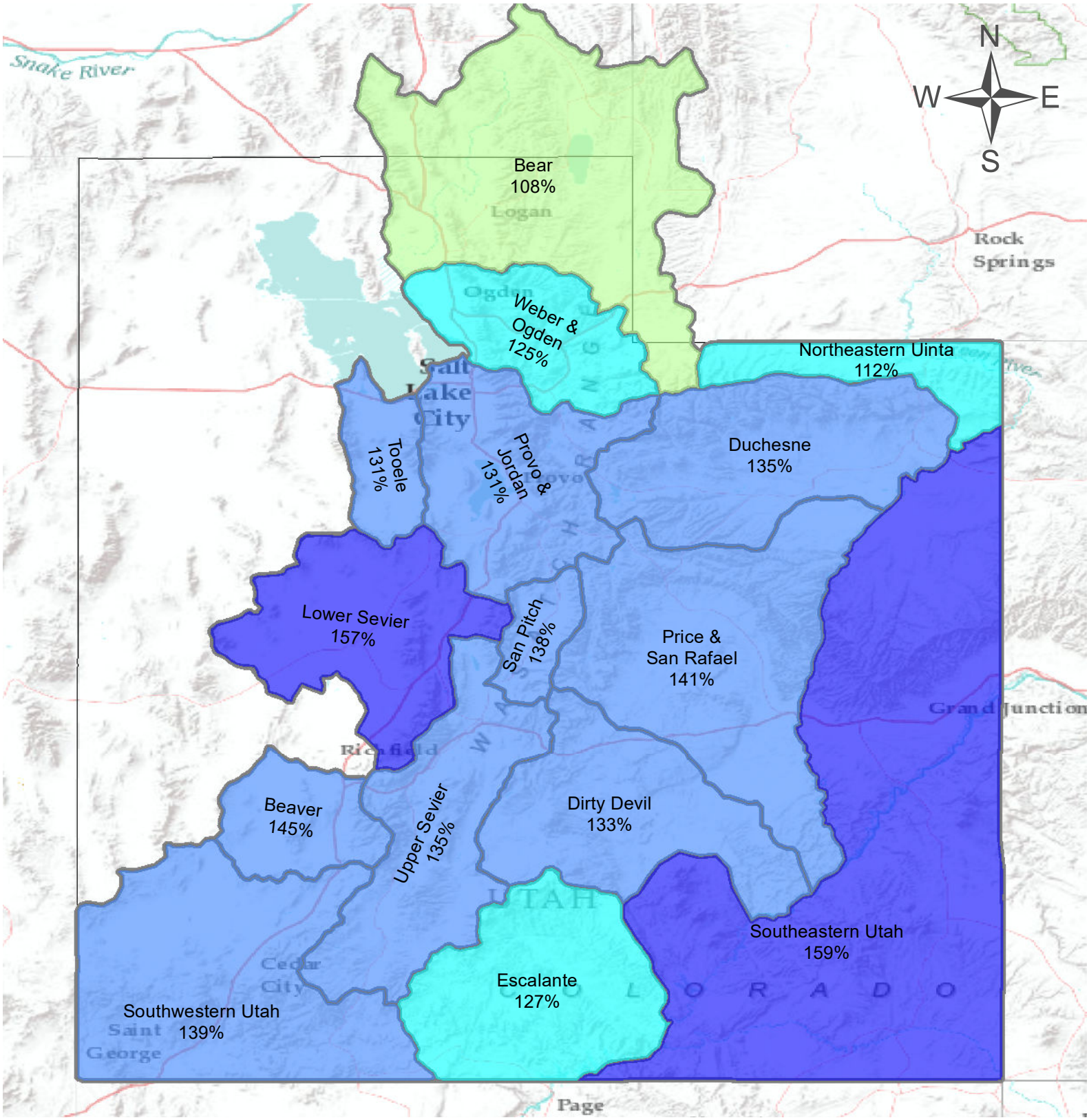
As of April 1, 2019:

140% of Normal Snow Water Equivalent

0 10 20 40 60 80 100
Miles

% of Normal

- < 50%
- 50 - 69%
- 70 - 89%
- 90 - 109%
- 110 - 129%
- 130 - 149%
- > 150%



Statewide Precipitation

As of April 1, 2019:

127% of Normal Precipitation

146% of Normal Precipitation Last Month

0 10 20 40 60 80 100
Miles

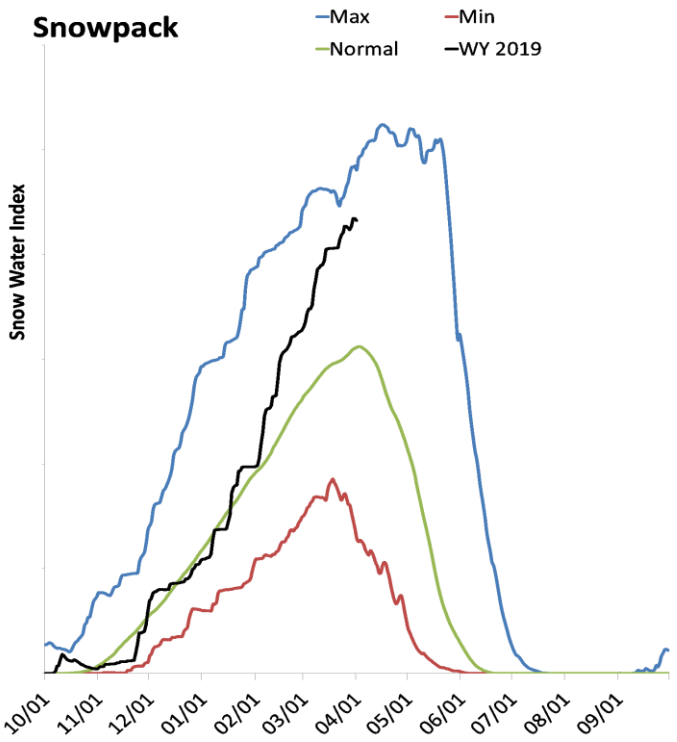
% of Normal

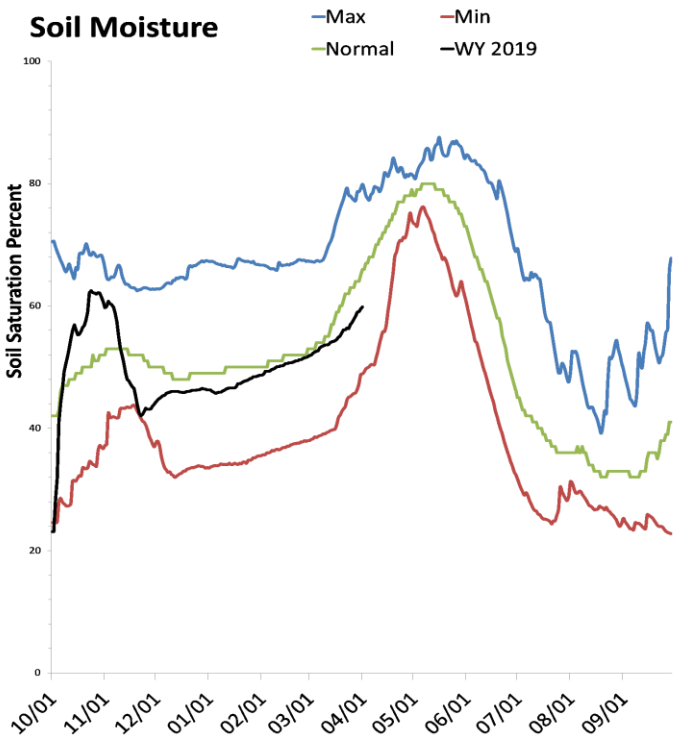
- < 50%
- 50 - 69%
- 70 - 89%
- 90 - 109%
- 110 - 129%
- 130 - 149%
- > 150%

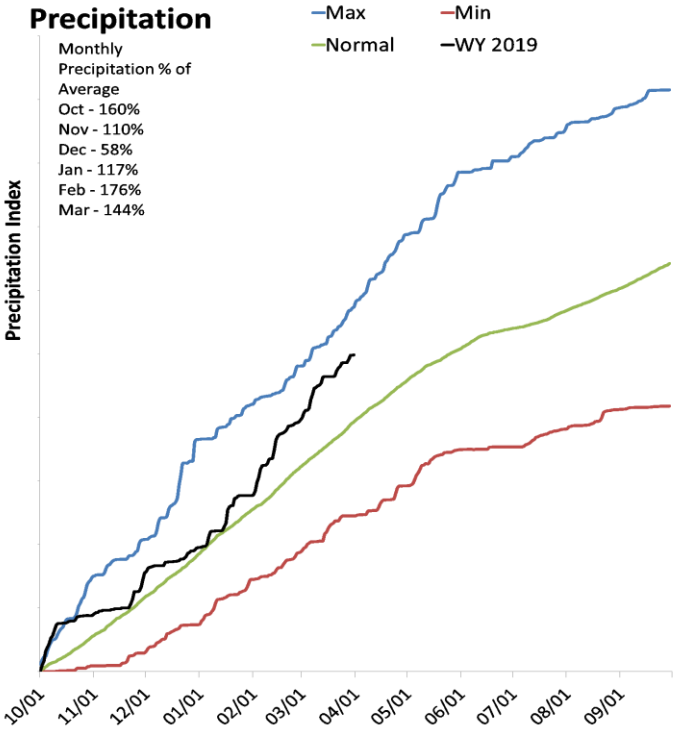
Statewide Utah

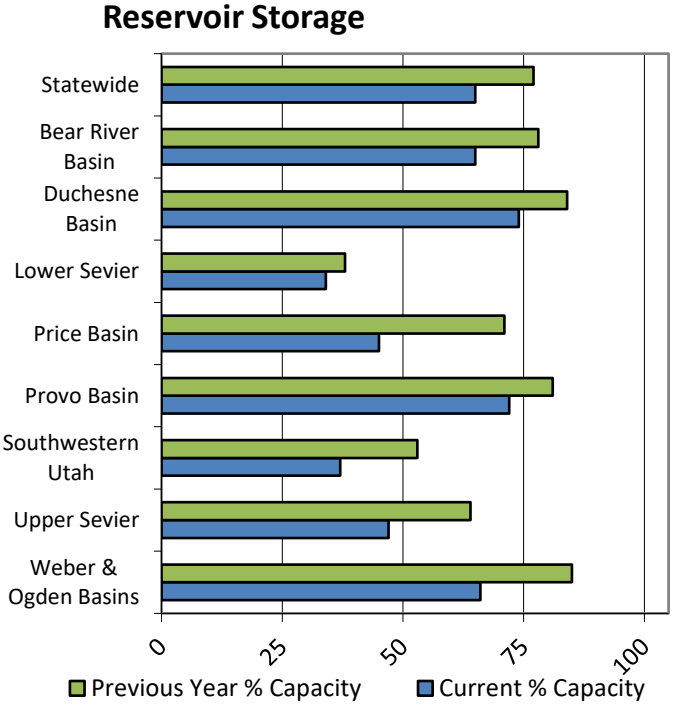
April 1, 2019

Snowpack in Utah is much above normal at 140% of normal, compared to 64% last year. Precipitation in March was much above average at 146%, which brings the seasonal accumulation (Oct-Mar) to 127% of average. Soil moisture is at 59% compared to 58% last year. Reservoir storage is at 65% of capacity, compared to 77% last year. Forecast streamflow volumes range from 105% to 293% of average.







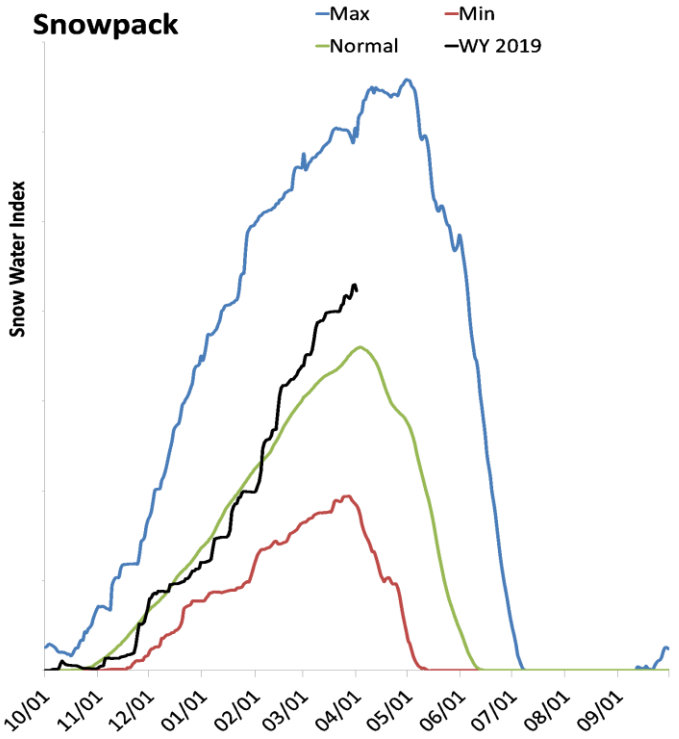


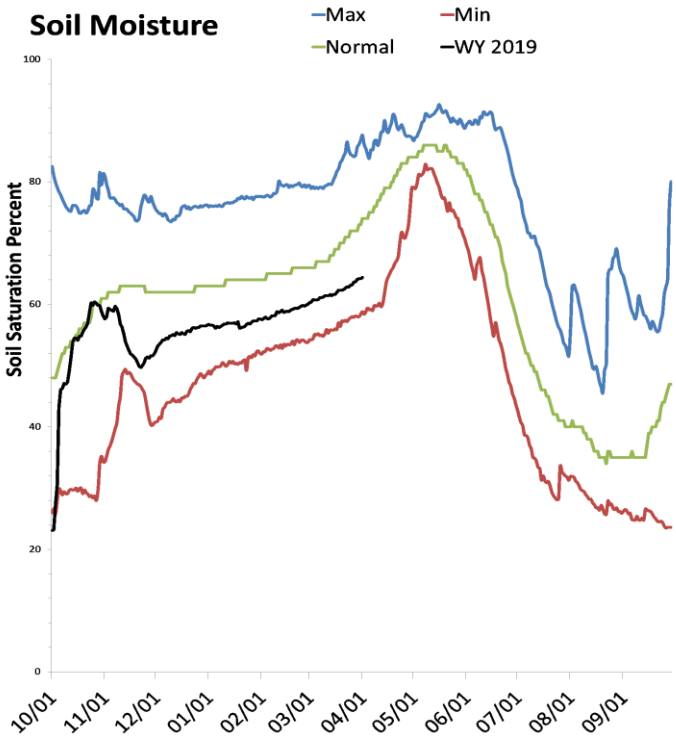
SNOTEL Data

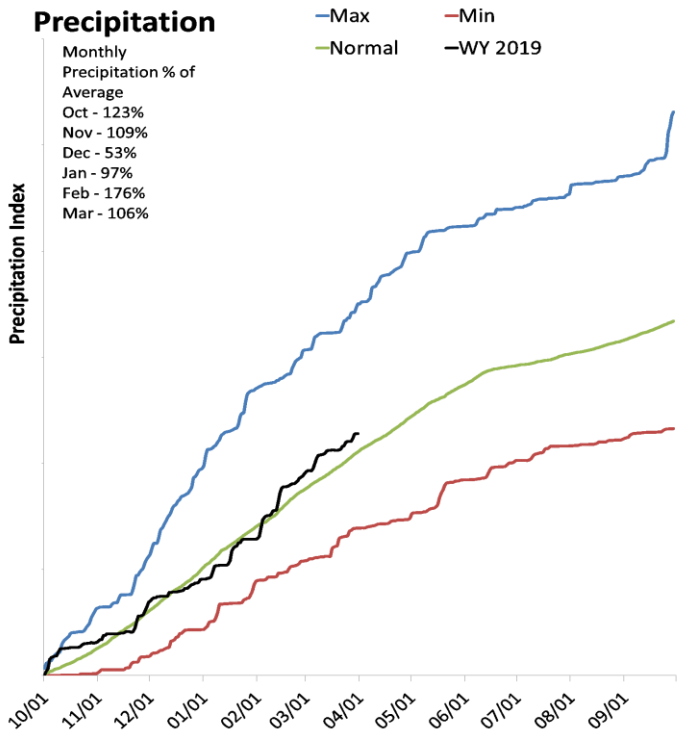
Bear River Basin

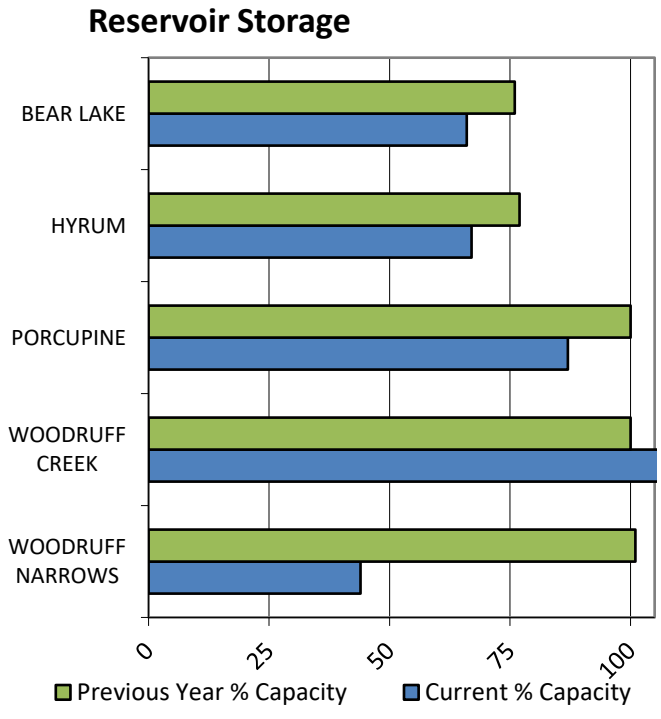
April 1, 2019

Snowpack in the Bear River Basin is above normal at 118% of normal, compared to 82% last year. Precipitation in March was near average at 107%, which brings the seasonal accumulation (Oct-Mar) to 108% of average. Soil moisture is at 64% compared to 76% last year. Reservoir storage is at 65% of capacity, compared to 78% last year. Forecast streamflow volumes range from 105% to 116% of average. The surface water supply index is 65% for the Bear River, 53% for the Woodruff Narrows, 57% for the Little Bear.









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Bear River
Streamflow Forecasts - April 1, 2019

Bear River	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast 90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Bear R nr UT-WY State Line								
	APR-JUL	93	112	125	112%	138	157	112
	APR-SEP	104	125	140	114%	155	176	123
Bear R ab Resv nr Woodruff								
	APR-JUL	62	107	137	113%	167	210	121
	APR-SEP	66	114	147	115%	180	230	128
Big Ck nr Randolph								
Smiths Fk nr Border								
	APR-JUL	72	87	97	109%	107	122	89
	APR-SEP	86	103	114	110%	125	142	104
Bear R bl Stewart Dam								
	APR-JUL	87	150	192	105%	235	295	183
	APR-SEP	97	167	215	105%	265	335	205
Little Bear at Paradise								
	APR-JUL	30	41	48	107%	55	66	45
Logan R nr Logan								
	APR-JUL	95	111	122	110%	133	149	111
Blacksmith Fk nr Hyrum								
	APR-JUL	29	41	50	116%	59	71	43

1) 90% and 10% exceedance probabilities are actually 95% and 5%
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
3) Median value used in place of average

Reservoir Storage End of March, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Bear Lake	853.7	994.3	611.9	1302.0
Hyrum Reservoir	10.2	11.8	13.0	15.3
Porcupine Reservoir	9.8	11.3	8.2	11.3
Woodruff Creek	4.8	4.0	3.3	4.0
Woodruff Narrows Reservoir	25.3	57.9	38.4	57.3
Basin-wide Total	903.8	1079.3	674.8	1389.9
# of reservoirs	5	5	5	5

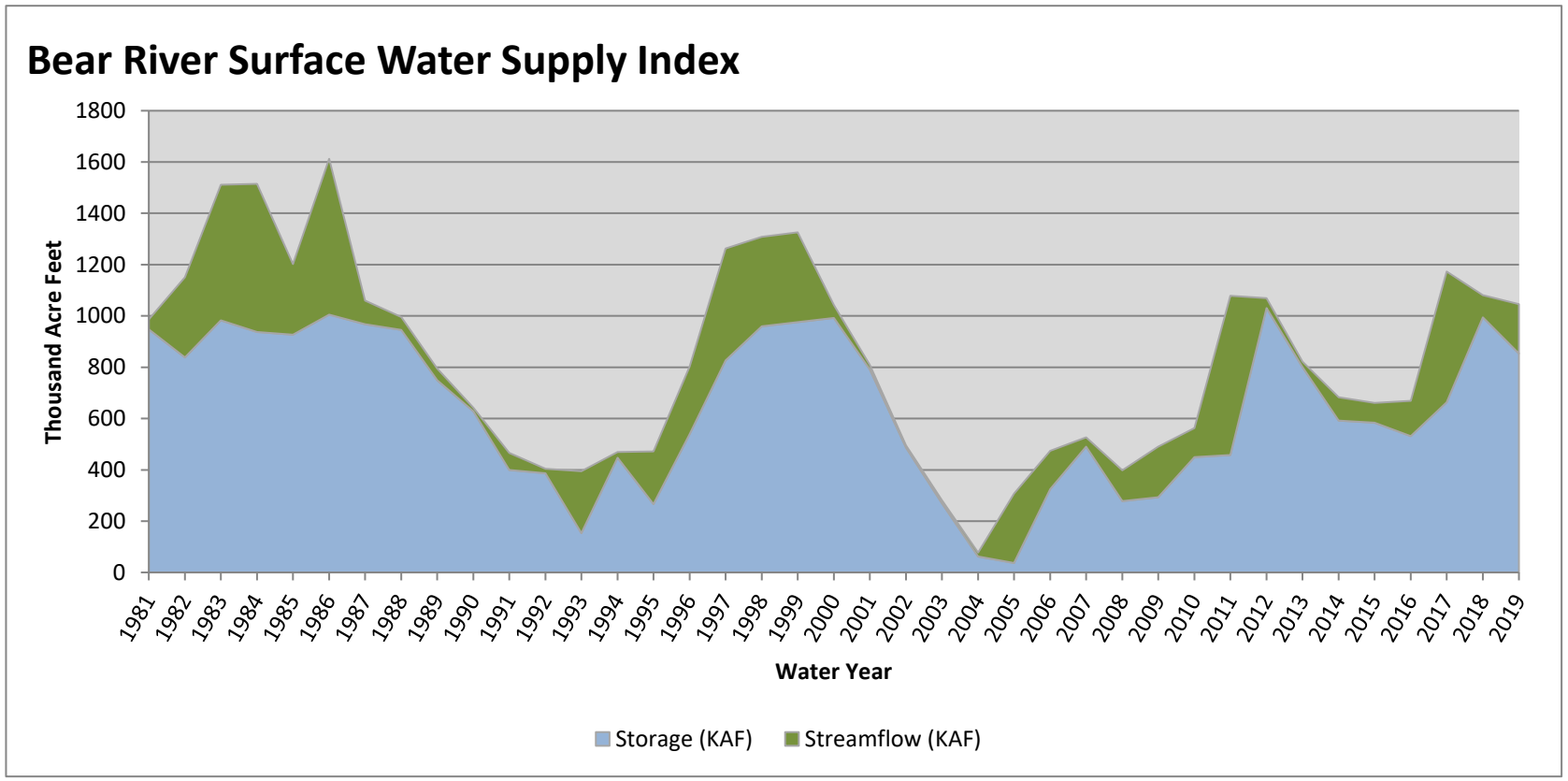
Watershed Snowpack Analysis April 1, 2019	# of Sites	% Median	Last Year % Median
Upper Bear	4	129%	78%
Middle Bear	7	112%	89%
Lower Bear	3	126%	72%
Logan River	9	116%	78%

April 1, 2019

Surface Water Supply Index

Basin or Region	Mar EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Bear River	**853.68**	**192.00**	**1045.68**	**65**	**1.25**	**88, 00, 87, 12**

*EOM, end of month; #SWSI, Surface Water Supply Index; ^KAF, thousand acre-feet.

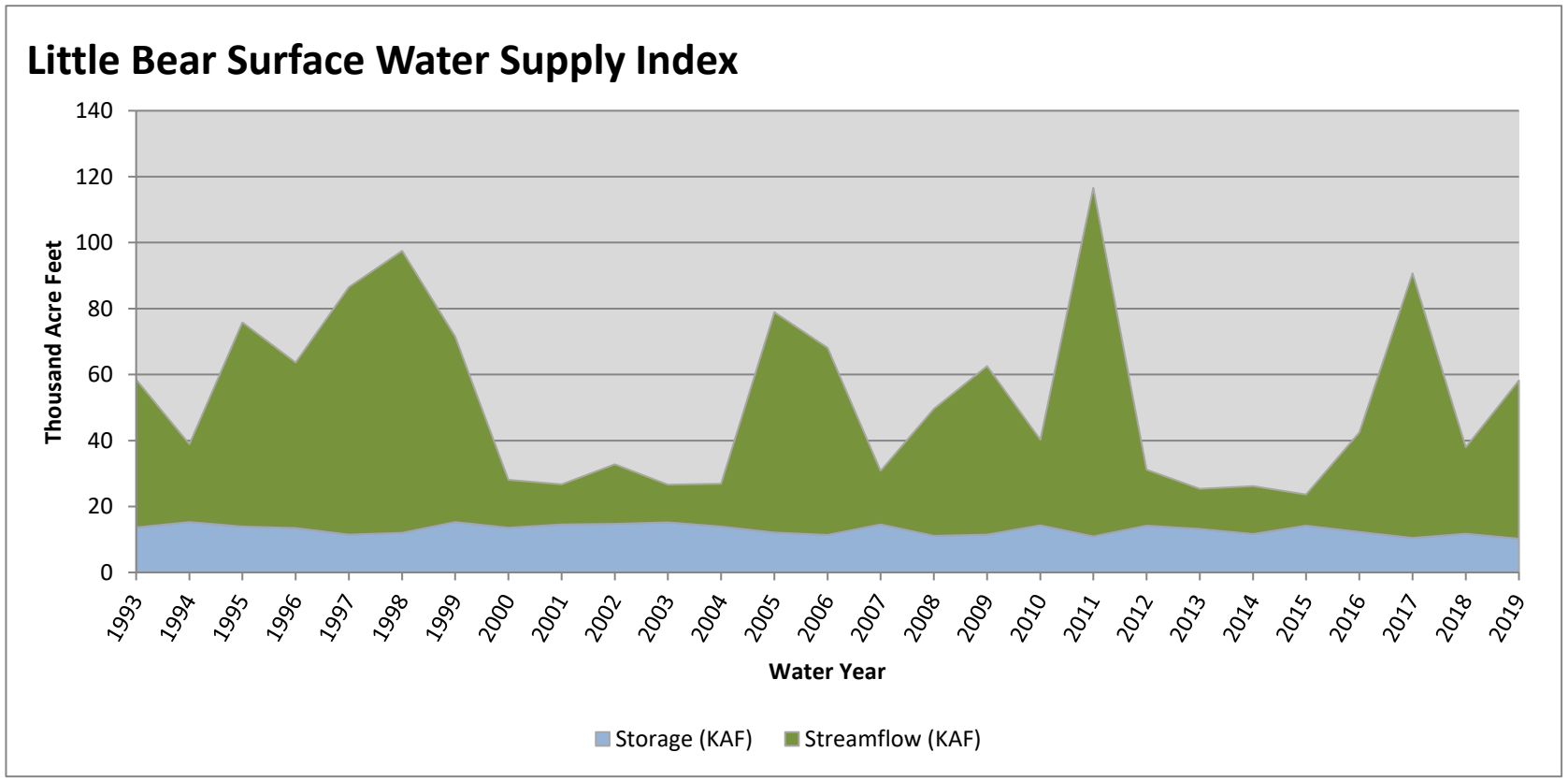


April 1, 2019

Surface Water Supply Index

Basin or Region	Mar EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Little Bear	**10.23**	**48.00**	**58.23**	**57**	**0.6**	**16, 08, 93, 09**

*EOM, end of month; #SWSI, Surface Water Supply Index; ^KAF, thousand acre-feet.

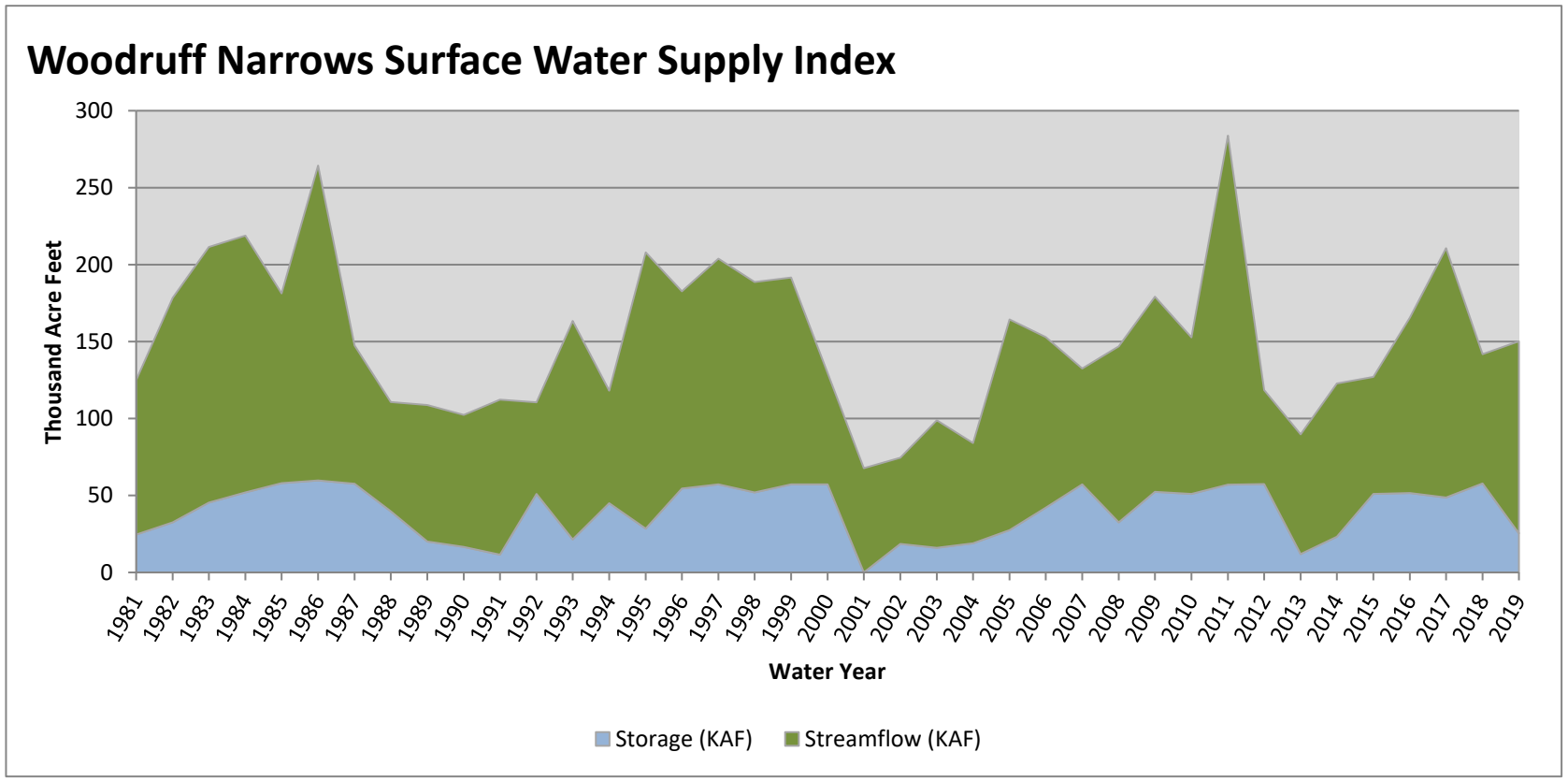


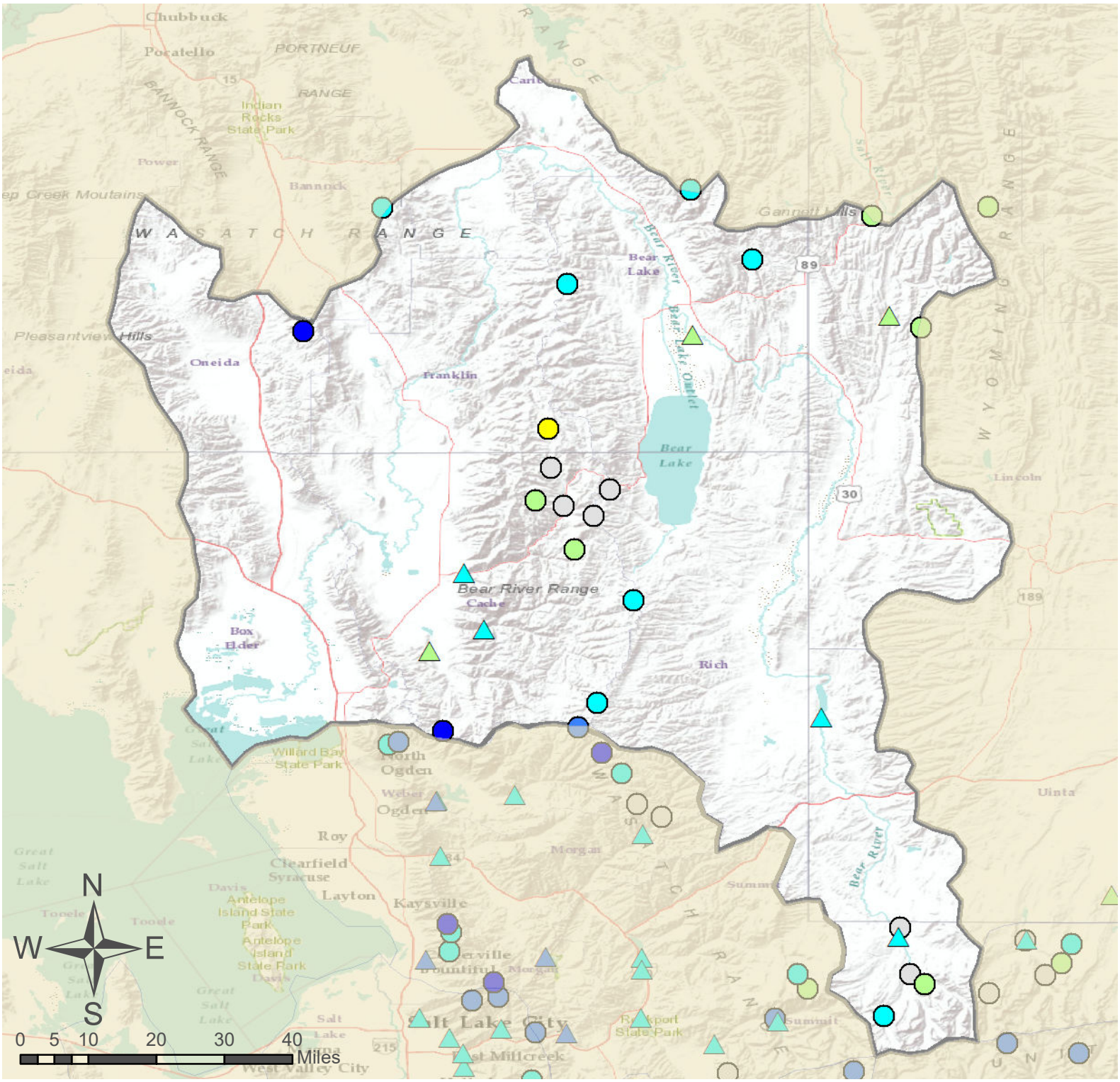
April 1, 2019

Surface Water Supply Index

Basin or Region	Mar EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Woodruff Narrows	**25.28**	**125.00**	**150.28**	**53**	**0.21**	**08, 87, 10, 06**

*EOM, end of month; #SWSI, Surface Water Supply Index; ^KAF, thousand acre-feet.





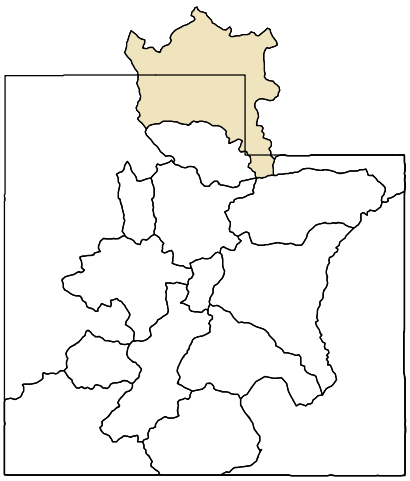
Bear River Basin

SNOTEL Site

Forecast Point

% of Normal

- < 50%
- 50 - 69%
- 70 - 89%
- 90 - 109%
- 110 - 129%
- 130 - 149%
- > 150%
- No Normal



As of April 1, 2019:

118% of Normal SWE

108% of Normal Precipitation

107% of Normal Precipitation Last Month

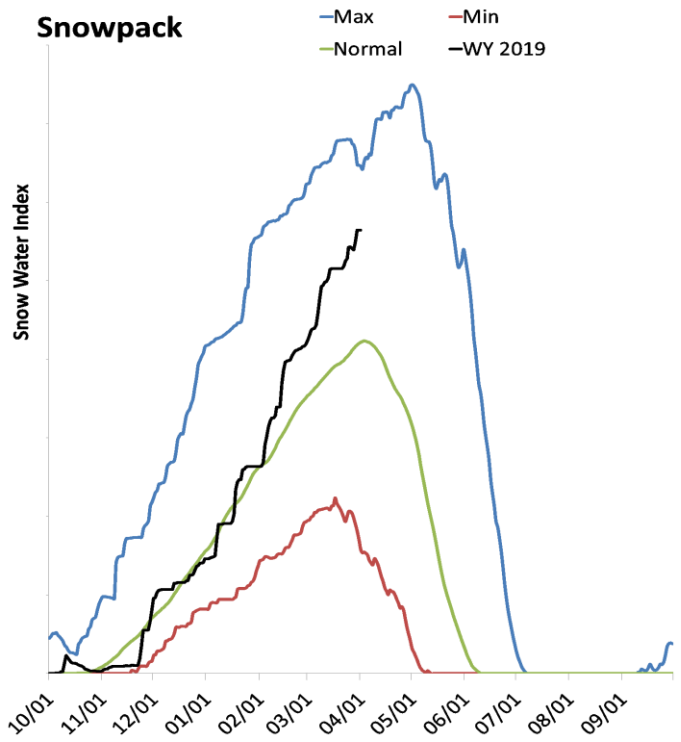
64% Saturation Soil Moisture

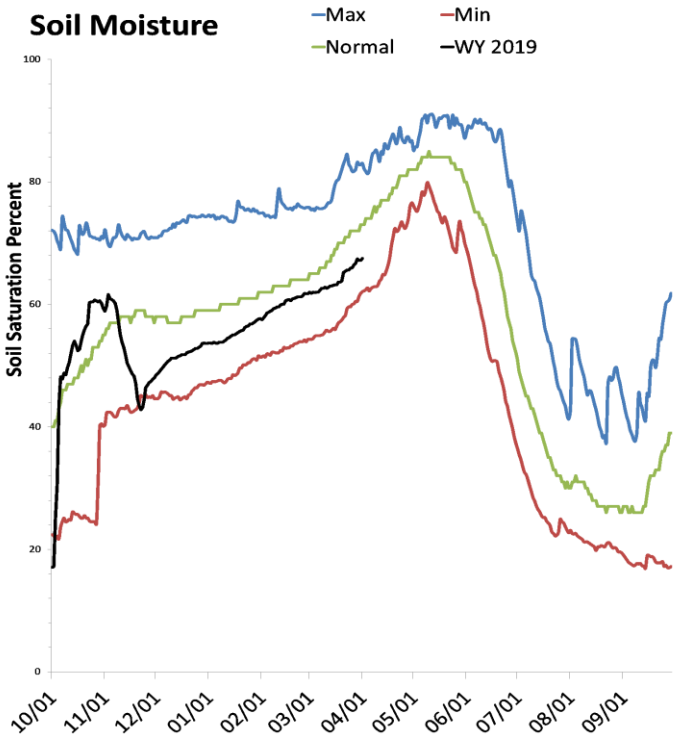
Bear River Basin

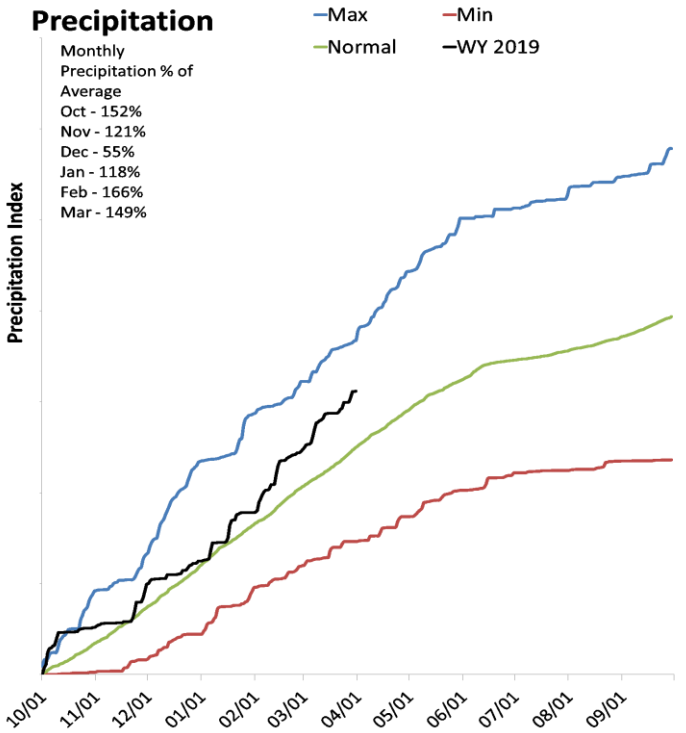
Weber & Ogden River Basins

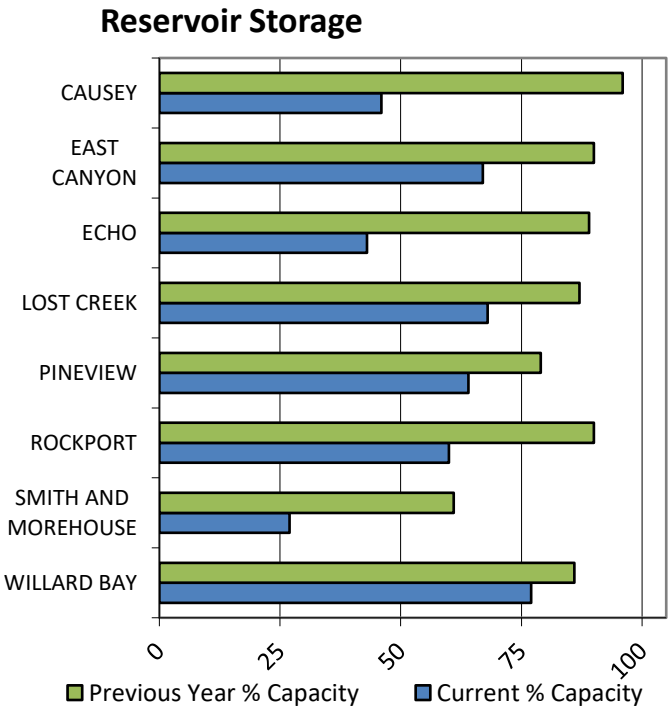
April 1, 2019

Snowpack in the Weber & Ogden River Basins is much above normal at 134% of normal, compared to 60% last year. Precipitation in March was much above average at 149%, which brings the seasonal accumulation (Oct-Mar) to 125% of average. Soil moisture is at 67% compared to 76% last year. Reservoir storage is at 66% of capacity, compared to 85% last year. Forecast streamflow volumes range from 117% to 148% of average. The surface water supply index is 63% for the Ogden River, 58% for the Weber River.









SNOTEL Data

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Weber Ogden Rivers
Streamflow Forecasts - April 1, 2019

Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Weber Ogden Rivers	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Smith & Morehouse Resv Inflow	APR-JUL	33	37	40	118%	43	47	34
Weber R nr Oakley	APR-JUL	115	133	145	124%	157	175	117
Rockport Reservoir Inflow	APR-JUL	110	133	148	120%	163	186	123
Chalk Ck at Coalville	APR-JUL	27	40	48	117%	56	69	41
Weber R nr Coalville	APR-JUL	110	134	150	119%	166	190	126
Echo Reservoir Inflow	APR-JUL	127	170	200	120%	230	275	166
Lost Ck Reservoir Inflow	APR-JUL	6.4	11.7	15.2	126%	18.7	24	12.1
East Canyon Ck nr Jeremy Ranch	APR-JUL	12.7	17	20	132%	23	27	15.2
East Canyon Ck nr Morgan	APR-JUL	25	32	37	132%	42	49	28
Weber R at Gateway	APR-JUL	205	310	380	121%	450	555	315
SF Ogden R nr Huntsville	APR-JUL	48	59	67	120%	75	86	56
Pineview Reservoir Inflow	APR-JUL	90	120	140	119%	160	190	118
Wheeler Ck nr Huntsville	APR-JUL	5.4	7.1	8.2	130%	9.3	11	6.3
Centerville Ck	APR-JUL	1.54	1.82	2	148%	2.2	2.5	1.35

1) 90% and 10% exceedance probabilities are actually 95% and 5%
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
3) Median value used in place of average

Reservoir Storage End of March, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Causey Reservoir	3.3	6.8	3.2	7.1
East Canyon Reservoir	33.1	44.4	36.4	49.5
Echo Reservoir	31.9	65.8	50.2	73.9
Lost Creek Reservoir	15.3	19.6	12.6	22.5
Pineview Reservoir	70.3	86.5	62.8	110.1
Rockport Reservoir	36.4	54.8	37.6	60.9
Willard Bay	166.3	184.9	147.7	215.0
Smith And Morehouse Reservoir	2.2	4.9	3.6	8.1
Basin-wide Total	358.9	467.6	354.1	547.1
# of reservoirs	8	8	8	8

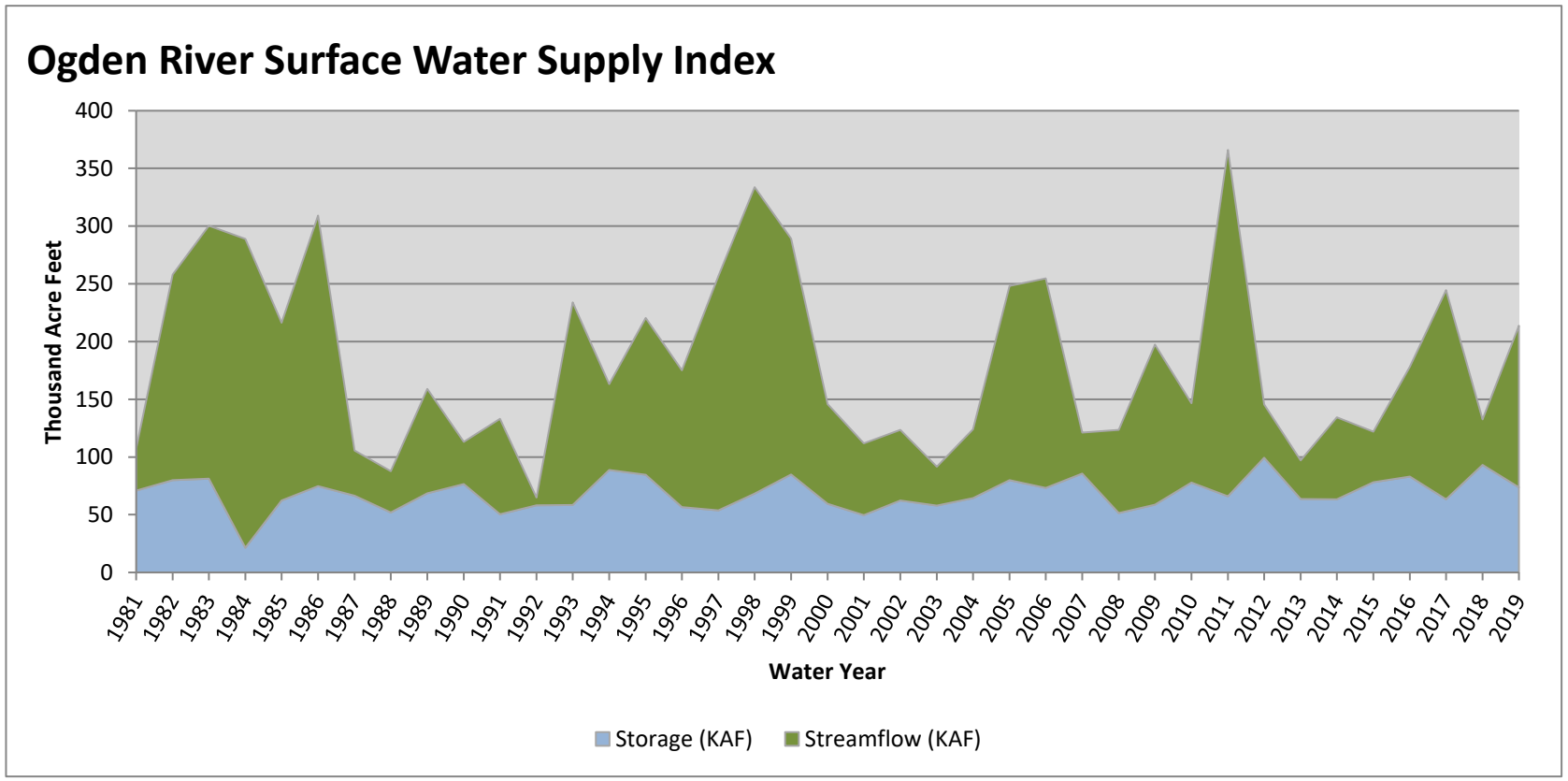
Watershed Snowpack Analysis April 1, 2019	# of Sites	% Median	Last Year % Median
Upper Weber	11	133%	71%
Lower Weber	7	137%	57%
Ogden River	5	134%	55%
Lost Creek	3	129%	75%

April 1, 2019

Surface Water Supply Index

Basin or Region	Mar EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Ogden River	**73.62**	**140.00**	**213.62**	**63**	**1.04**	**16, 09, 85, 95**

*EOM, end of month; #SWSI, Surface Water Supply Index; ^KAF, thousand acre-feet.

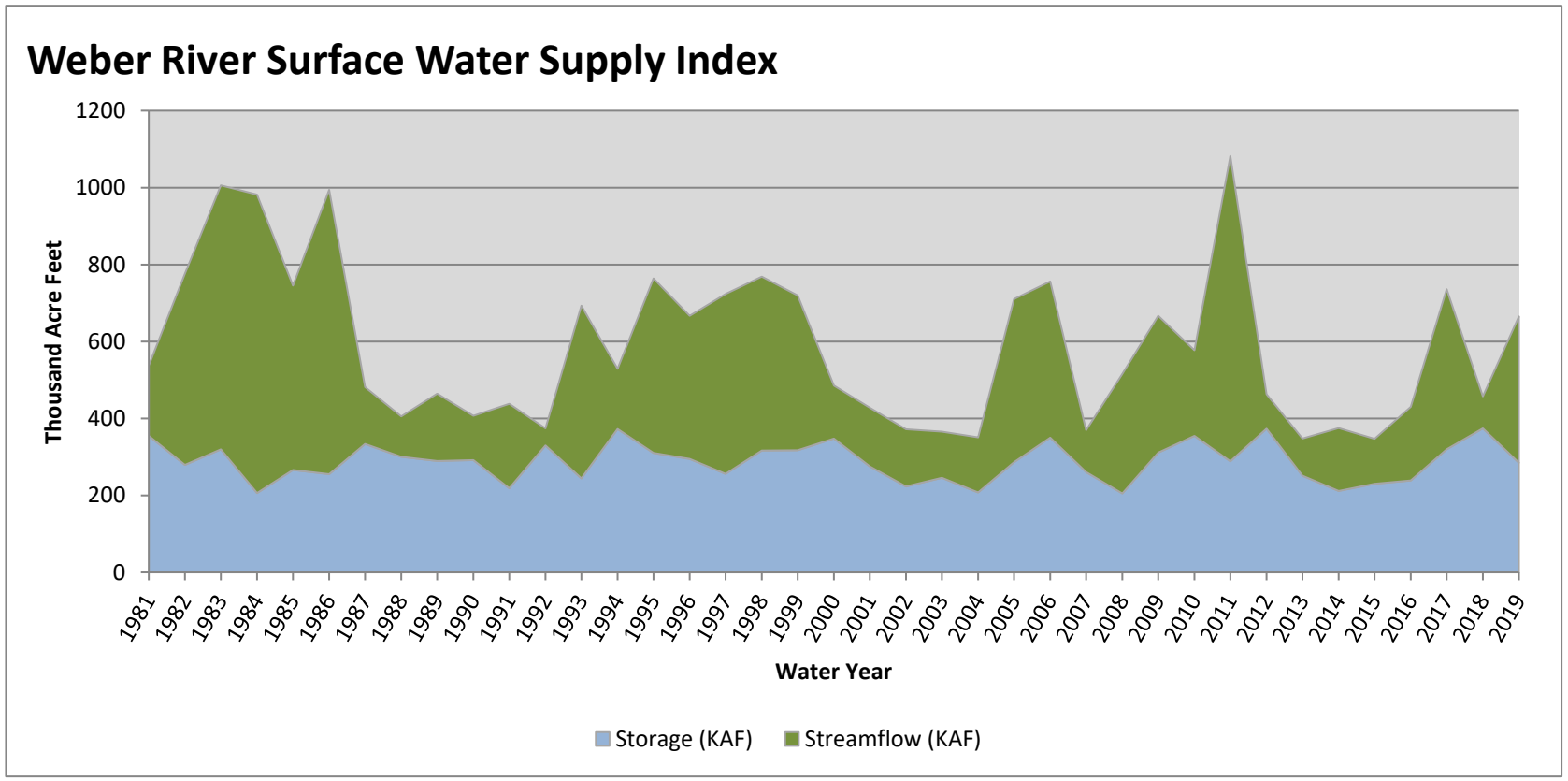


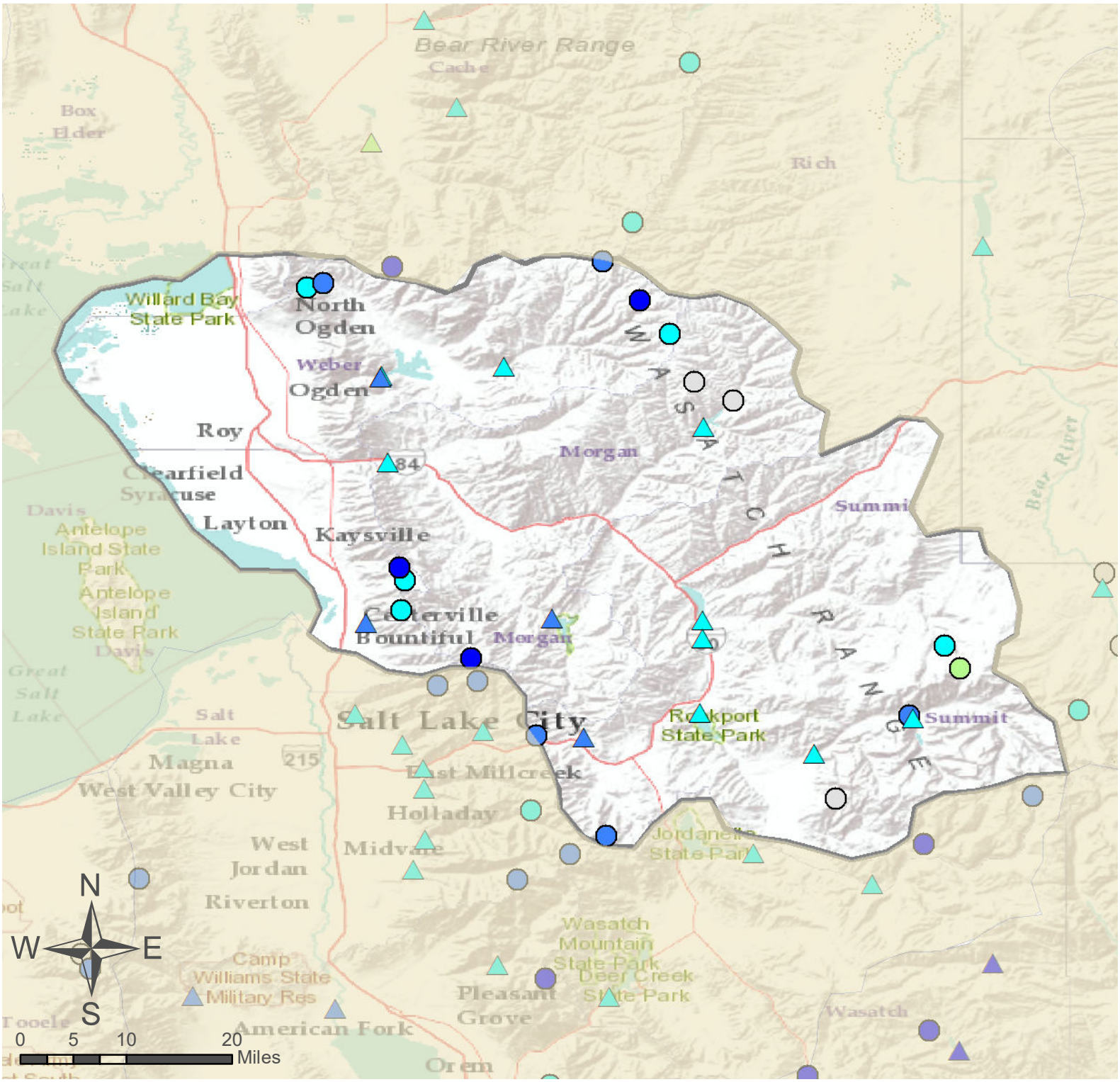
April 1, 2019

Surface Water Supply Index

Basin or Region	Mar EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Weber River	**285.26**	**380.00**	**665.26**	**58**	**0.62**	**81, 10, 96, 09**

*EOM, end of month; #SWSI, Surface Water Supply Index; ^KAF, thousand acre-feet.





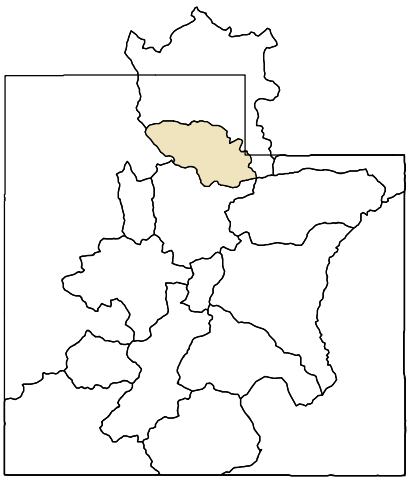
Weber & Ogden River Basins

SNOTEL Site

Forecast Point

% of Normal

- < 50%
- 50 - 69%
- 70 - 89%
- 90 - 109%
- 110 - 129%
- 130 - 149%
- > 150%
- No Normal



As of April 1, 2019:

134% of Normal SWE

125% of Normal Precipitation

149% of Normal Precipitation Last Month

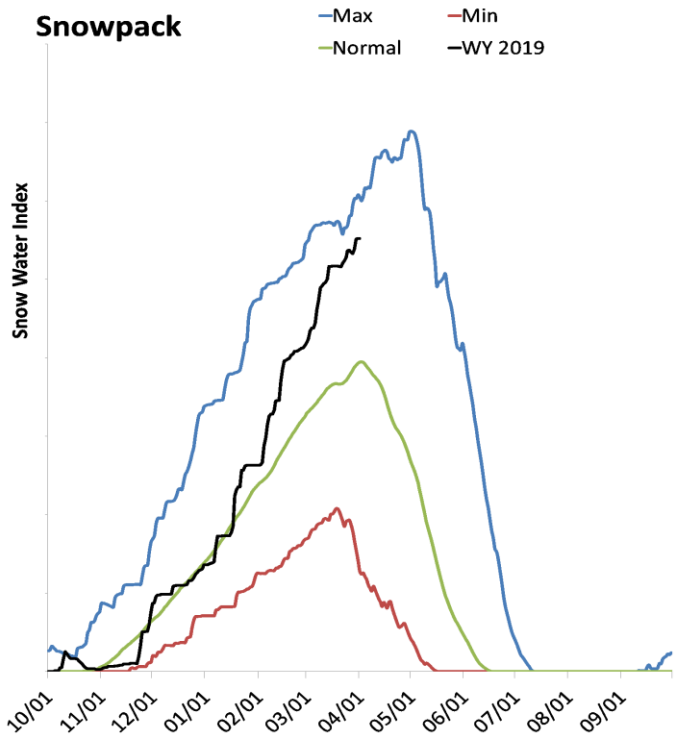
67% Saturation Soil Moisture

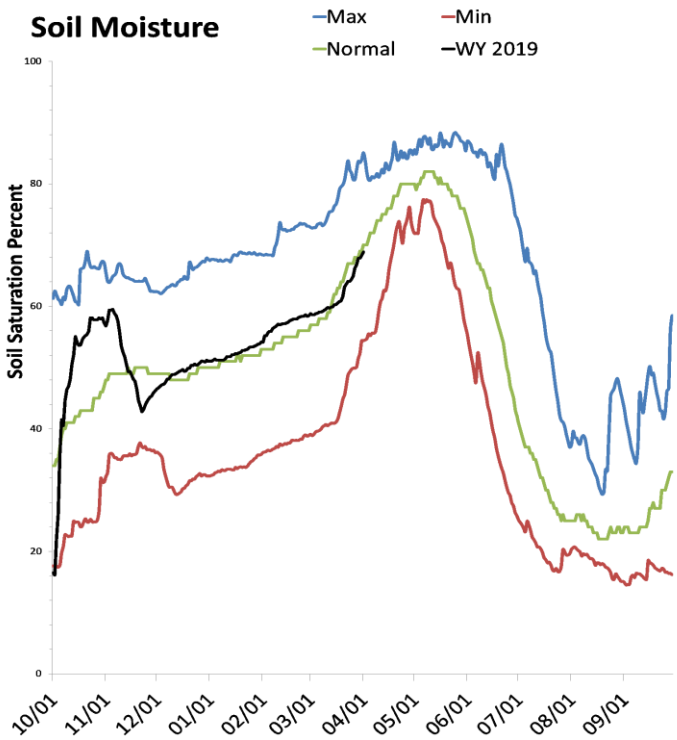
Weber & Ogden River Basins

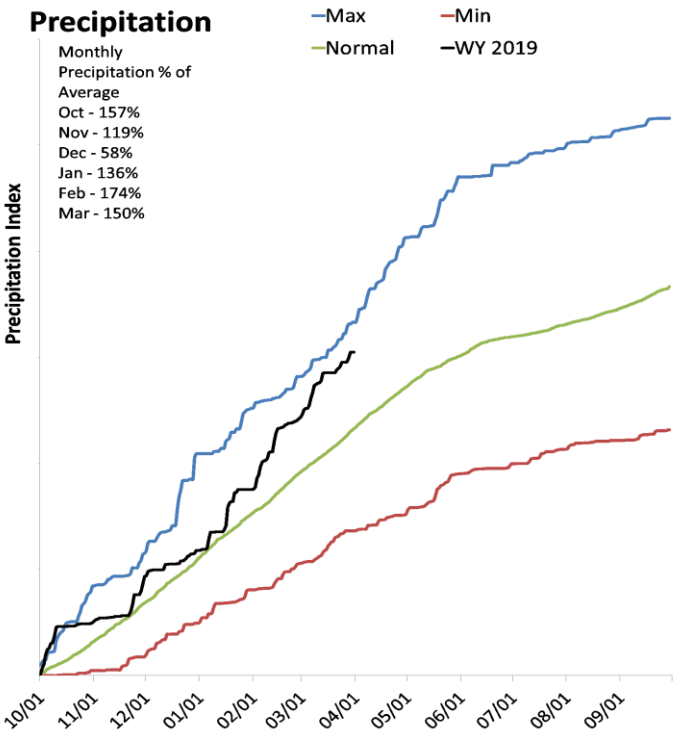
Provo & Jordan River Basins

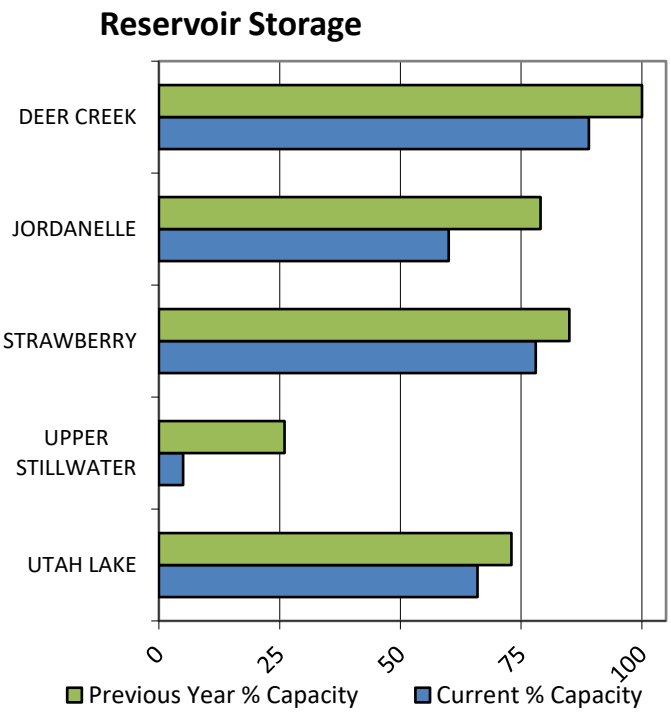
April 1, 2019

Snowpack in the Provo & Jordan River Basins is much above normal at 140% of normal, compared to 61% last year. Precipitation in March was much above average at 150%, which brings the seasonal accumulation (Oct-Mar) to 131% of average. Soil moisture is at 68% compared to 67% last year. Reservoir storage is at 72% of capacity, compared to 81% last year. Forecast streamflow volumes range from 117% to 142% of average. The surface water supply index is 27% for the Provo River.









SNOTEL Data

Data Current as of: 4/3/2019 3:29:49 PM

Provo Jordan Rivers
Streamflow Forecasts - April 1, 2019

		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Provo Jordan Rivers	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Provo R at Woodland	APR-JUL	84	104	119	119%	135	160	100
Provo R at Hailstone	APR-JUL	85	111	130	120%	151	185	108
Provo R bl Deer Ck Dam	APR-JUL	102	126	142	122%	158	182	116
Spanish Fk at Castilla	APR-JUL	11.8	57	88	128%	119	164	69
American Fk ab Upper Powerplant	APR-JUL	26	34	39	122%	44	52	32
Utah Lake Inflow	APR-JUL	42	200	350	132%	500	660	265
W Canyon Ck nr Cedar Fort	APR-JUL	1.64	2.2	2.5	142%	2.8	3.4	1.76
Little Cottonwood Ck nr SLC	APR-JUL	35	41	45	118%	49	56	38
Big Cottonwood Ck nr SLC	APR-JUL	32	38	42	117%	46	52	36
Mill Ck nr SLC	APR-JUL	4.1	6.1	7.5	117%	8.9	10.9	6.4
Parleys Ck nr SLC	APR-JUL	9	13.8	17	120%	20	25	14.2
Dell Fk nr SLC	APR-JUL	0.72	4	6.8	124%	9.6	13.6	5.5
Emigration Ck nr SLC	APR-JUL	1.89	3.7	5	125%	6.3	8.1	4
City Ck nr SLC	APR-JUL	5	7.5	9.2	119%	10.9	13.4	7.7
Salt Ck at Nephi	APR-JUL	5.3	9.3	12	126%	14.7	18.7	9.5

1) 90% and 10% exceedance probabilities are actually 95% and 5%
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
3) Median value used in place of average

Reservoir Storage End of March, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Deer Creek Reservoir	133.4	150.0	116.8	149.7
Strawberry Reservoir	860.3	935.8	665.1	1105.9
Utah Lake	578.6	633.4	816.5	870.9
Jordanelle Reservoir	191.2	253.6	239.4	314.0
Basin-wide Total	1763.4	1972.8	1837.8	2440.5
# of reservoirs	4	4	4	4

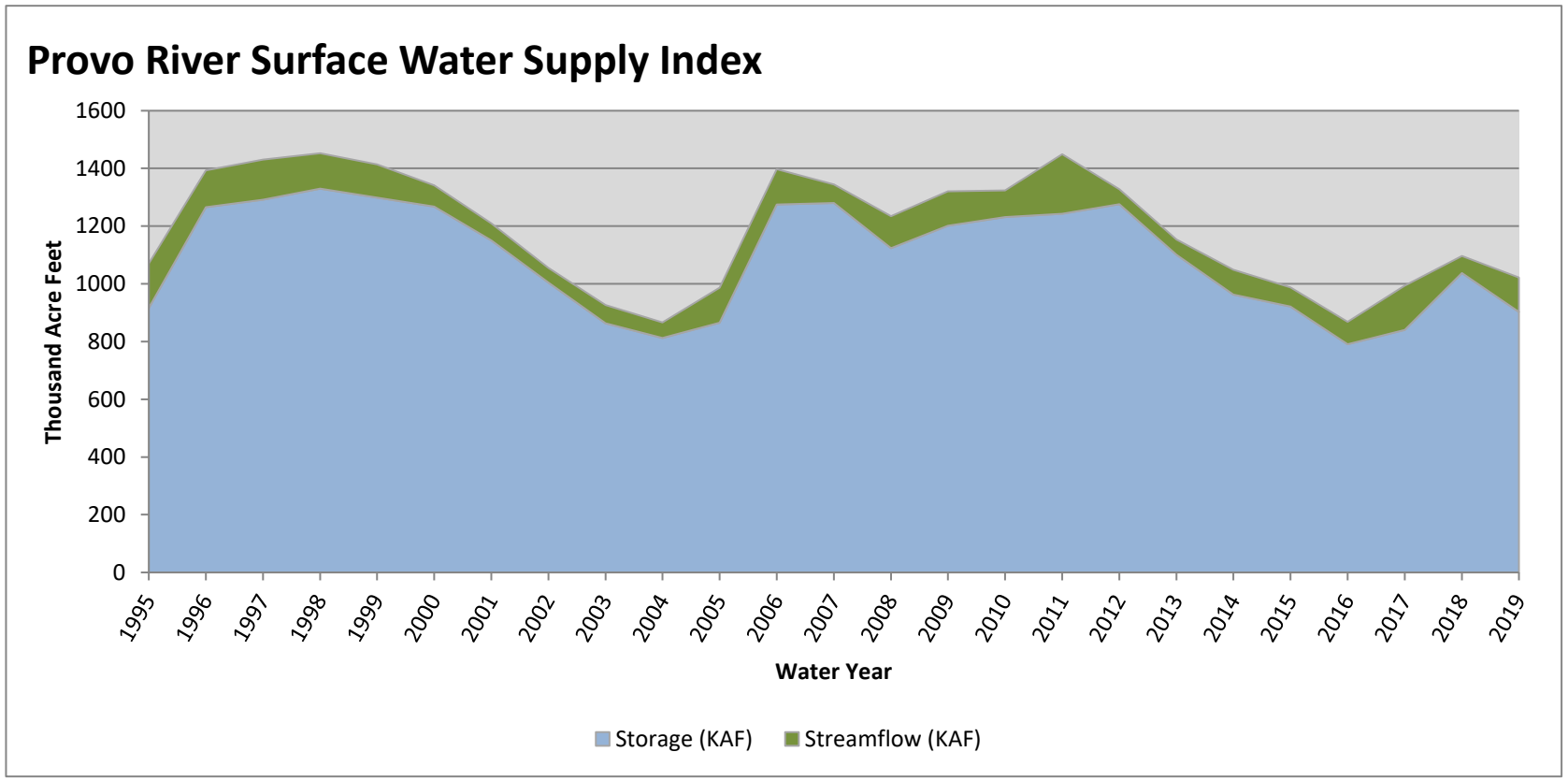
Watershed Snowpack Analysis April 1, 2019	# of Sites	% Median	Last Year % Median
Provo River	7	145%	61%
Jordan River	13	138%	69%
Utah Lake	12	143%	57%
Spanish Fork River	5	143%	49%
Six Creeks	12	138%	69%
Cottonwood Creeks	6	136%	74%

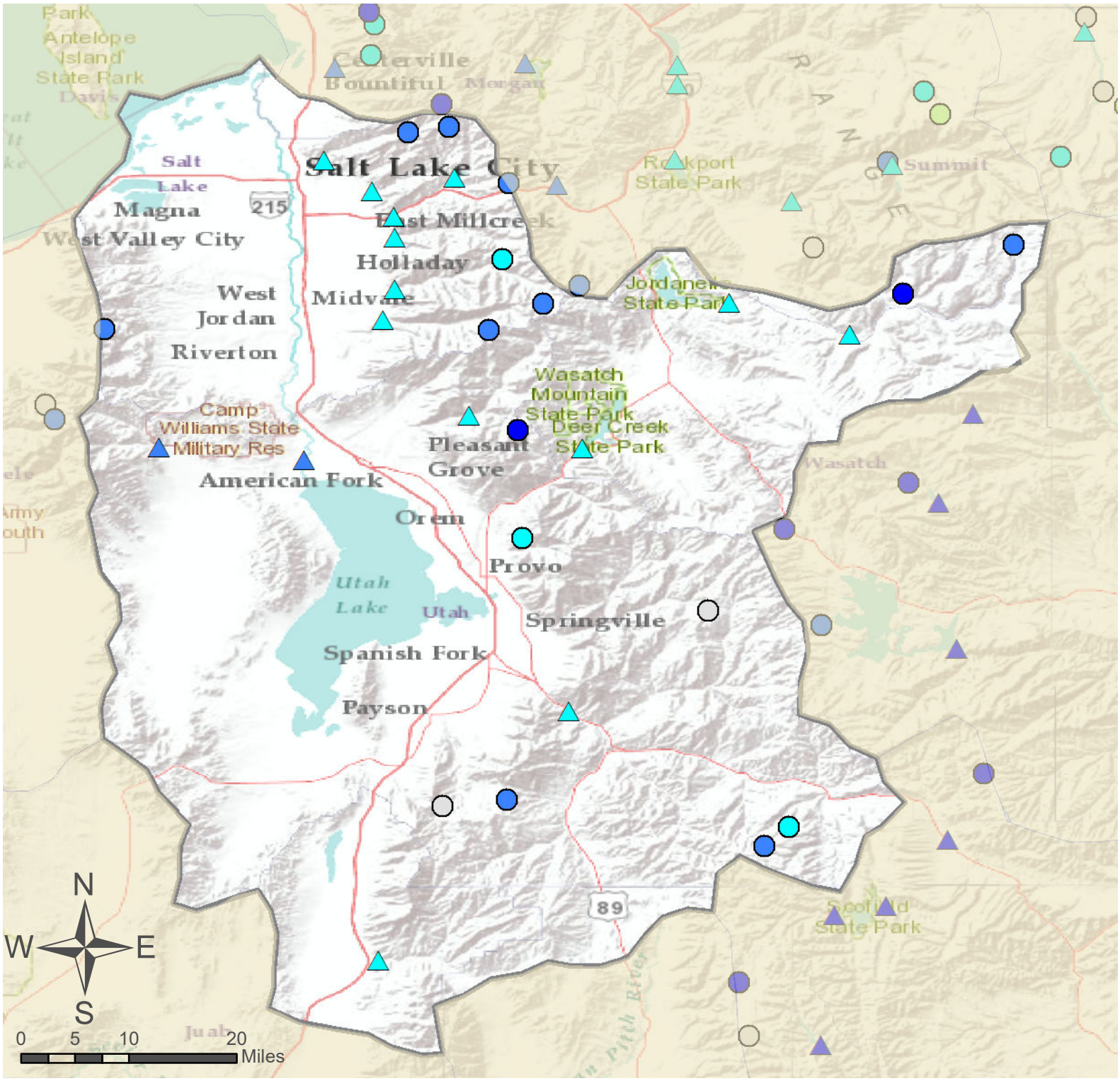
April 1, 2019

Surface Water Supply Index

Basin or Region	Mar EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Provo River	**903.08**	**119.00**	**1022.08**	**27**	**-1.92**	**15, 17, 14, 02**

*EOM, end of month; #SWSI, Surface Water Supply Index; ^KAF, thousand acre-feet.





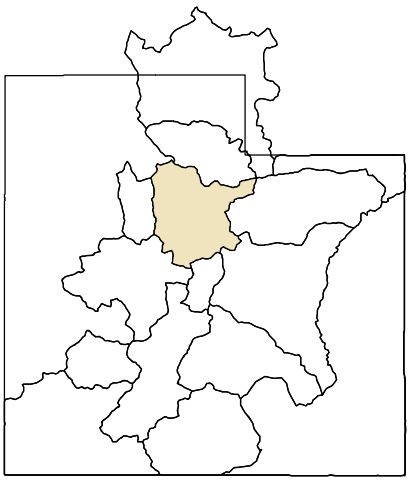
Provo & Jordan River Basins

SNOTEL Site

Forecast Point

% of Normal

- < 50%
- 50 - 69%
- 70 - 89%
- 90 - 109%
- 110 - 129%
- 130 - 149%
- > 150%
- No Normal



As of April 1, 2019:

140% of Normal SWE

131% of Normal Precipitation

150% of Normal Precipitation Last Month

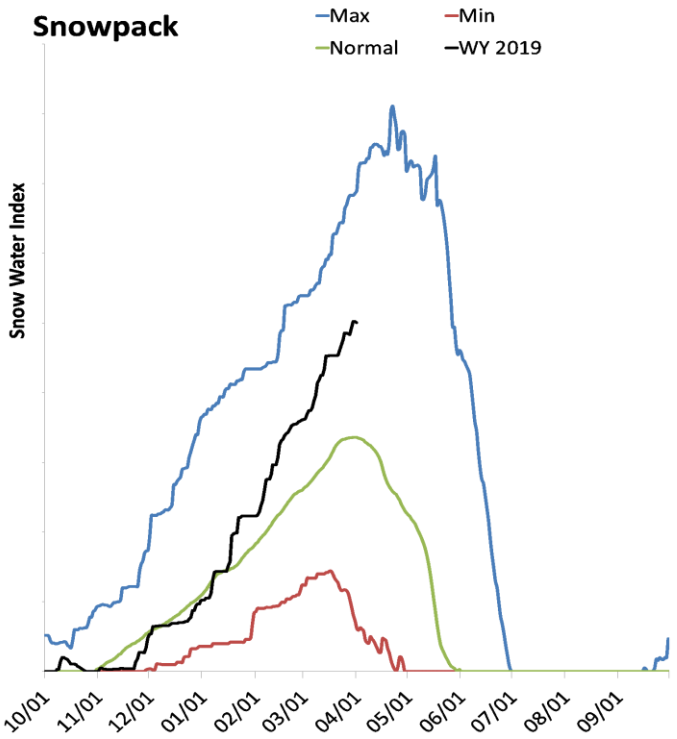
68% Saturation Soil Moisture

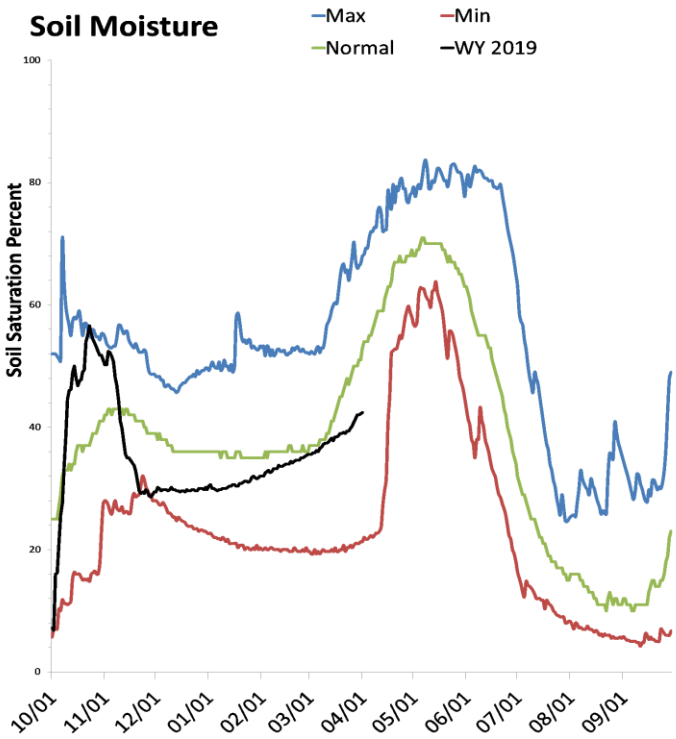
Provo & Jordan River Basins

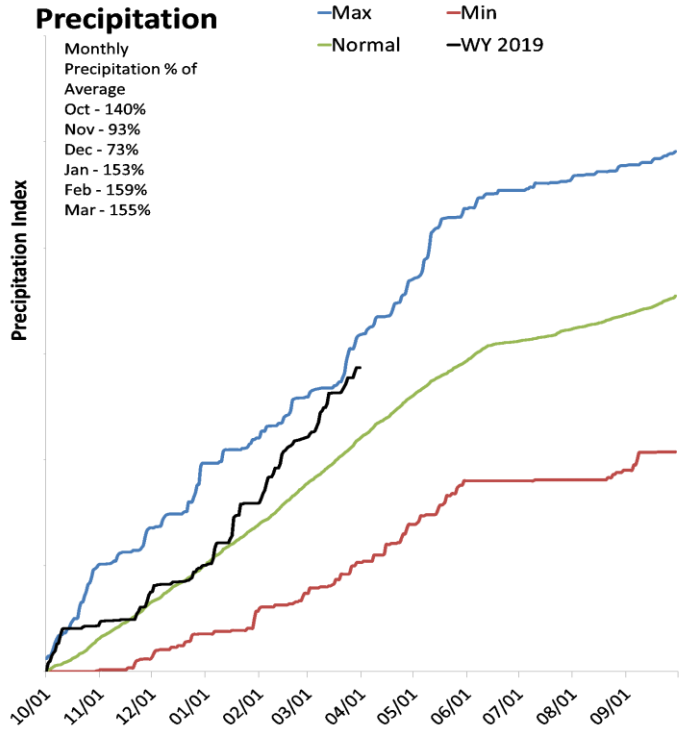
Tooele Valley & West Desert Basins

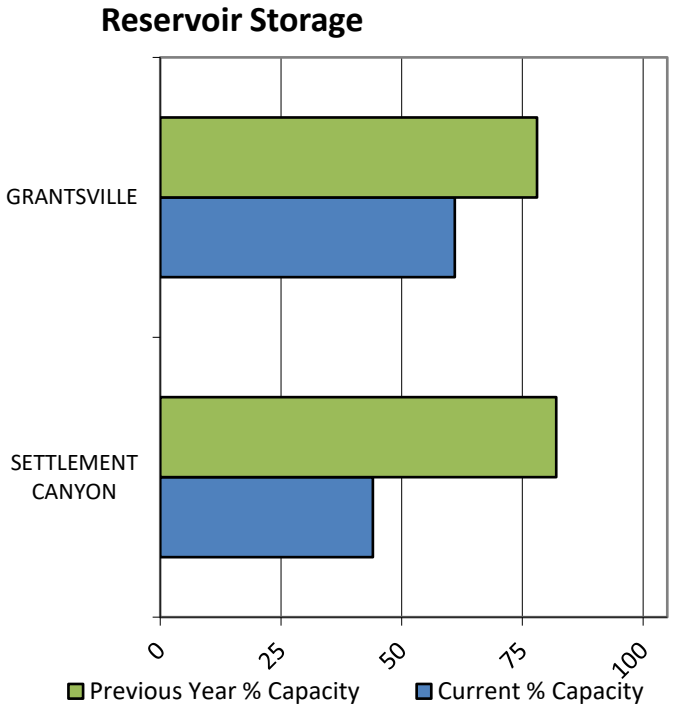
April 1, 2019

Snowpack in the Tooele Valley & West Desert Basins is much above normal at 149% of normal, compared to 53% last year. Precipitation in March was much above average at 156%, which brings the seasonal accumulation (Oct-Mar) to 131% of average. Soil moisture is at 42% compared to 44% last year. Reservoir storage is at 57% of capacity, compared to 79% last year. Forecast streamflow volumes range from 110% to 144% of average.









SNOTEL Data

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Tooele Valley West Desert
Streamflow Forecasts - April 1, 2019

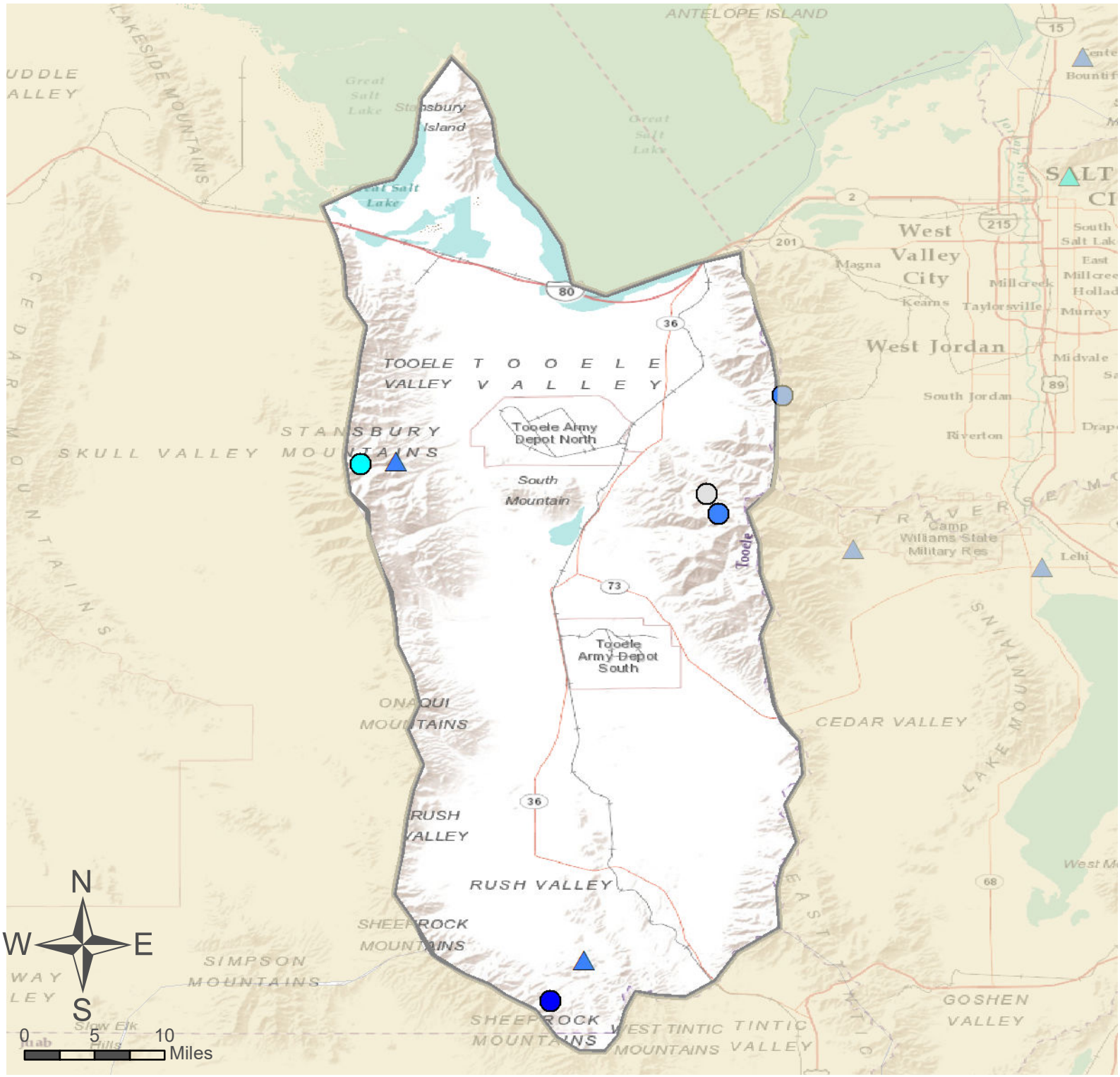
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Tooele Valley West Desert	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Vernon Ck nr Vernon	APR-JUL	1	1.59	2	144%	2.4	3	1.39
S Willow Ck nr Grantsville	APR-JUL	2.9	3.6	4	129%	4.4	5.1	3.1
Dunn Ck nr Park Valley	APR-JUL	1.79	2.6	3.2	110%	3.8	4.6	2.9
W Canyon Ck nr Cedar Fort	APR-JUL	1.64	2.2	2.5	142%	2.8	3.4	1.76

1) 90% and 10% exceedance probabilities are actually 95% and 5%
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
3) Median value used in place of average

Reservoir Storage End of March, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Settlement Canyon Reservoir	0.4	0.8	0.8	1.0
Grantsville Reservoir	2.0	2.6	2.5	3.3
Basin-wide Total	2.4	3.4	3.3	4.3
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis April 1, 2019	# of Sites	% Median	Last Year % Median
Tooele Valley	3	140%	58%
Raft River	4	119%	63%
Deep Creek	0		
Northwestern Utah	3	140%	55%



Tooele Valley & West Desert Basins

SNOTEL Site

Forecast Point

As of April 1, 2019:

149% of Normal SWE

131% of Normal Precipitation

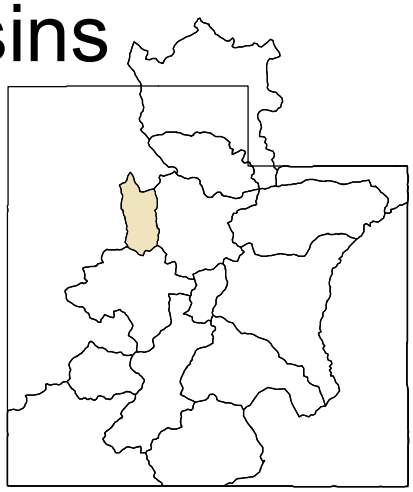
156% of Normal Precipitation Last Month

42% Saturation Soil Moisture

Tooele Valley & West Desert Basins

% of Normal

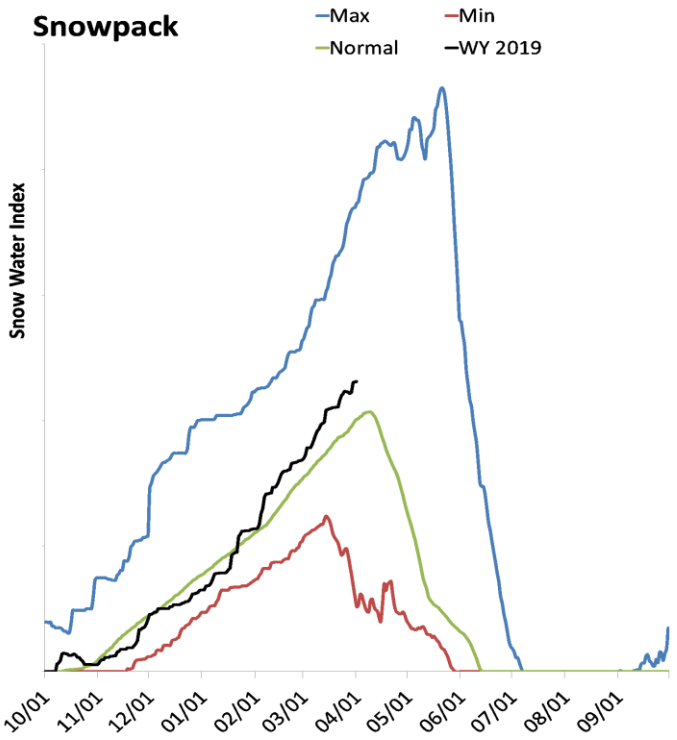
- < 50%
- 50 - 69%
- 70 - 89%
- 90 - 109%
- 110 - 129%
- 130 - 149%
- > 150%
- No Normal

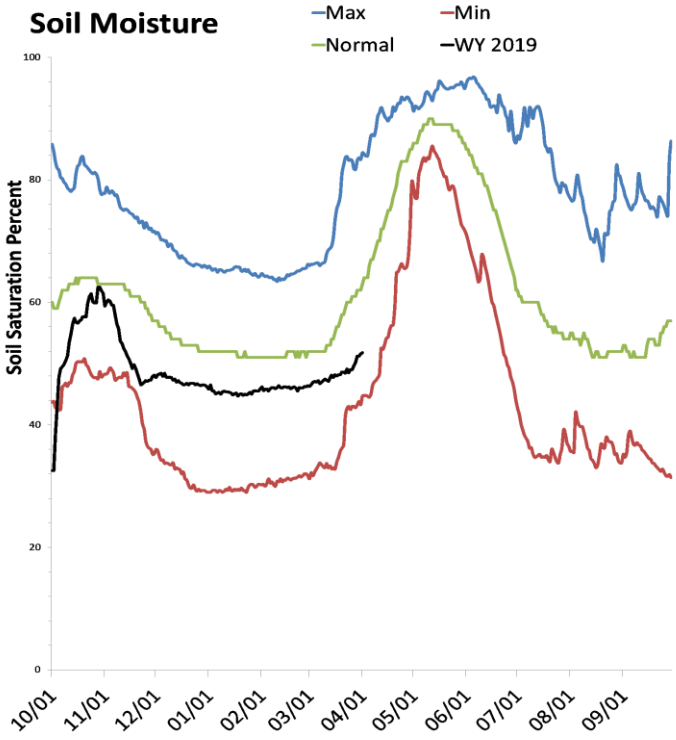


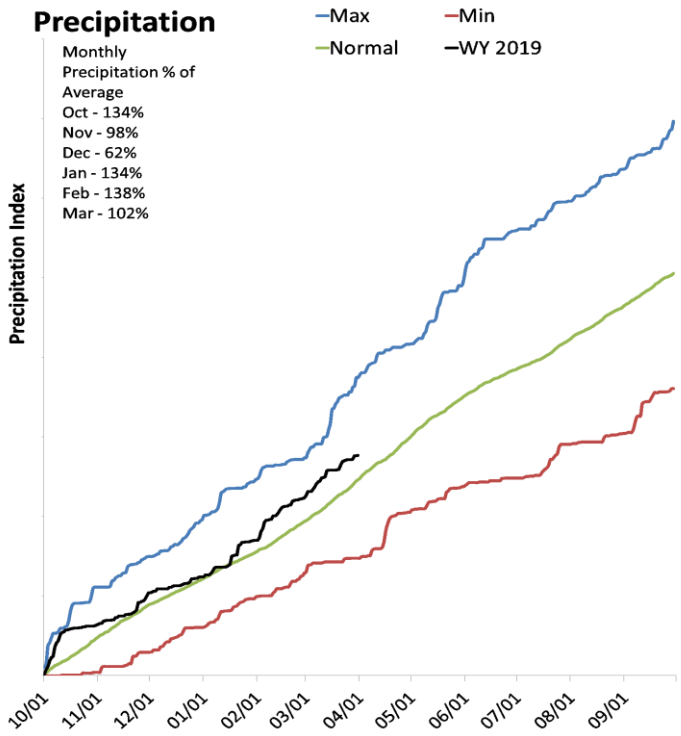
Northeastern Uinta Basin

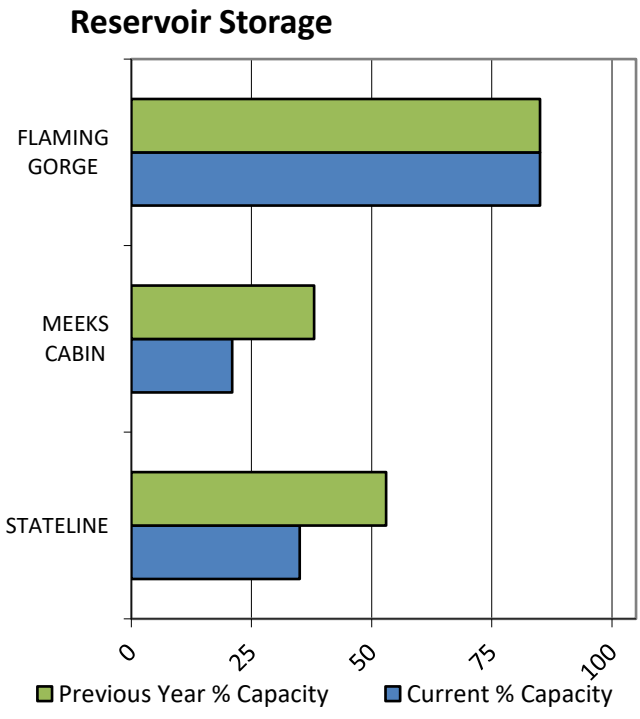
April 1, 2019

Snowpack in the Northeastern Uinta Basin is above normal at 115% of normal, compared to 83% last year. Precipitation in March was near average at 101%, which brings the seasonal accumulation (Oct-Mar) to 112% of average. Soil moisture is at 50% compared to 53% last year. Reservoir storage is at 84% of capacity, compared to 84% last year. Forecast streamflow volumes range from 90% to 115% of average. The surface water supply index is 62% for the Blacks Fork, 57% for the Smiths Creek.









SNOTEL Data

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Northeastern Uintas
Streamflow Forecasts - April 1, 2019

		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Northeastern Uintas	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Blacks Fk nr Robertson	APR-JUL	73	88	99	115%	111	129	86
EF of Smiths Fork nr Robertson [2]	APR-JUL	20	25	29	107%	33	39	27
Flaming Gorge Reservoir Inflow [2]	APR-JUL	520	725	885	90%	1060	1350	980
Ashley Ck nr Vernal	APR-JUL	35	47	56	112%	66	82	50
Big Brush Ck ab Red Fleet Reservoir	APR-JUL	15	19.6	23	110%	27	33	21

1) 90% and 10% exceedance probabilities are actually 95% and 5%
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
3) Median value used in place of average

Reservoir Storage End of March, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Flaming Gorge Reservoir	3185.0	3184.3	3020.0	3749.0
Stateline Reservoir	4.2	6.3	5.3	12.0
Meeks Cabin Reservoir	6.8	12.2	13.4	32.5
Basin-wide Total	3196.0	3202.9	3038.7	3793.5
# of reservoirs	3	3	3	3

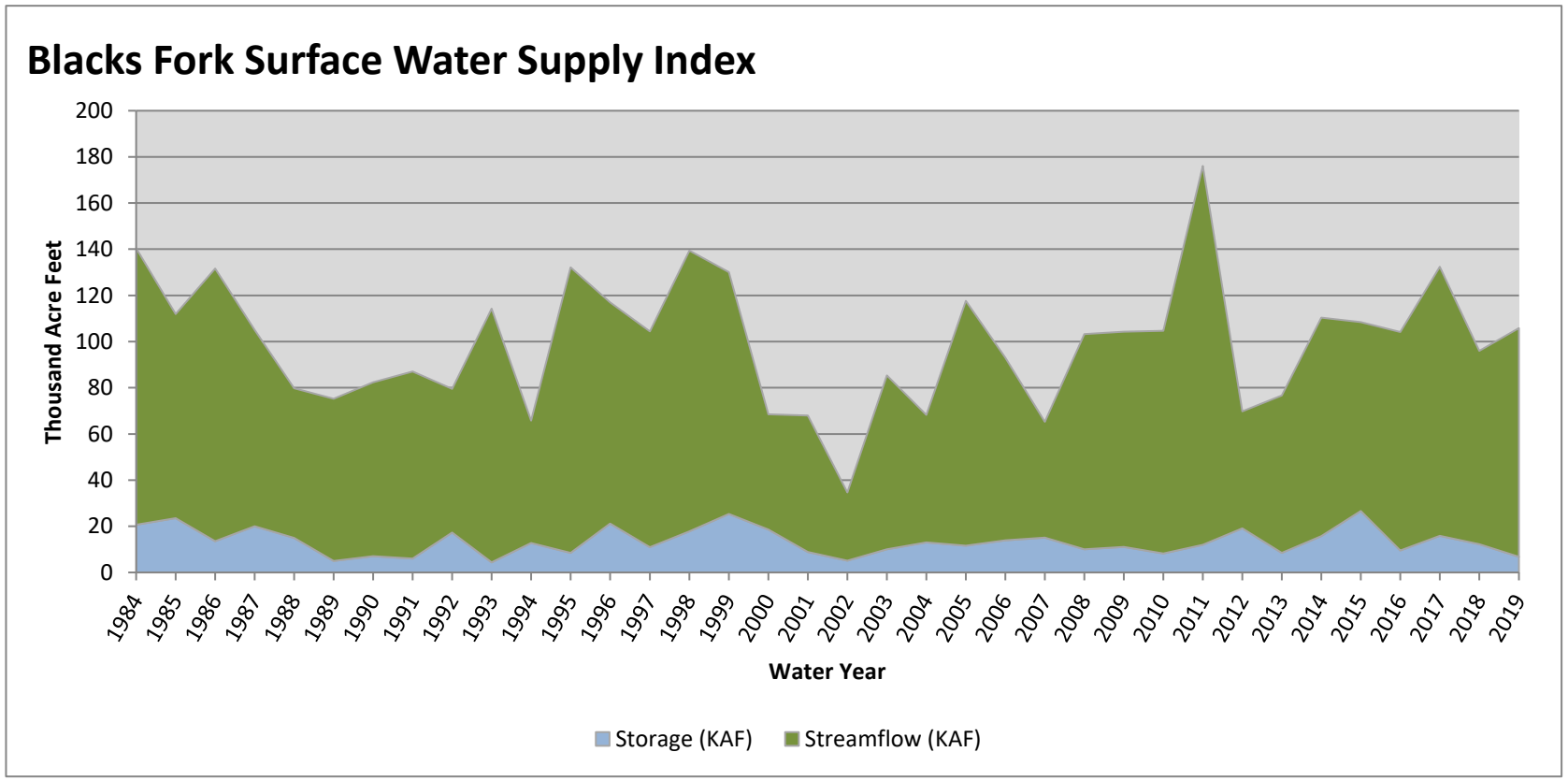
Watershed Snowpack Analysis April 1, 2019	# of Sites	% Median	Last Year % Median
Blacks Fork River	5	122%	84%
Upper Green	2	109%	97%
Ashley Brush Creeks	4	129%	70%

April 1, 2019

Surface Water Supply Index

Basin or Region	Mar EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Blacks Fork	**6.82**	**99.00**	**105.82**	**62**	**1.01**	**10, 87, 15, 14**

*EOM, end of month; #SWSI, Surface Water Supply Index; ^KAF, thousand acre-feet.

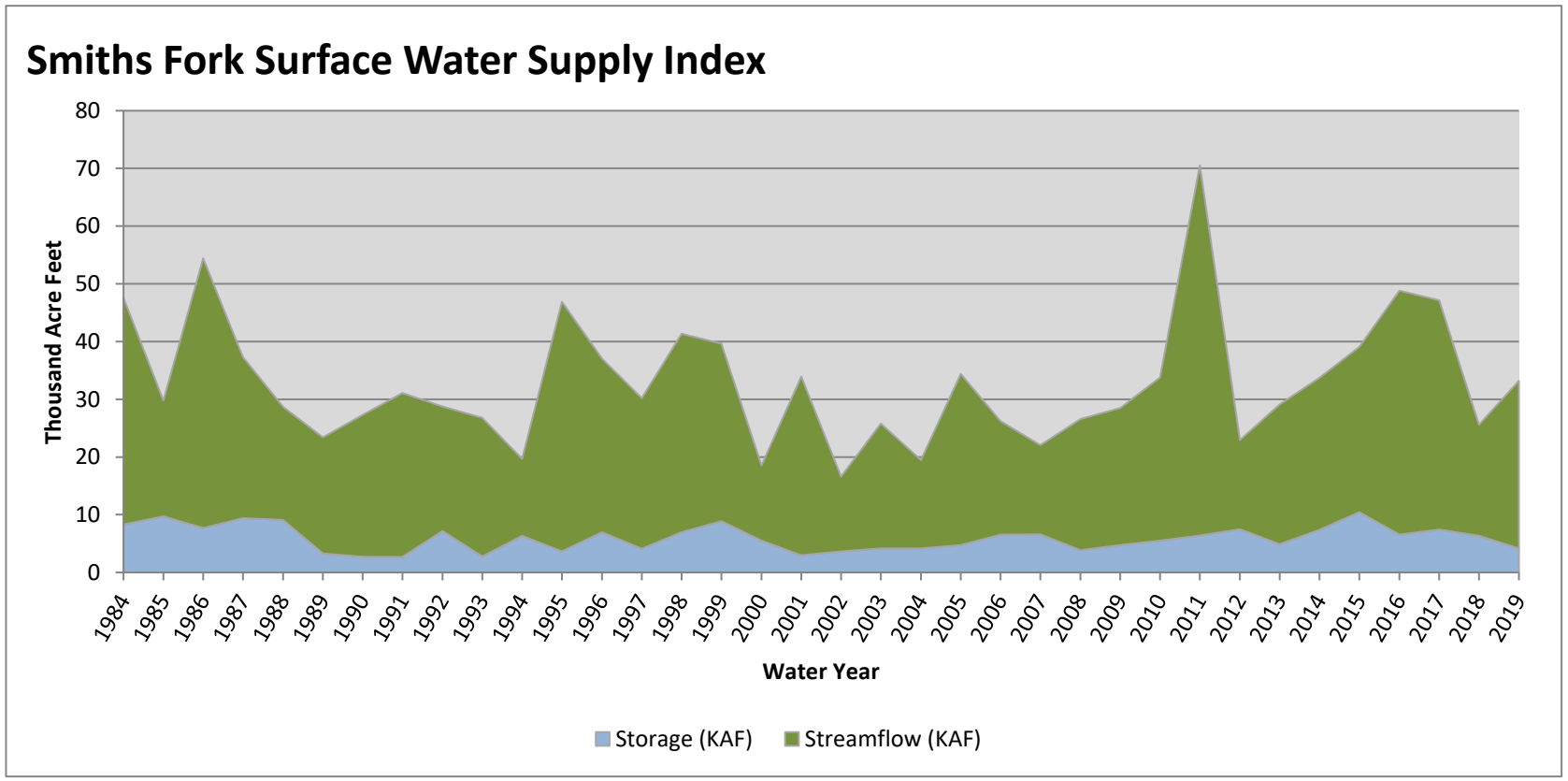


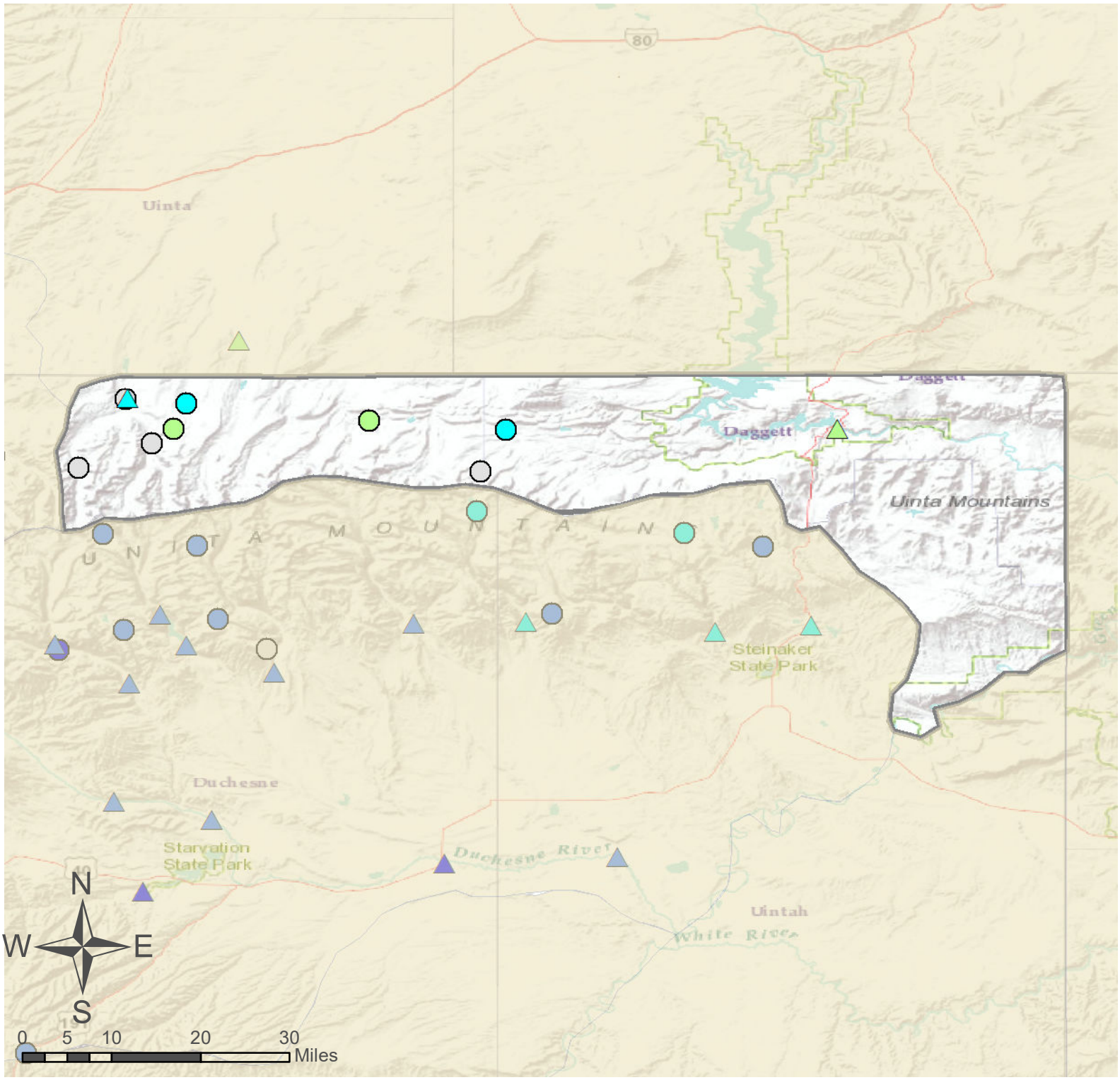
April 1, 2019

Surface Water Supply Index

Basin or Region	Mar EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Smiths Fork	**4.19**	**29.00**	**33.19**	**57**	**0.56**	**97, 91, 14, 10**

*EOM, end of month; #SWSI, Surface Water Supply Index; ^KAF, thousand acre-feet.





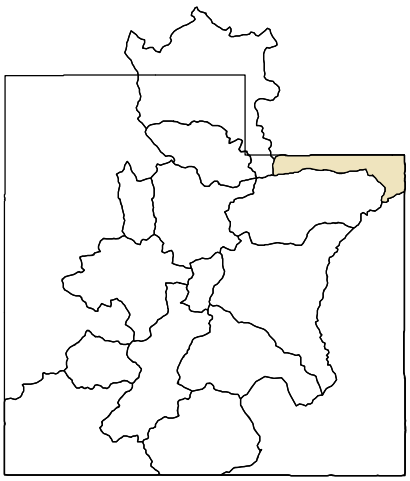
Northeastern Uinta Basin

SNOTEL Site

Forecast Point

% of Normal

- < 50%
- 50 - 69%
- 70 - 89%
- 90 - 109%
- 110 - 129%
- 130 - 149%
- > 150%
- No Normal



<u>As of April 1, 2019:</u>

115% of Normal SWE

112% of Normal Precipitation

101% of Normal Precipitation Last Month

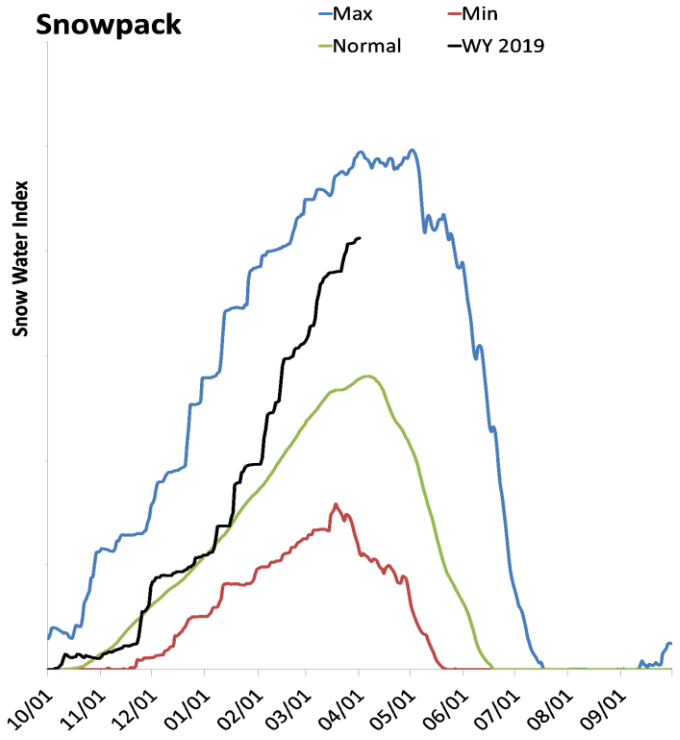
50% Saturation Soil Moisture

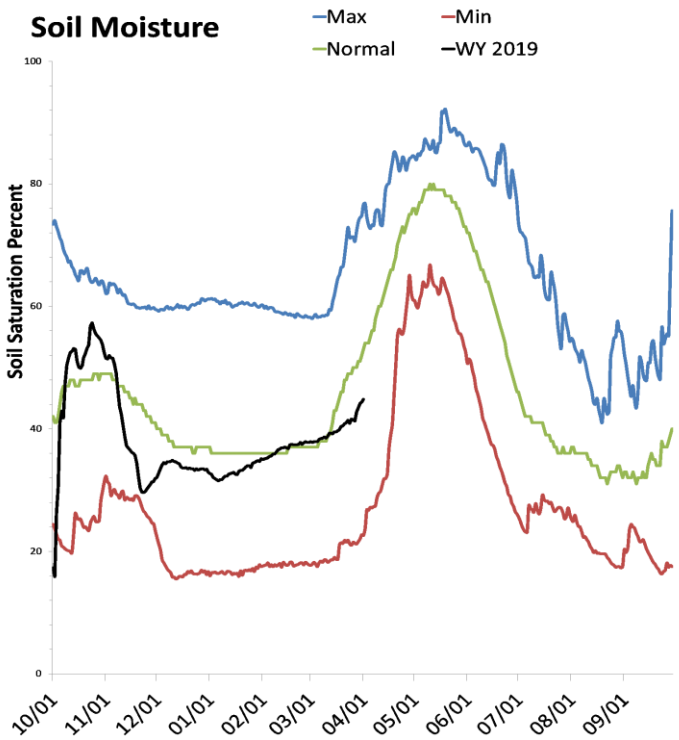
Northeastern Uinta Basin

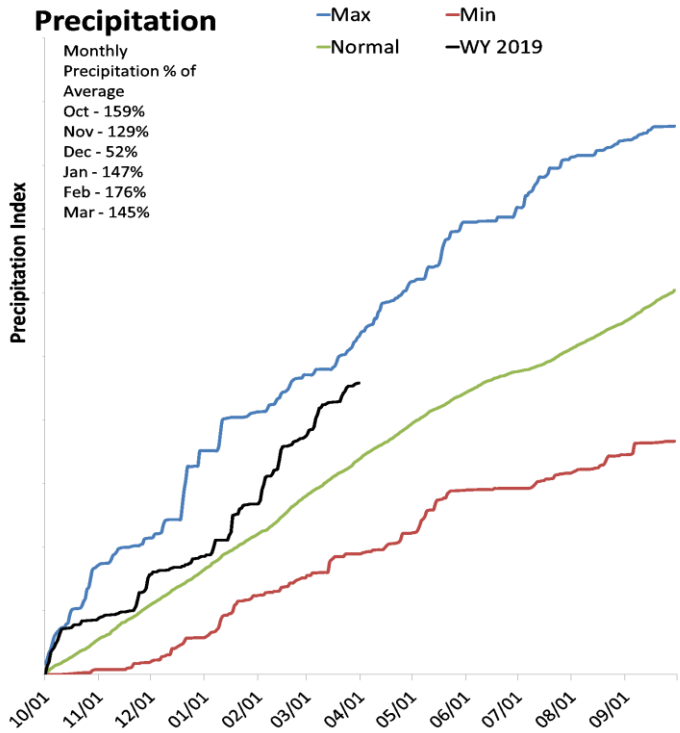
Duchesne River Basin

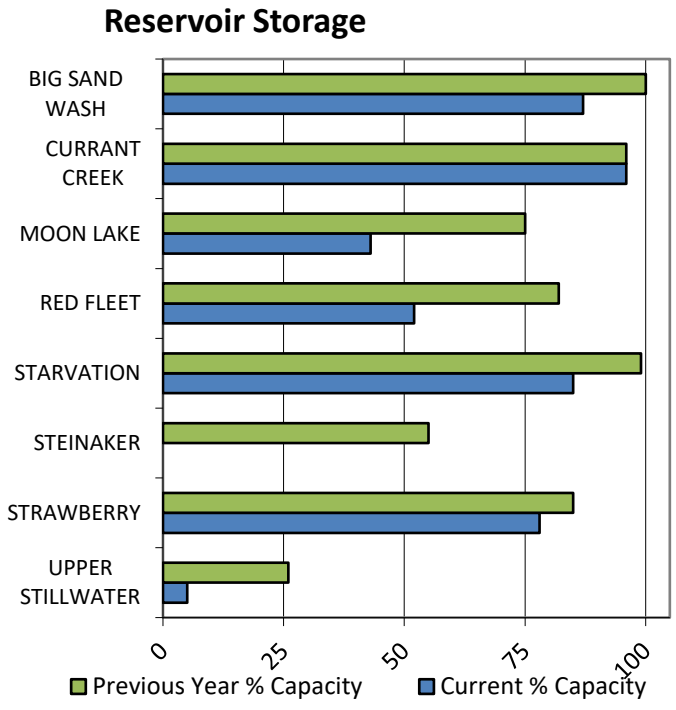
April 1, 2019

Snowpack in the Duchesne River Basin is much above average at 148% of normal, compared to 63% last year. Precipitation in March was much above average at 144%, which brings the seasonal accumulation (Oct-Mar) to 135% of average. Soil moisture is at 45% compared to 43% last year. Reservoir storage is at 74% of capacity, compared to 84% last year. Forecast streamflow volumes range from 110% to 205% of average. The surface water supply index is 70% for the Western Uintas, 30% for the Eastern Uintas.









SNOTEL Data

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Duchesne River
Streamflow Forecasts - April 1, 2019

Duchesne River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
WF Duchesne R at VAT Diversion	APR-JUL	21	25	28	151%	31	36	18.6
Duchesne R nr Tabiona [2]	APR-JUL	120	140	155	144%	170	194	108
Upper Stillwater Reservoir Inflow[2]	APR-JUL	79	91	100	135%	109	124	74
Rock Ck nr Mountain Home [2]	APR-JUL	94	108	118	134%	128	144	88
Duchesne R ab Knight Diversion [2]	APR-JUL	215	245	270	138%	295	335	195
Currant Ck Reservoir Inflow[2]	APR-JUL	27	32	36	180%	41	48	20
Strawberry R nr Soldier Springs [2]	APR-JUL	85	105	119	205%	134	159	58
Strawberry R nr Duchesne [2]	APR-JUL	146	186	215	192%	245	295	112
Lake Fork R ab Moon Lake Reservoir	APR-JUL	64	78	88	144%	99	115	61
Lake Fk R Bl Moon Lk nr Mountain Home[2]	APR-JUL	71	83	92	139%	101	115	66
Yellowstone R nr Altonah	APR-JUL	61	74	84	138%	94	110	61
Duchesne R at Myton [2]	APR-JUL	390	485	555	168%	630	750	330
Uinta R bl Powerplant Diversion nr Neola[2]	APR-JUL	68	89	105	142%	122	150	74
Whiterocks R nr Whiterocks	APR-JUL	40	53	62	115%	72	89	54
Duchesne R nr Randlett [2]	APR-JUL	360	475	565	147%	660	820	385
Ashley Ck nr Vernal	APR-JUL	35	47	56	112%	66	82	50
Big Brush Ck ab Red Fleet Reservoir	APR-JUL	15	19.6	23	110%	27	33	21

1) 90% and 10% exceedance probabilities are actually 95% and 5%
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
3) Median value used in place of average

Reservoir Storage End of March, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Steinaker Reservoir	0.0	18.3	24.5	33.4
Red Fleet Reservoir	13.3	21.1	18.8	25.7
Big Sand Wash Reservoir	22.3	25.7		25.7
Upper Stillwater Reservoir	1.5	8.3	4.5	32.5
Starvation Reservoir	140.1	163.1	149.7	164.1
Moon Lake Reservoir	15.5	26.8	27.3	35.8
Currant Creek Reservoir	14.8	15.0	14.8	15.5
Strawberry Reservoir	860.3	935.8	665.1	1105.9
Basin-wide Total	1045.4	1188.3	904.7	1412.9
# of reservoirs	7	7	7	7

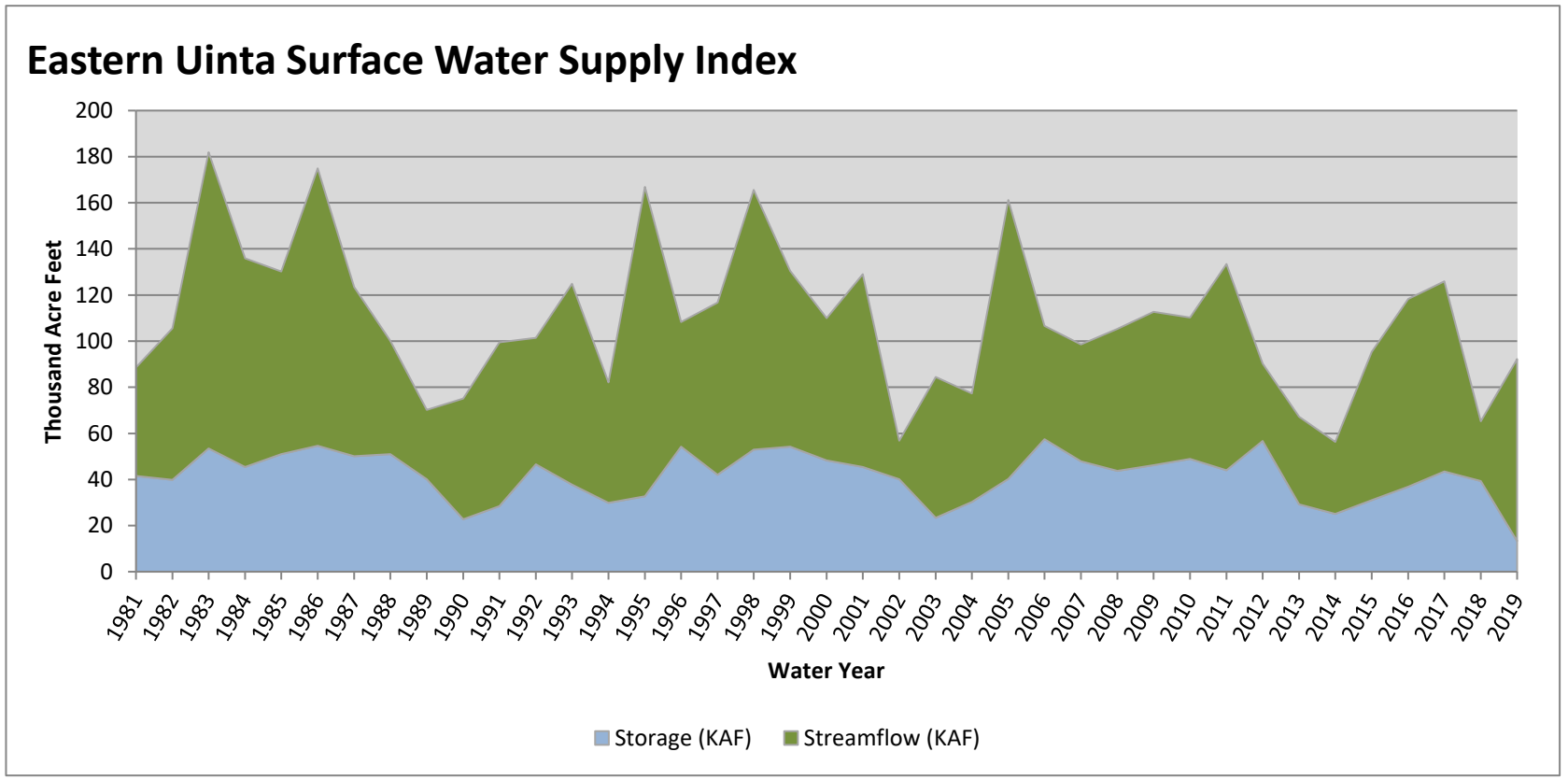
Watershed Snowpack Analysis April 1, 2019	# of Sites	% Median	Last Year % Median
Strawberry River	5	164%	46%
Lakefork Yellowstone Rivers	7	143%	74%
Uinta Whiterocks River	2	126%	66%

April 1, 2019

Surface Water Supply Index

Basin or Region	Mar EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Eastern Uinta	**13.27**	**79.00**	**92.27**	**30**	**-1.67**	**81, 12, 15, 07**

*EOM, end of month; #SWSI, Surface Water Supply Index; ^KAF, thousand acre-feet.

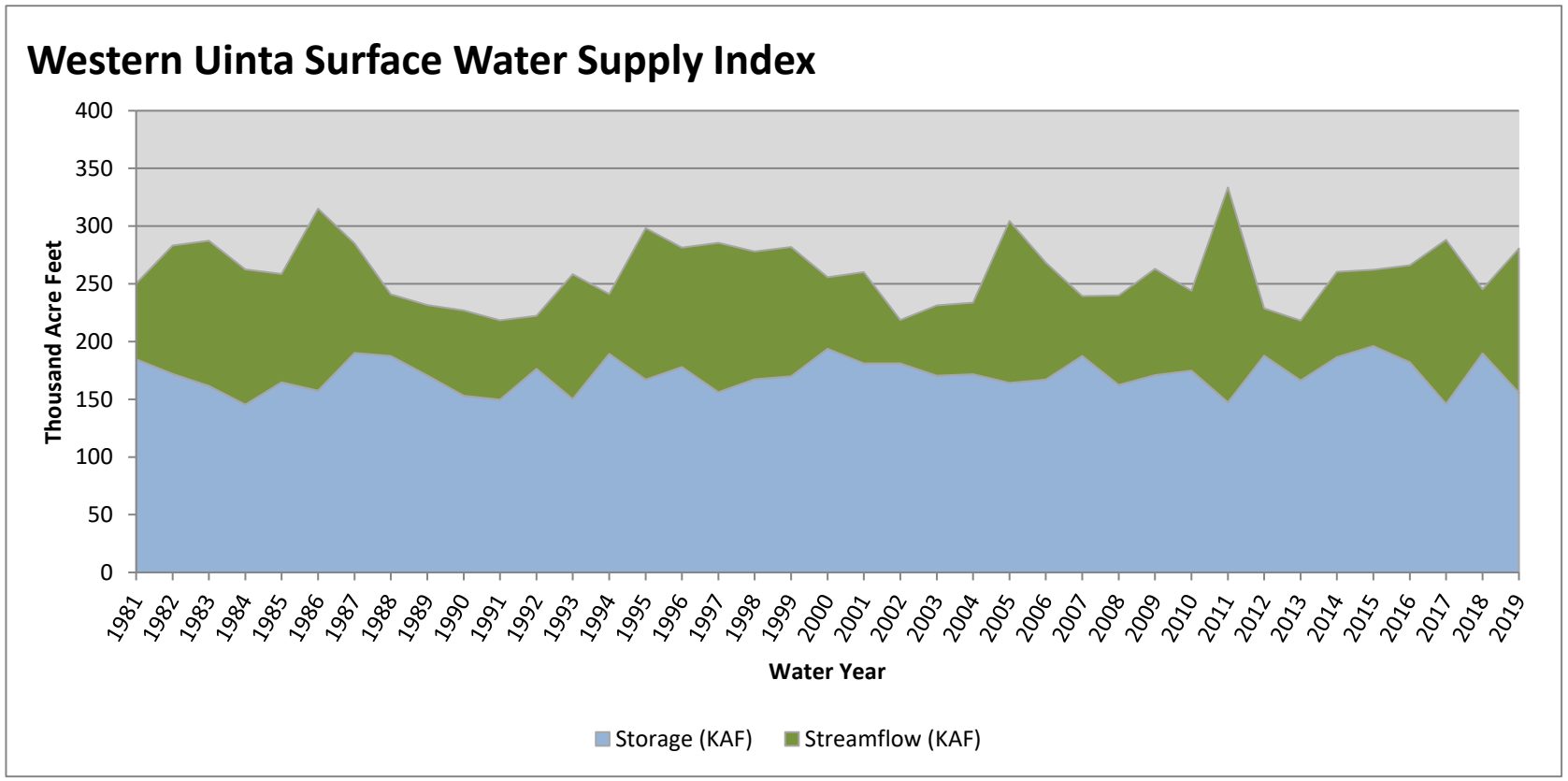


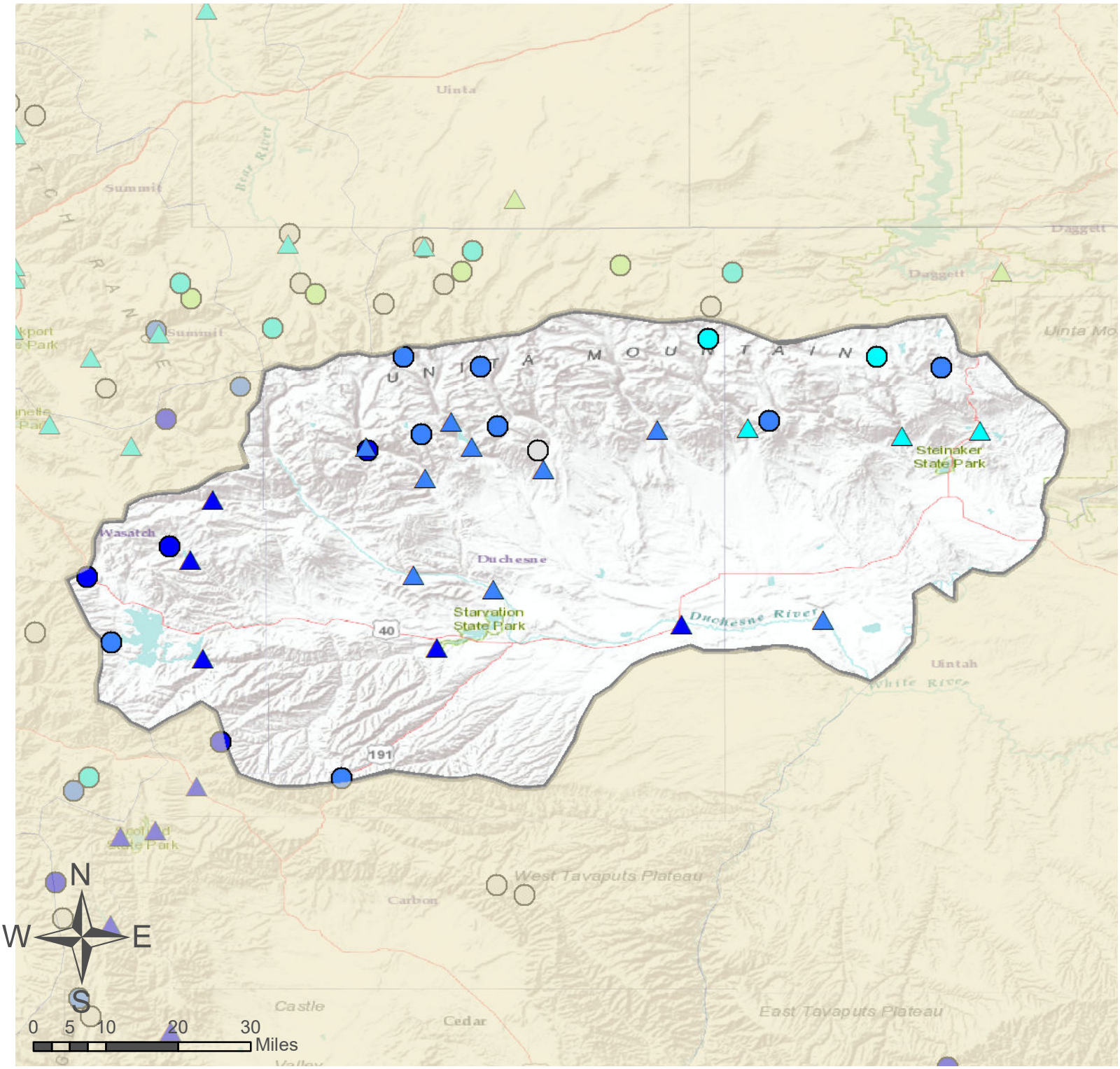
April 1, 2019

Surface Water Supply Index

Basin or Region	Mar EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Western Uinta	**155.56**	**125.00**	**280.56**	**70**	**1.67**	**06, 98, 96, 99**

*EOM, end of month; #SWSI, Surface Water Supply Index; ^KAF, thousand acre-feet.





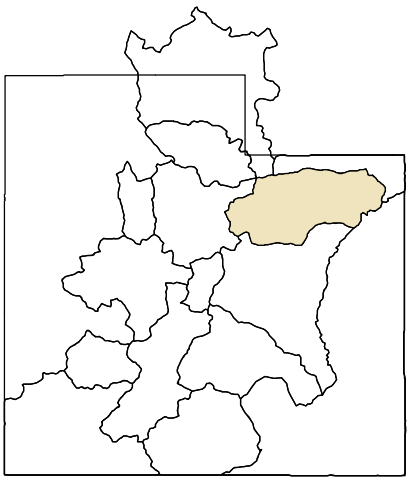
Duchesne River Basin

SNOTEL Site

Forecast Point

% of Normal

- < 50%
- 50 - 69%
- 70 - 89%
- 90 - 109%
- 110 - 129%
- 130 - 149%
- > 150%
- No Normal



As of April 1, 2019:

148% of Normal SWE

135% of Normal Precipitation

144% of Normal Precipitation Last Month

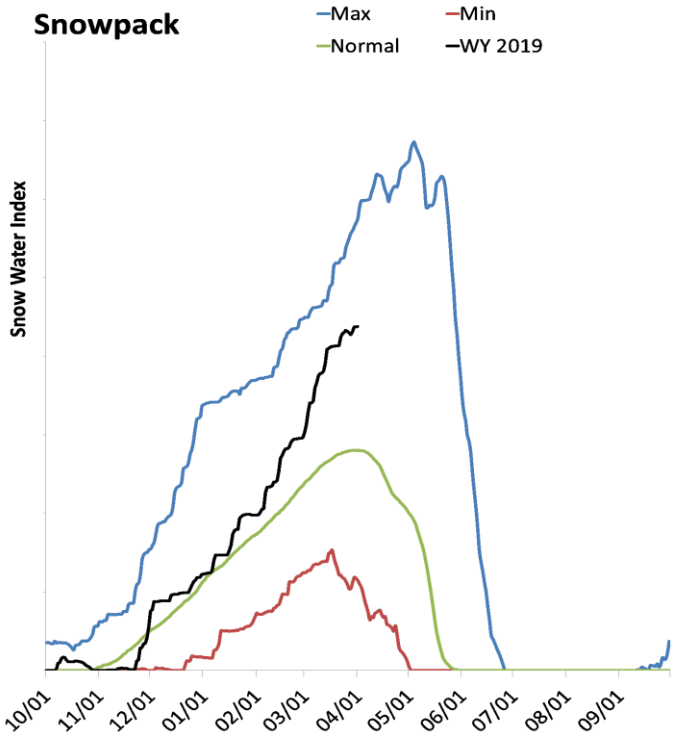
45% Saturation Soil Moisture

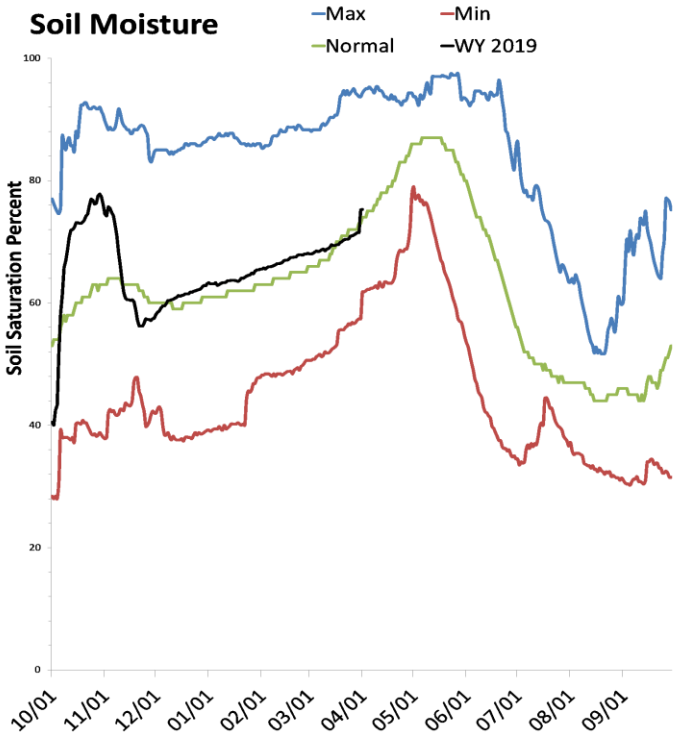
Duchesne River Basin

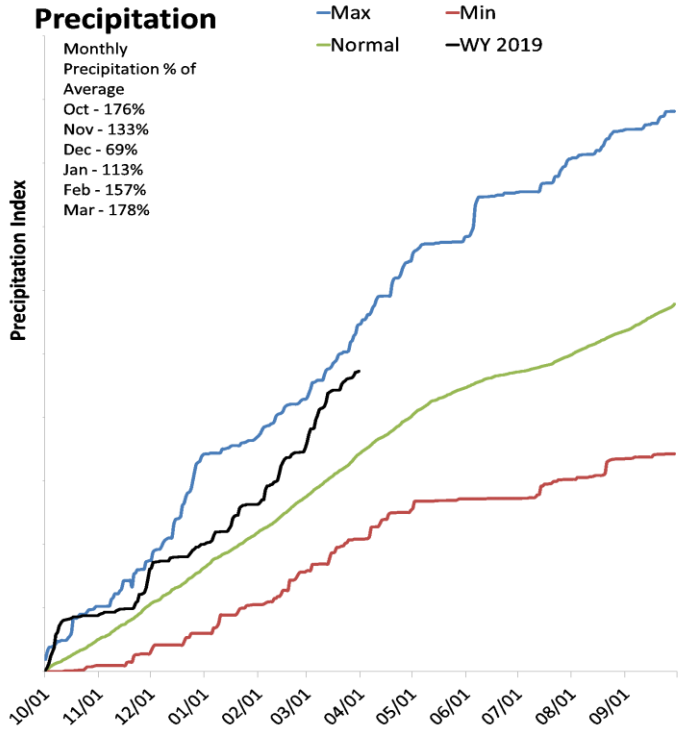
San Pitch River Basin

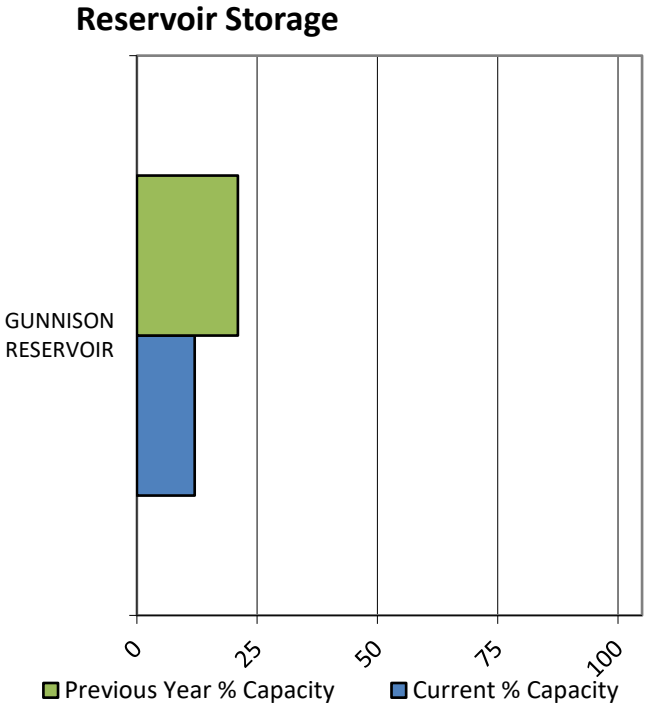
April 1, 2019

Snowpack in the San Pitch River Basin is much above normal at 156% of normal, compared to 62% last year. Precipitation in March was much above average at 176%, which brings the seasonal accumulation (Oct-Mar) to 138% of average. Soil moisture is at 72% compared to 63% last year. Reservoir storage is at 12% of capacity, compared to 21% last year. The forecast streamflow volume for Manti Creek is 132% of average. The surface water supply index is 38% for the San Pitch.









SNOTEL Data

Data Current as of: 4/3/2019 3:30:53 PM

San Pitch River
Streamflow Forecasts - April 1, 2019

Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

San Pitch River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Manti Ck bl Dugway Ck nr Manti								
	APR-JUL	15.8	19.4	22	132%	25	29	16.7
Sevier R nr Gunnison								
	APR-JUL	194	220	240	242%	260	285	99

1) 90% and 10% exceedance probabilities are actually 95% and 5%
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
3) Median value used in place of average

Reservoir Storage End of March, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Gunnison Reservoir	2.5	4.4	14.7	20.3
Basin-wide Total	2.5	4.4	14.7	20.3
# of reservoirs	1	1	1	1

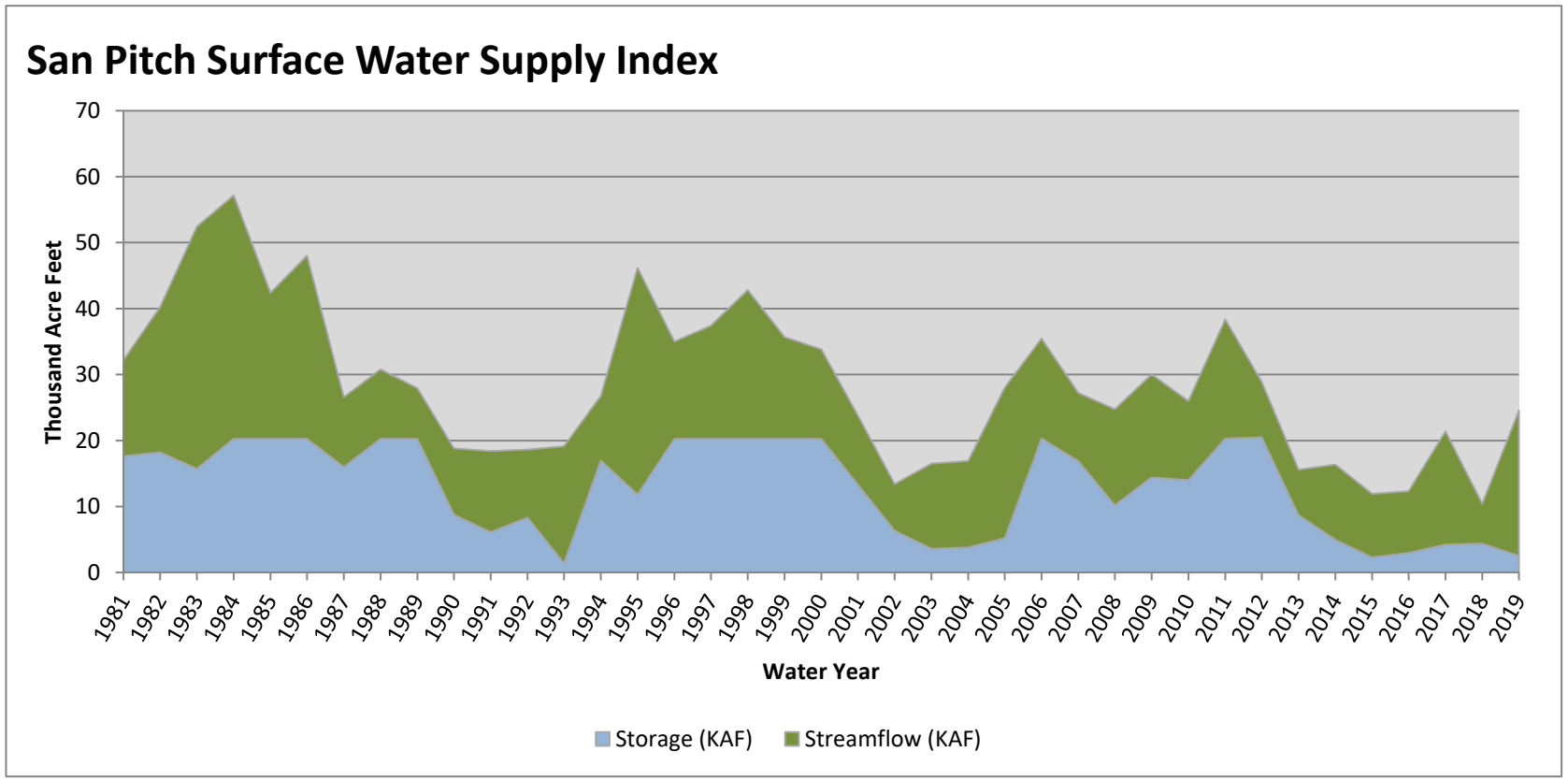
Watershed Snowpack Analysis April 1, 2019	# of Sites	% Median	Last Year % Median
Upper San Pitch	3	135%	59%
Lower San Pitch	7	148%	64%

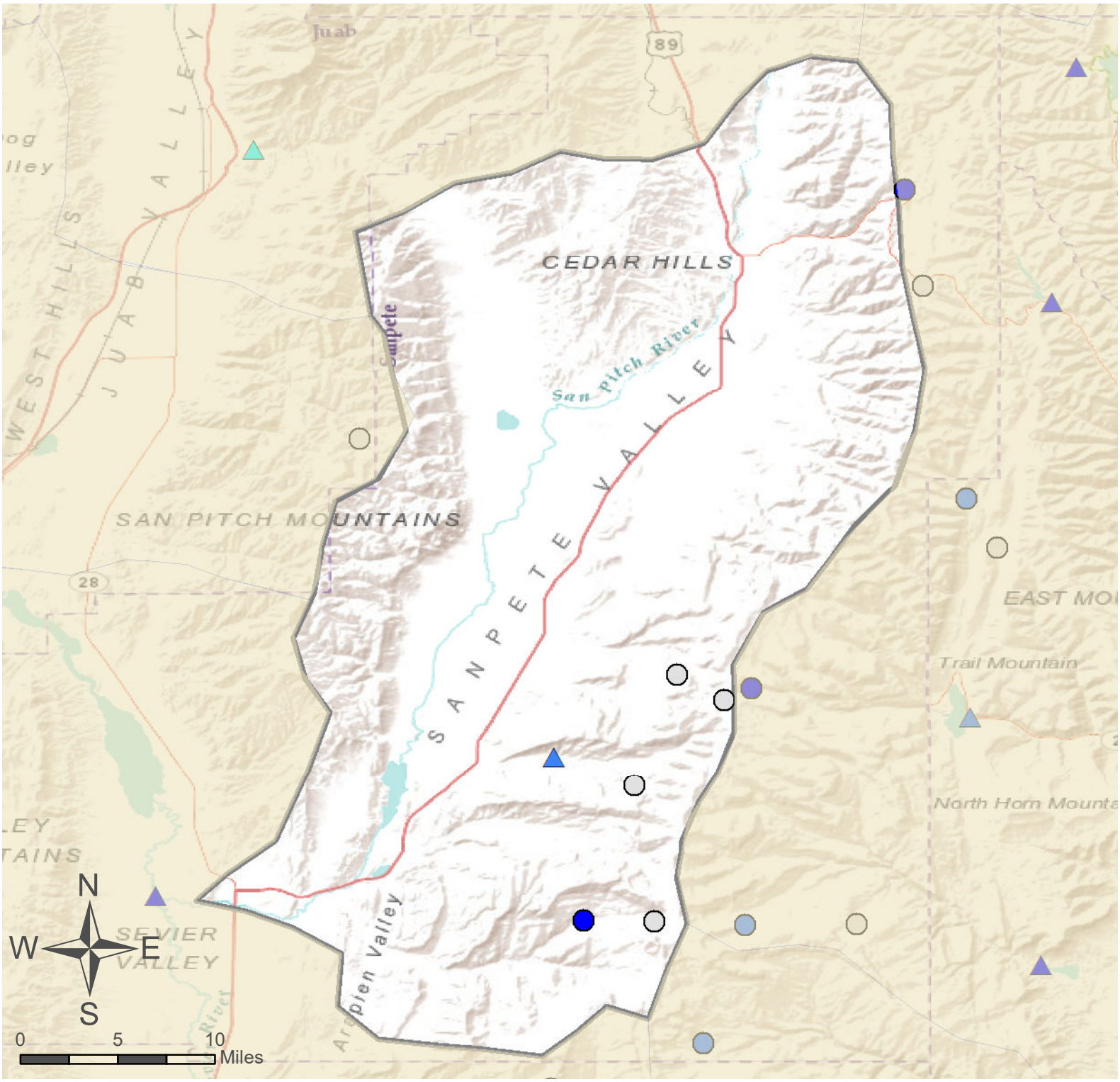
April 1, 2019

Surface Water Supply Index

Basin or Region	Mar EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
San Pitch	**2.53**	**22.00**	**24.53**	**38**	**-1.04**	**17, 01, 08, 10**

*EOM, end of month; #SWSI, Surface Water Supply Index; ^KAF, thousand acre-feet.





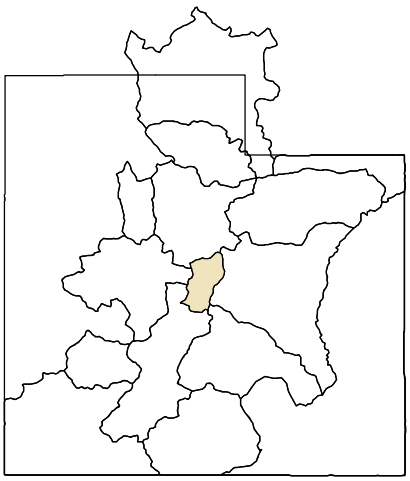
San Pitch River Basin

SNOTEL Site

Forecast Point

% of Normal

- < 50%
- 50 - 69%
- 70 - 89%
- 90 - 109%
- 110 - 129%
- 130 - 149%
- > 150%
- No Normal



As of April 1, 2019:

156% of Normal SWE

138% of Normal Precipitation

176% of Normal Precipitation Last Month

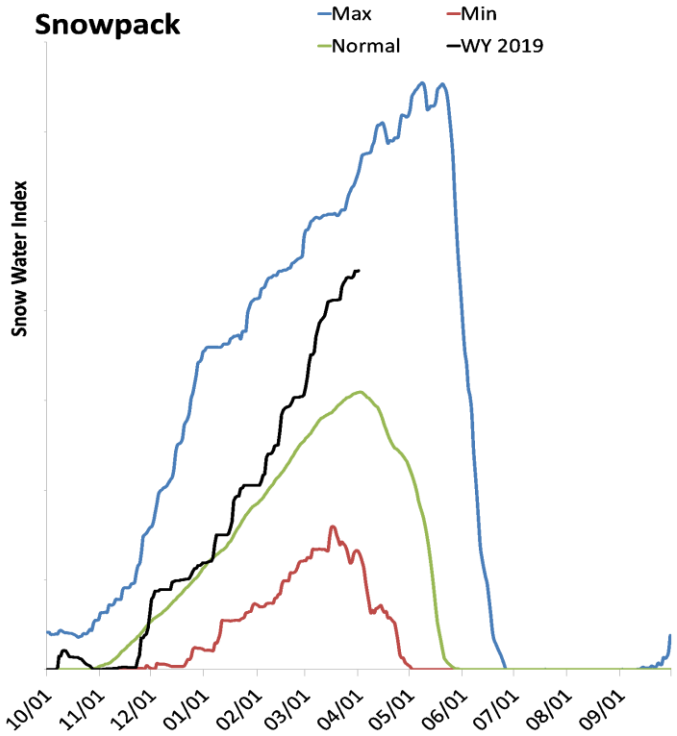
72% Saturation Soil Moisture

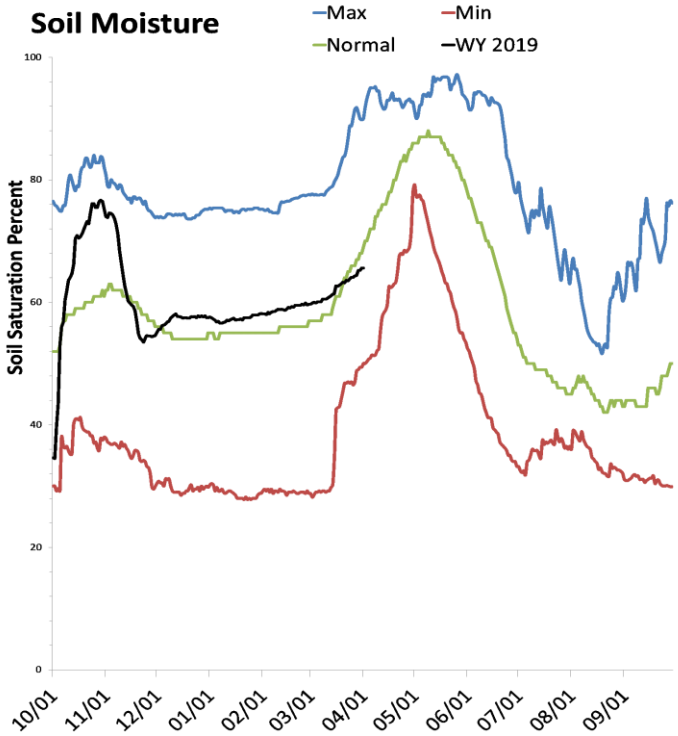
San Pitch River Basin

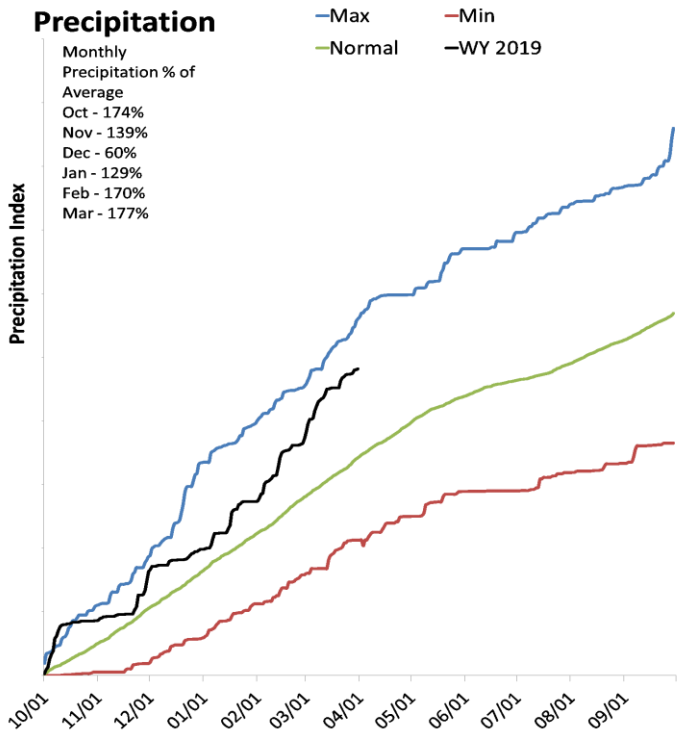
Price & San Rafael Basins

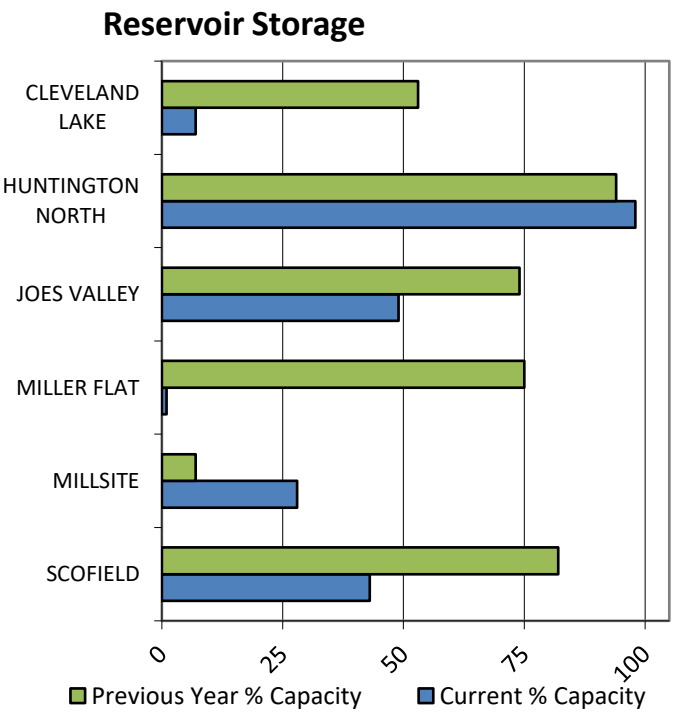
April 1, 2019

Snowpack in the Price & San Rafael Basins is much above normal at 144% of normal, compared to 58% last year. Precipitation in March was much above average at 176%, which brings the seasonal accumulation (Oct-Mar) to 141% of average. Soil moisture is at 66% compared to 53% last year. Reservoir storage is at 45% of capacity, compared to 71% last year. Forecast streamflow volumes range from 117% to 194% of average. The surface water supply index is 85% for the Price River, 75% for Joe's Valley, 83% for Ferron Creek.









SNOTEL Data

Data Current as of: 4/3/2019 3:30:21 PM

Price San Rafael Rivers
Streamflow Forecasts - April 1, 2019

Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Price San Rafael Rivers	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Fish Ck ab Reservoir nr Scofield	APR-JUL	36	44	50	167%	56	66	30
Price R nr Scofield Reservoir[2]	APR-JUL	52	66	76	185%	87	104	41
White R bl Tabbyune Creek	APR-JUL	23	27	30	194%	33	38	15.5
Green R at Green River, UT [2]	APR-JUL	2350	2980	3450	117%	3960	4770	2960
Electric Lake Inflow [2]	APR-JUL	17.2	21	24	180%	28	33	13.3
Huntington Ck nr Huntington [2]	APR-JUL	56	65	72	180%	79	90	40
Joes Valley Reservoir Inflow[2]	APR-JUL	58	71	80	143%	90	106	56
Ferron Ck (Upper Station) nr Ferron	APR-JUL	45	52	57	150%	62	70	38

1) 90% and 10% exceedance probabilities are actually 95% and 5%
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
3) Median value used in place of average

Reservoir Storage End of March, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Joes Valley Reservoir	30.0	45.9	40.0	61.6
Millsite	4.7	1.2	10.4	16.7
Huntington North Reservoir	4.1	4.0	3.8	4.2
Cleveland Lake	0.4	2.9		5.4
Miller Flat Reservoir	0.1	3.9		5.2
Scofield Reservoir	28.6	53.7	30.7	65.8
Basin-wide Total	67.4	104.7	84.9	148.3
# of reservoirs	4	4	4	4

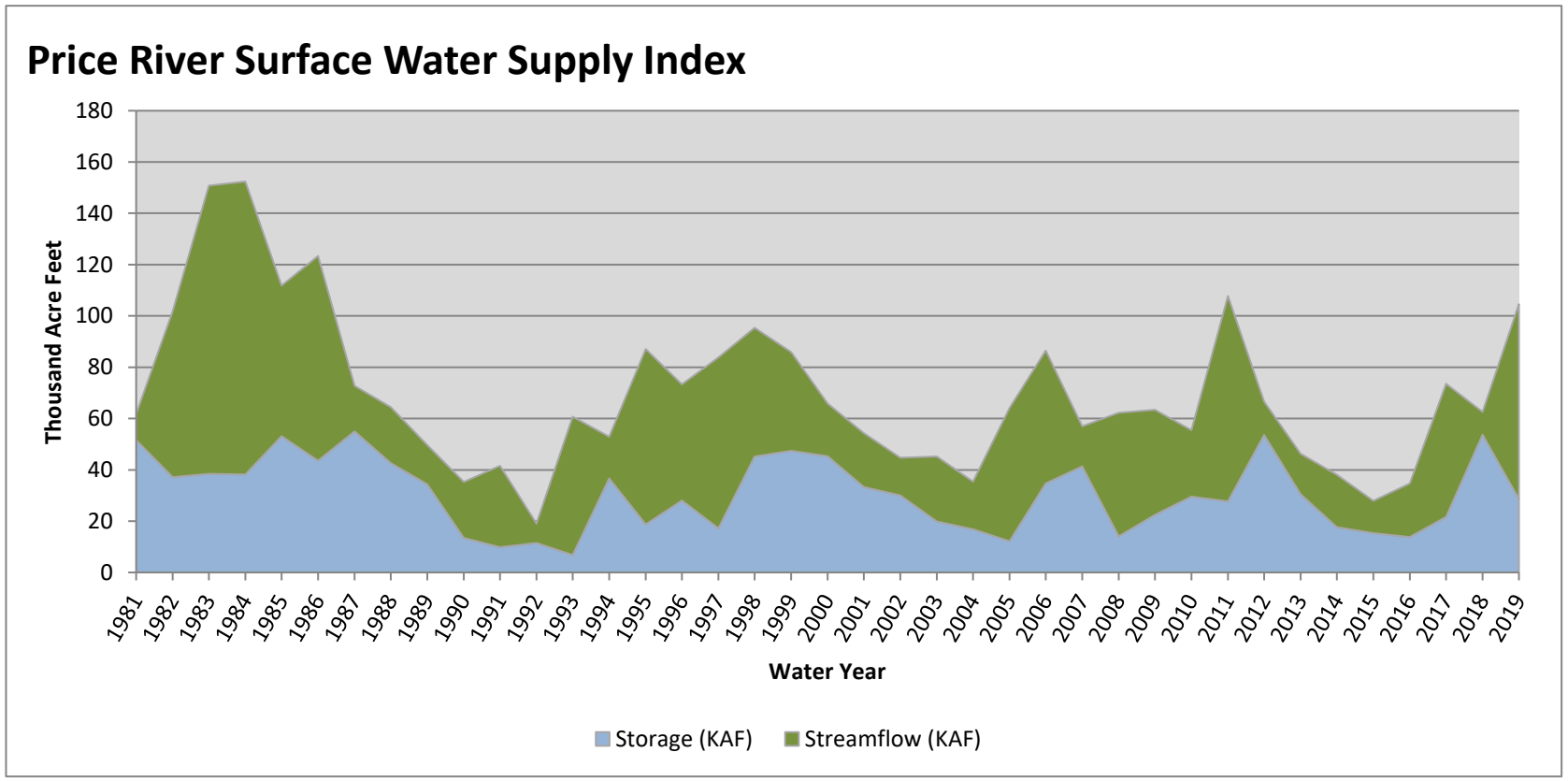
Watershed Snowpack Analysis April 1, 2019	# of Sites	% Median	Last Year % Median
Price River	4	146%	58%
San Rafael	6	137%	62%

April 1, 2019

Surface Water Supply Index

Basin or Region	Mar EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Price River	**28.58**	**76.00**	**104.58**	**85**	**2.92**	**98, 82, 11, 85**

*EOM, end of month; #SWSI, Surface Water Supply Index; ^KAF, thousand acre-feet.

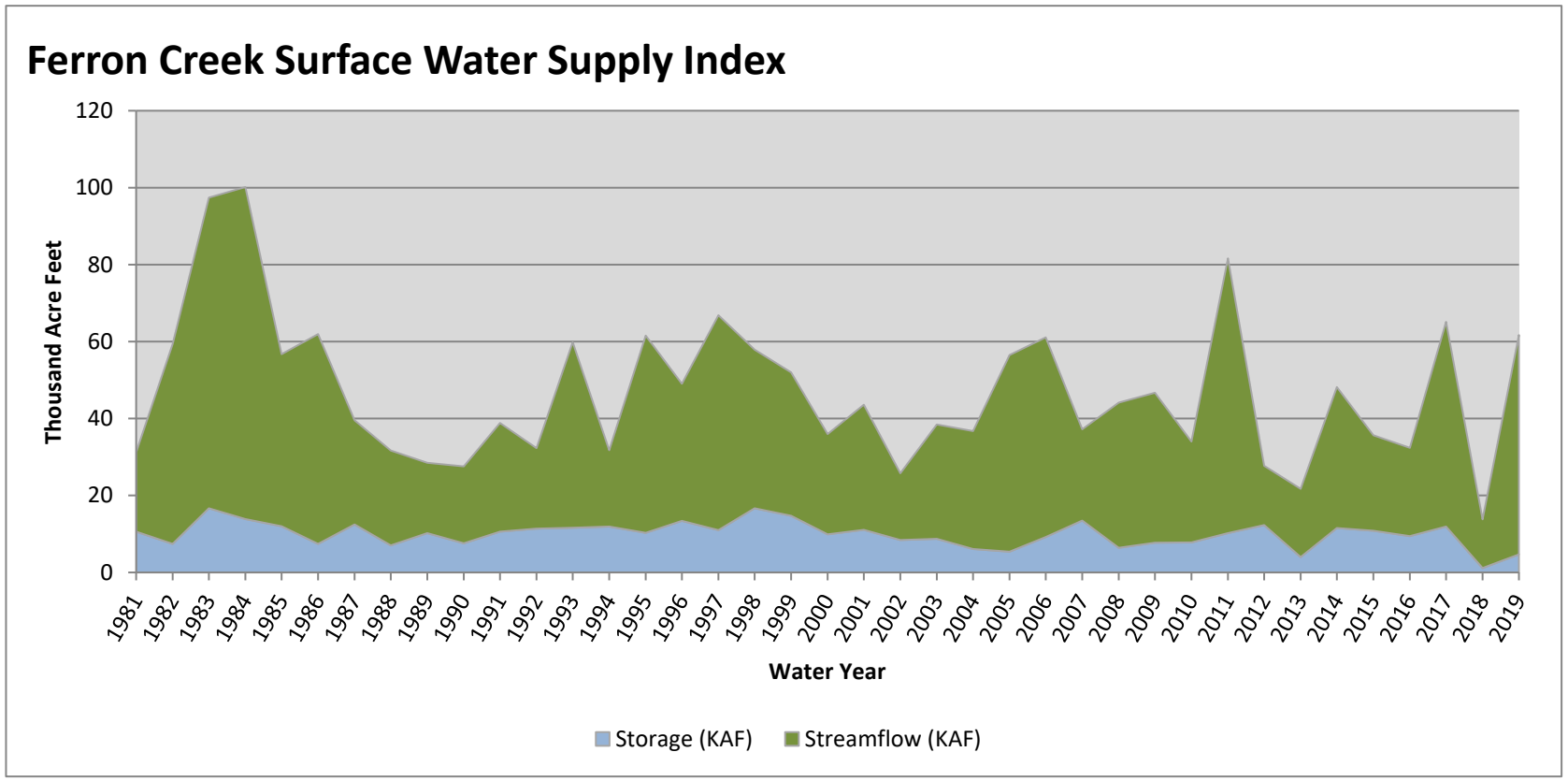


April 1, 2019

Surface Water Supply Index

Basin or Region	Mar EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Ferron Creek	**4.71**	**57.00**	**61.71**	**83**	**2.71**	**06, 95, 86, 17**

*EOM, end of month; #SWSI, Surface Water Supply Index; ^KAF, thousand acre-feet.

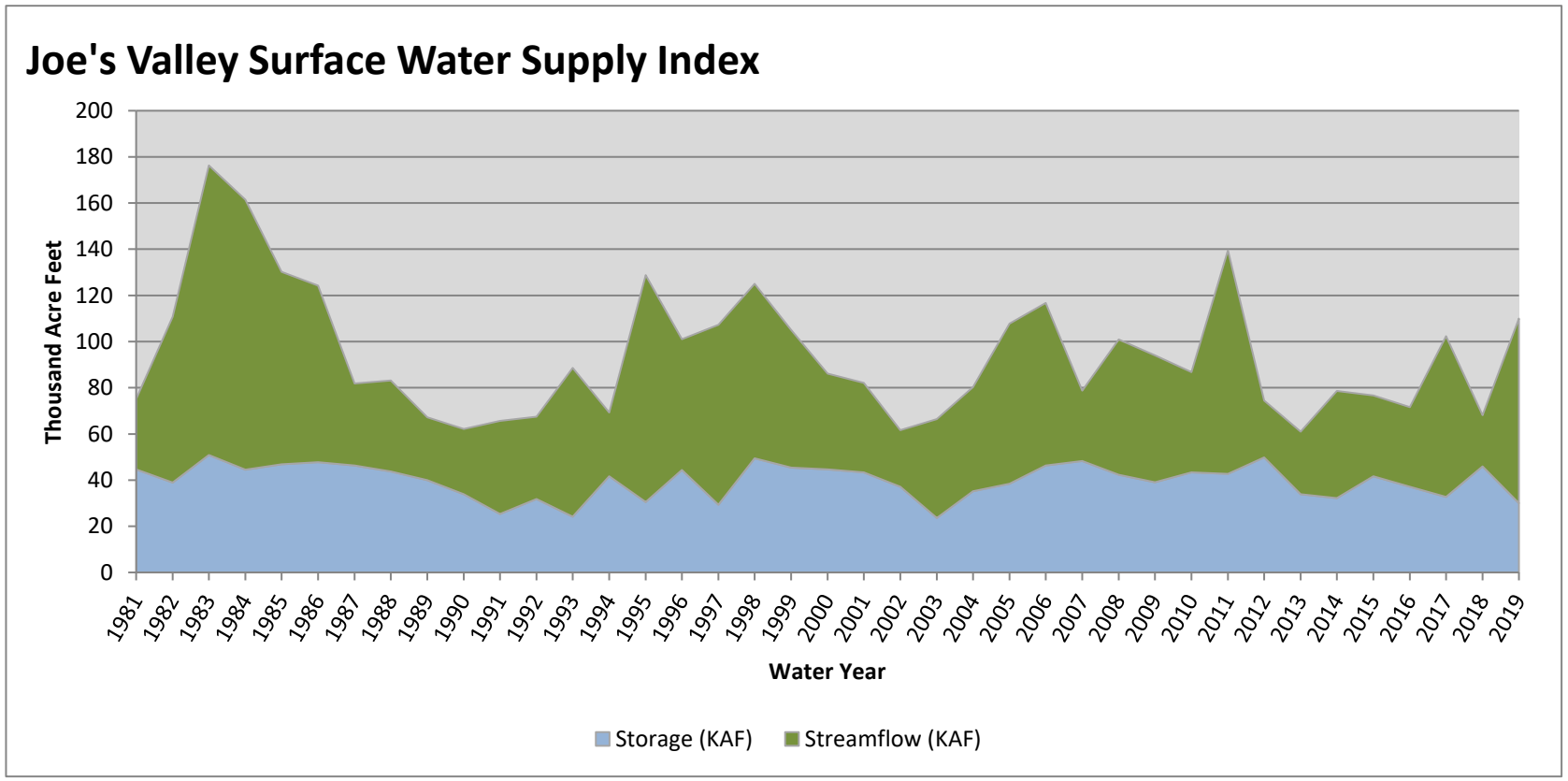


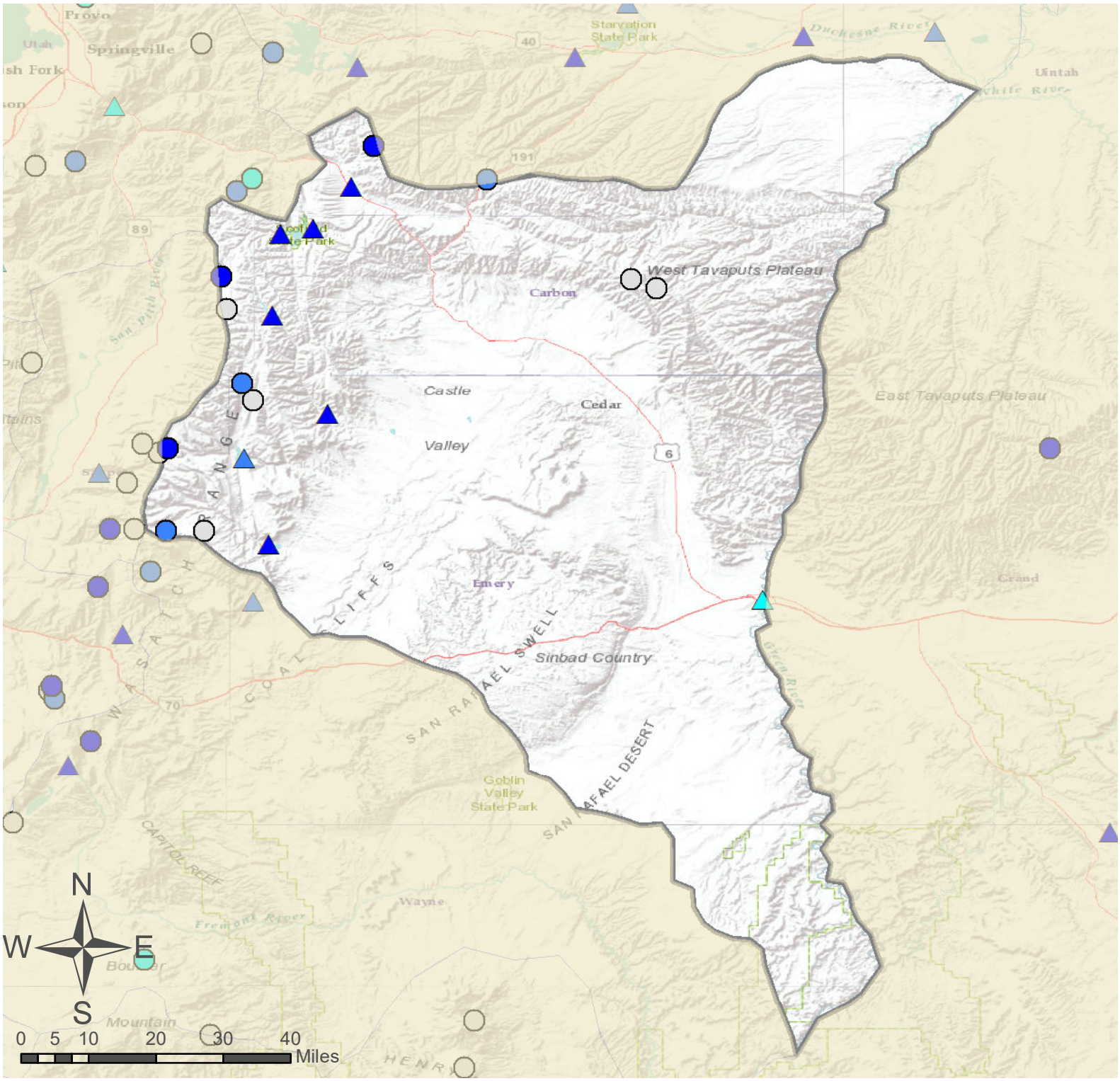
April 1, 2019

Surface Water Supply Index

Basin or Region	Mar EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Joe's Valley	**29.98**	**80.00**	**109.98**	**75**	**2.08**	**97, 05, 82, 06**

*EOM, end of month; #SWSI, Surface Water Supply Index; ^KAF, thousand acre-feet.





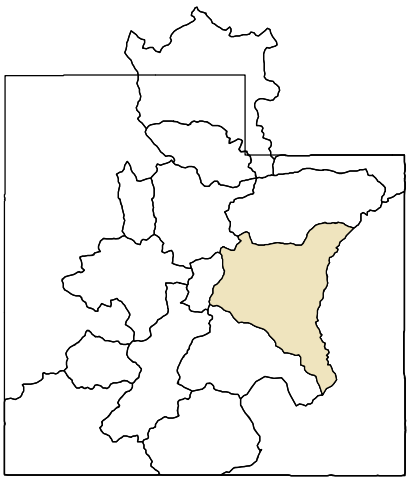
Price & San Rafael Basins

SNOTEL Site

Forecast Point

% of Normal

- < 50%
- 50 - 69%
- 70 - 89%
- 90 - 109%
- 110 - 129%
- 130 - 149%
- > 150%
- No Normal



As of April 1, 2019:

144% of Normal SWE

141% of Normal Precipitation

176% of Normal Precipitation Last Month

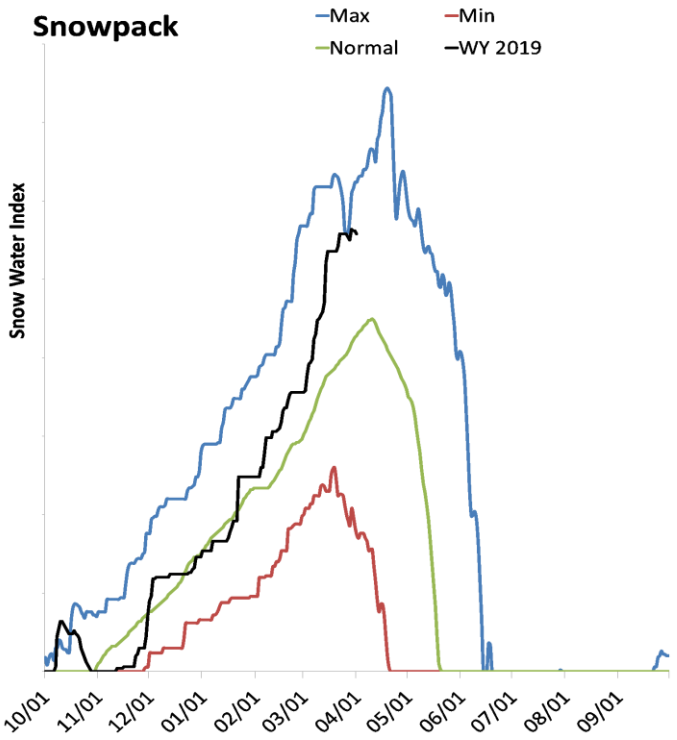
66% Saturation Soil Moisture

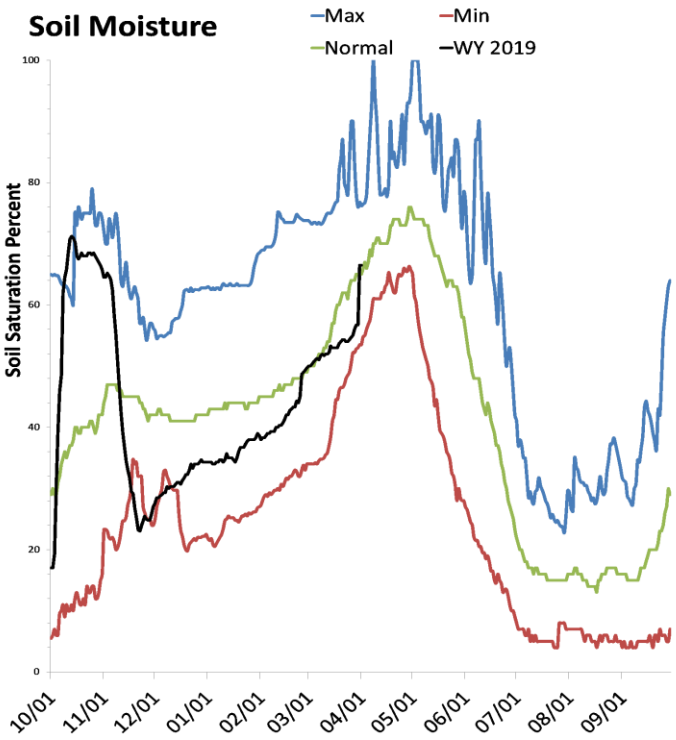
Price & San Rafael Basins

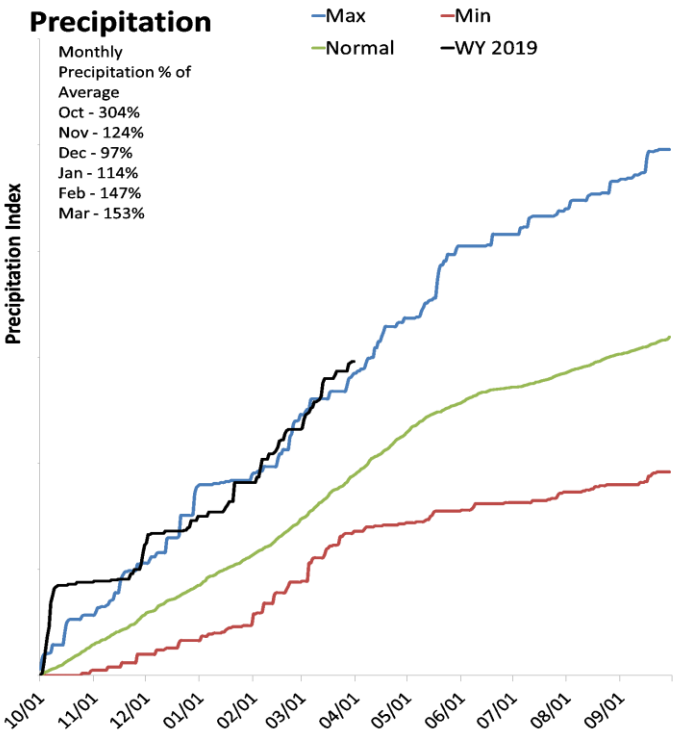
Lower Sevier Basin

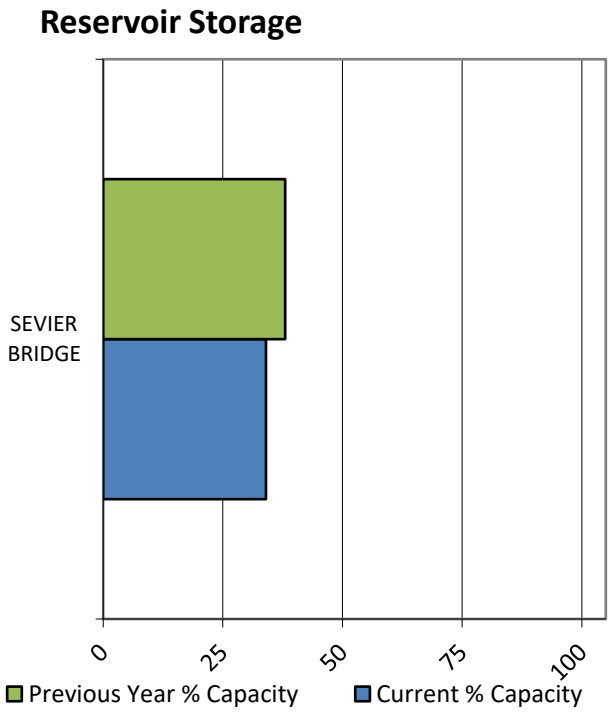
April 1, 2019

Snowpack in the Lower Sevier Basin is above normal at 130% of normal, compared to 67% last year. Precipitation in March was much above average at 152%, which brings the seasonal accumulation (Oct-Mar) to 157% of average. Soil moisture is at 57% compared to 52% last year. Reservoir storage is at 34% of capacity, compared to 38% last year. Forecast streamflow volumes for Sevier R. nr. Gunnison is 242% of average. The surface water supply index is 78% for the Lower Sevier.









SNOTEL Data

Data Current as of: 4/3/2019 3:31:02 PM

Lower Sevier
Streamflow Forecasts - April 1, 2019

Lower Sevier	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Chicken Ck nr Levan								
Sevier R nr Gunnison	APR-JUL	194	220	240	242%	260	285	99
Oak Ck nr Oak City								

1) 90% and 10% exceedance probabilities are actually 95% and 5%
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
3) Median value used in place of average

Reservoir Storage End of March, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Sevier Bridge Reservoir	79.3	88.7	181.9	236.0
Basin-wide Total	79.3	88.7	181.9	236.0
# of reservoirs	1	1	1	1

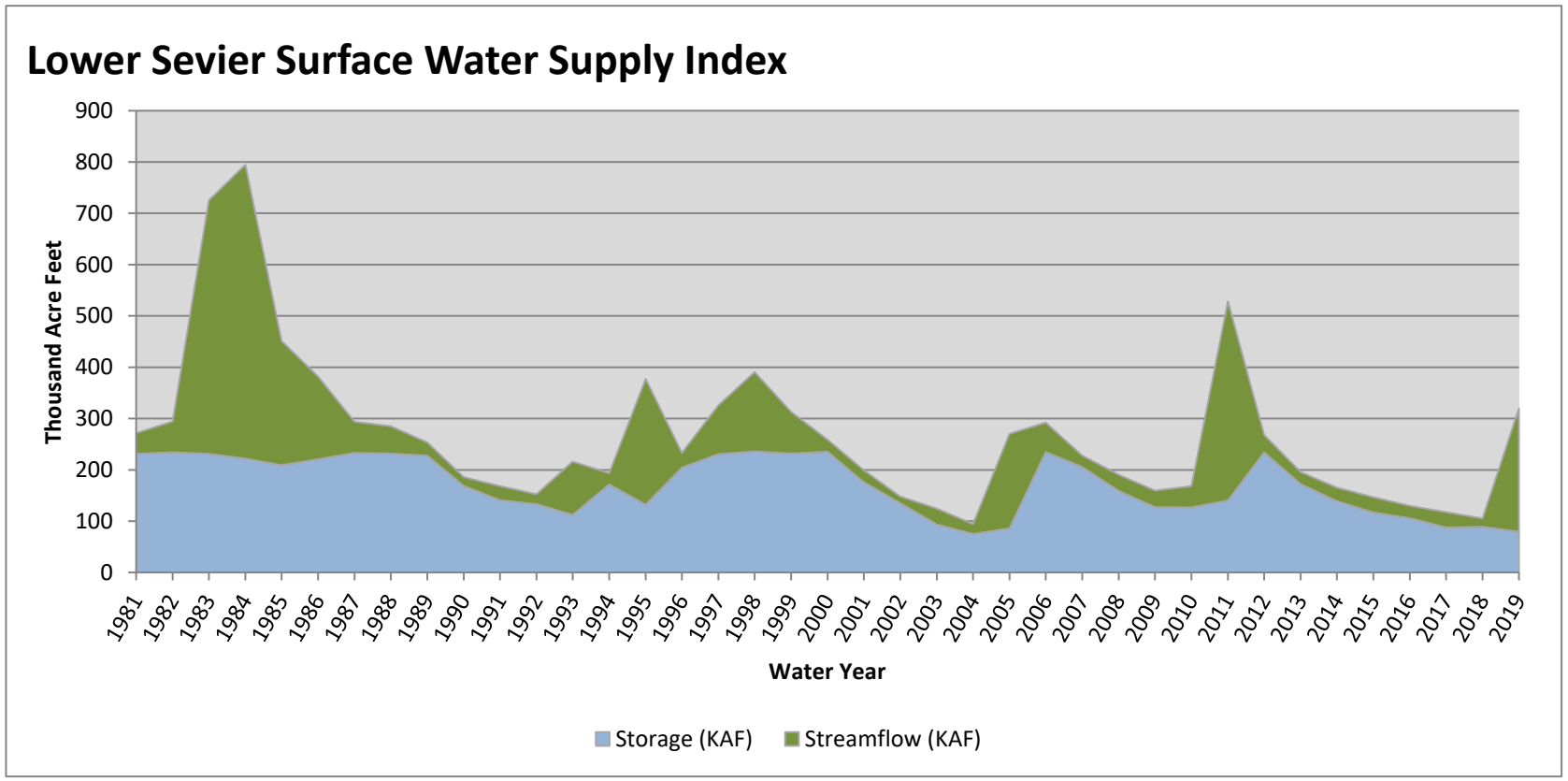
Watershed Snowpack Analysis April 1, 2019	# of Sites	% Median	Last Year % Median
Lower Sevier	1	130%	67%

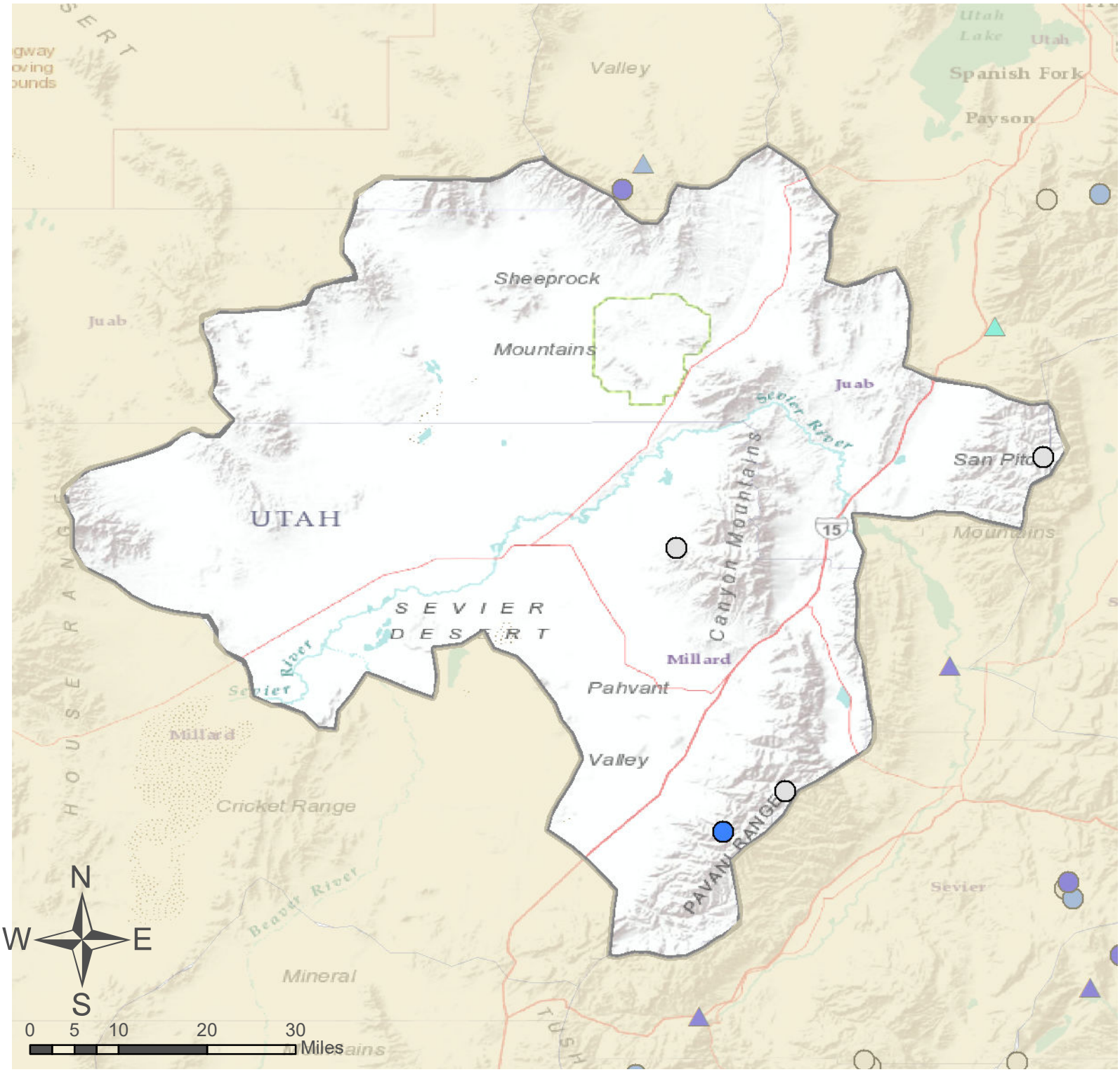
April 1, 2019

Surface Water Supply Index

Basin or Region	Mar EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Lower Sevier	**79.34**	**240.00**	**319.34**	**78**	**2.29**	**82, 99, 97, 95**

*EOM, end of month; #SWSI, Surface Water Supply Index; ^KAF, thousand acre-feet.





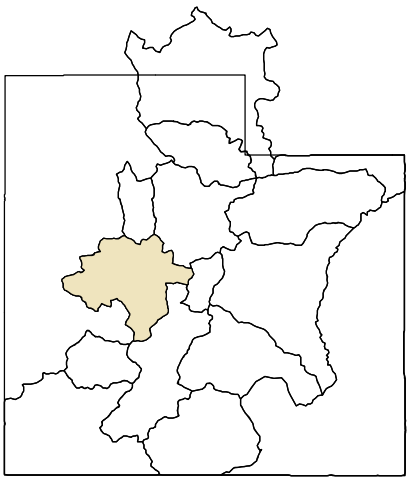
Lower Sevier Basin

SNOTEL Site

Forecast Point

% of Normal

- < 50%
- 50 - 69%
- 70 - 89%
- 90 - 109%
- 110 - 129%
- 130 - 149%
- > 150%
- No Normal



As of April 1, 2019:

130% of Normal SWE

157% of Normal Precipitation

152% of Normal Precipitation Last Month

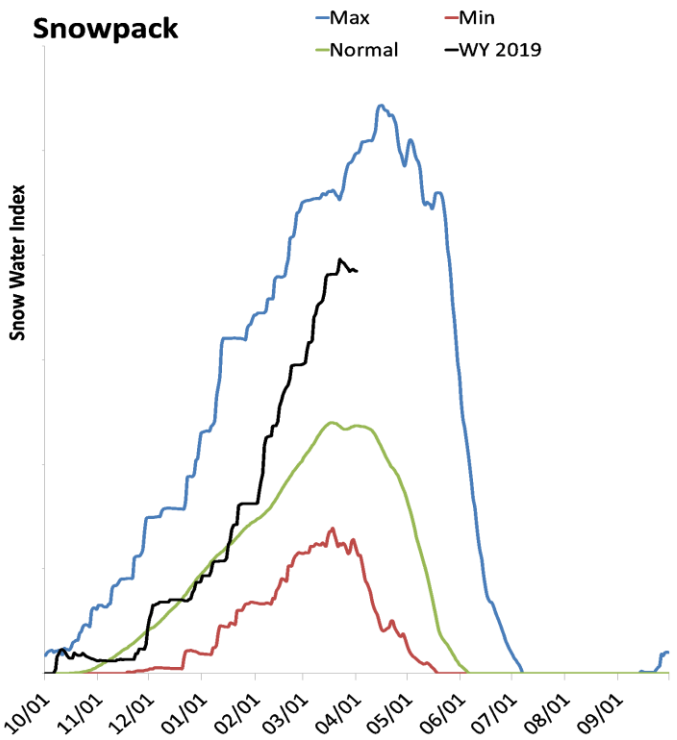
57% Saturation Soil Moisture

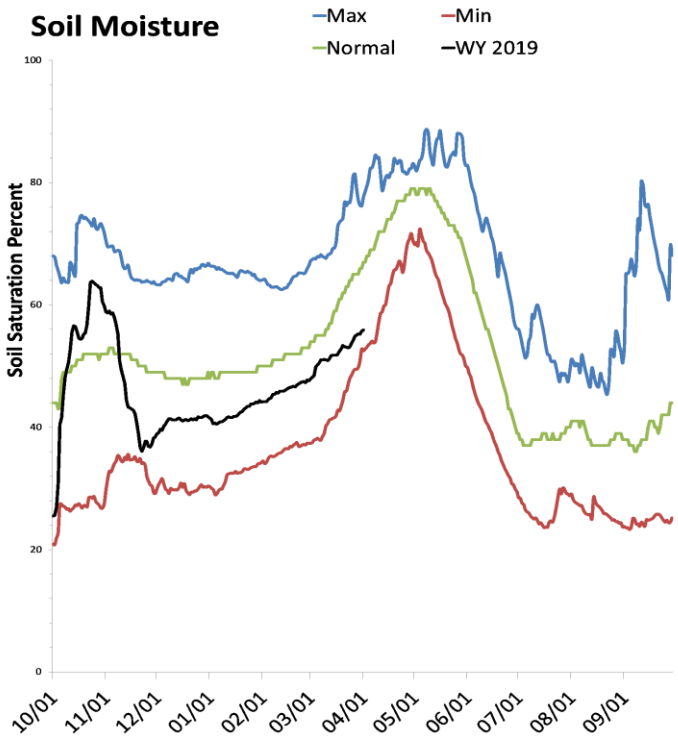
Lower Sevier Basin

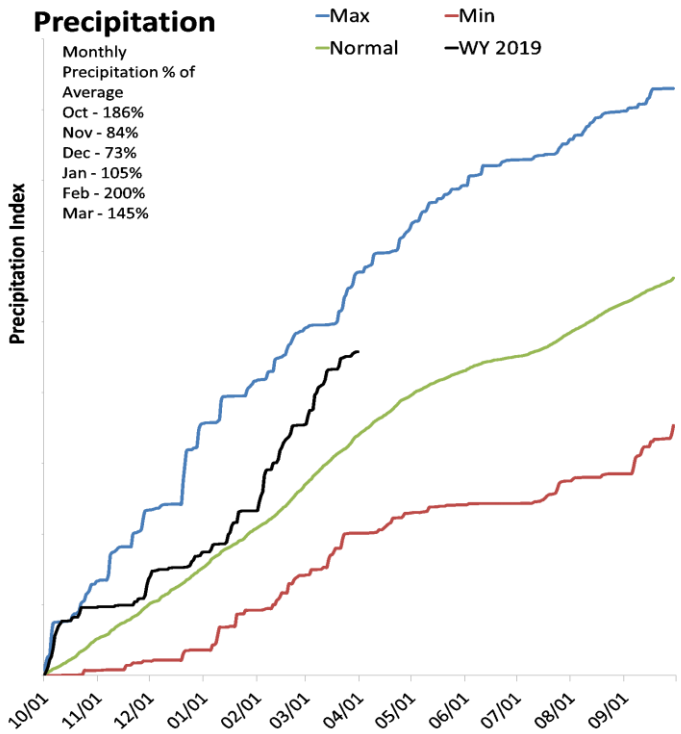
Upper Sevier Basin

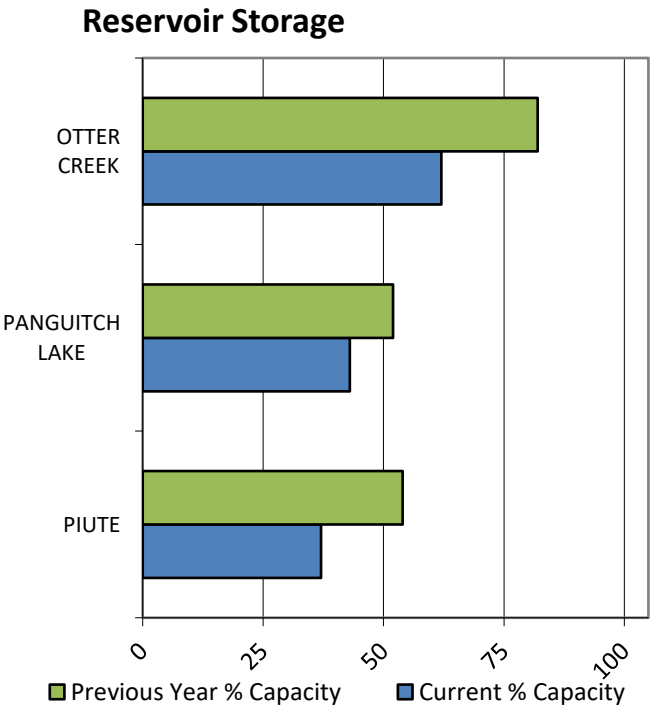
April 1, 2019

Snowpack in the Upper Sevier Basin is much above normal at 162% of normal, compared to 62% last year. Precipitation in March was much above average at 145%, which brings the seasonal accumulation (Oct-Mar) to 135% of average. Soil moisture is at 54% compared to 55% last year. Reservoir storage is at 47% of capacity, compared to 64% last year. Forecast streamflow volumes range from 133% to 233% of average. The surface water supply index is 68% for the Upper Sevier.









SNOTEL Data

Data Current as of: 4/3/2019 3:30:45 PM

Upper Sevier
Streamflow Forecasts - April 1, 2019

Upper Sevier	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Mammoth Ck nr Hatch								
	APR-JUL	4	28	48	178%	68	93	27
Sevier R at Hatch								
	APR-JUL	97	106	112	233%	118	127	48
EF Sevier R nr Kingston								
	APR-JUL	31	42	50	143%	58	69	35
Sevier R nr Kingston								
	APR-JUL	22	35	44	133%	53	66	33
Sevier R bl Piute Dam								
	APR-JUL	78	106	126	191%	146	174	66
Clear Ck ab Diversions nr Sevier								
	APR-JUL	29	34	37	176%	40	45	21
Salina Ck nr Emery								
	APR-JUL	8.2	11.1	13	165%	14.9	17.8	7.9

1) 90% and 10% exceedance probabilities are actually 95% and 5%
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
3) Median value used in place of average

Reservoir Storage End of March, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Piute Reservoir	26.4	38.7	58.2	71.8
Otter Creek Reservoir	32.5	42.9	42.2	52.5
Panguitch Lake	9.7	11.6	14.5	22.3
Basin-wide Total	68.6	93.2	114.9	146.6
# of reservoirs	3	3	3	3

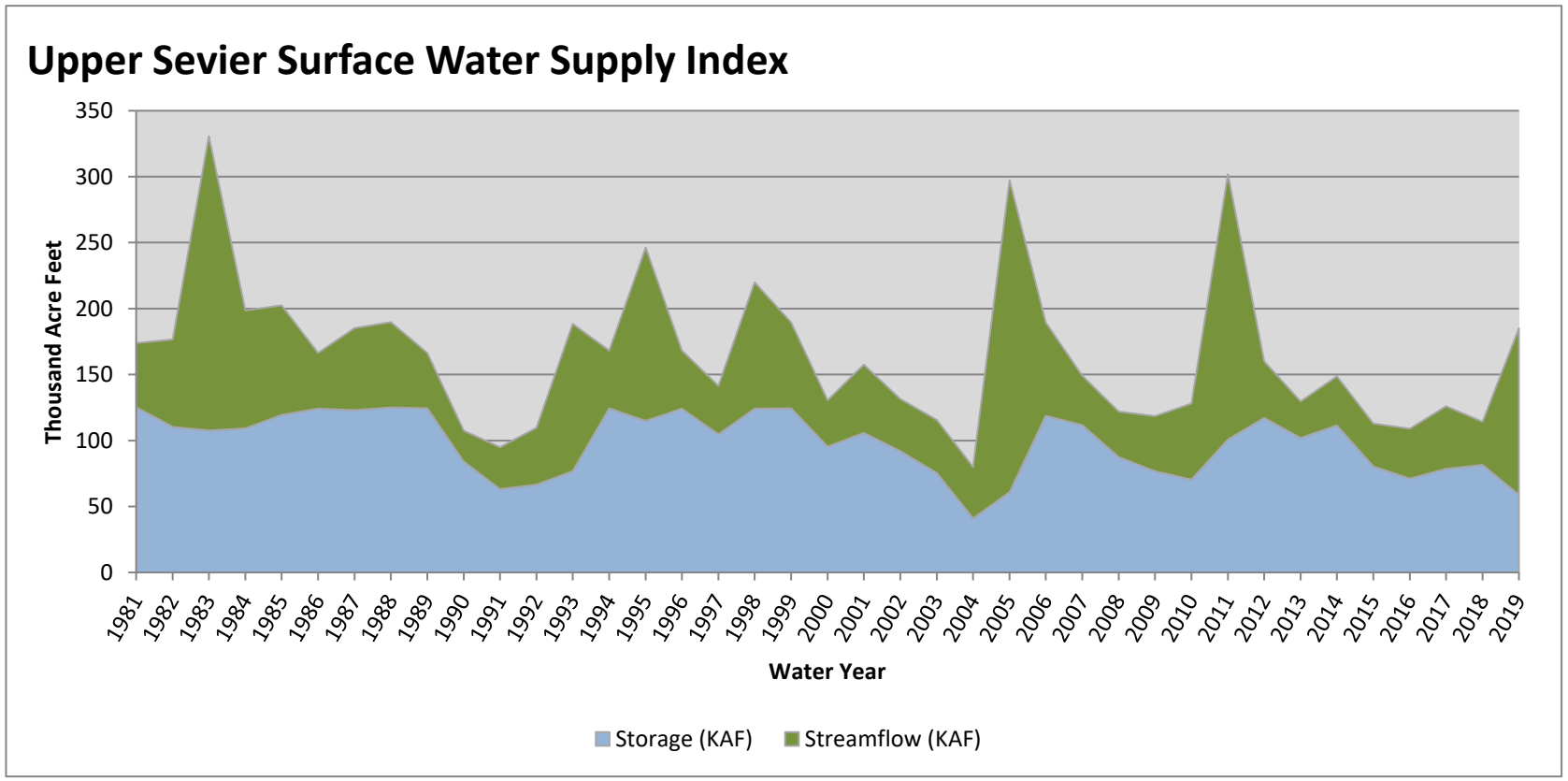
Watershed Snowpack Analysis April 1, 2019	# of Sites	% Median	Last Year % Median
Upper Sevier	12	162%	62%
Middle Sevier	8	146%	66%
East Fork Sevier River	5	210%	38%

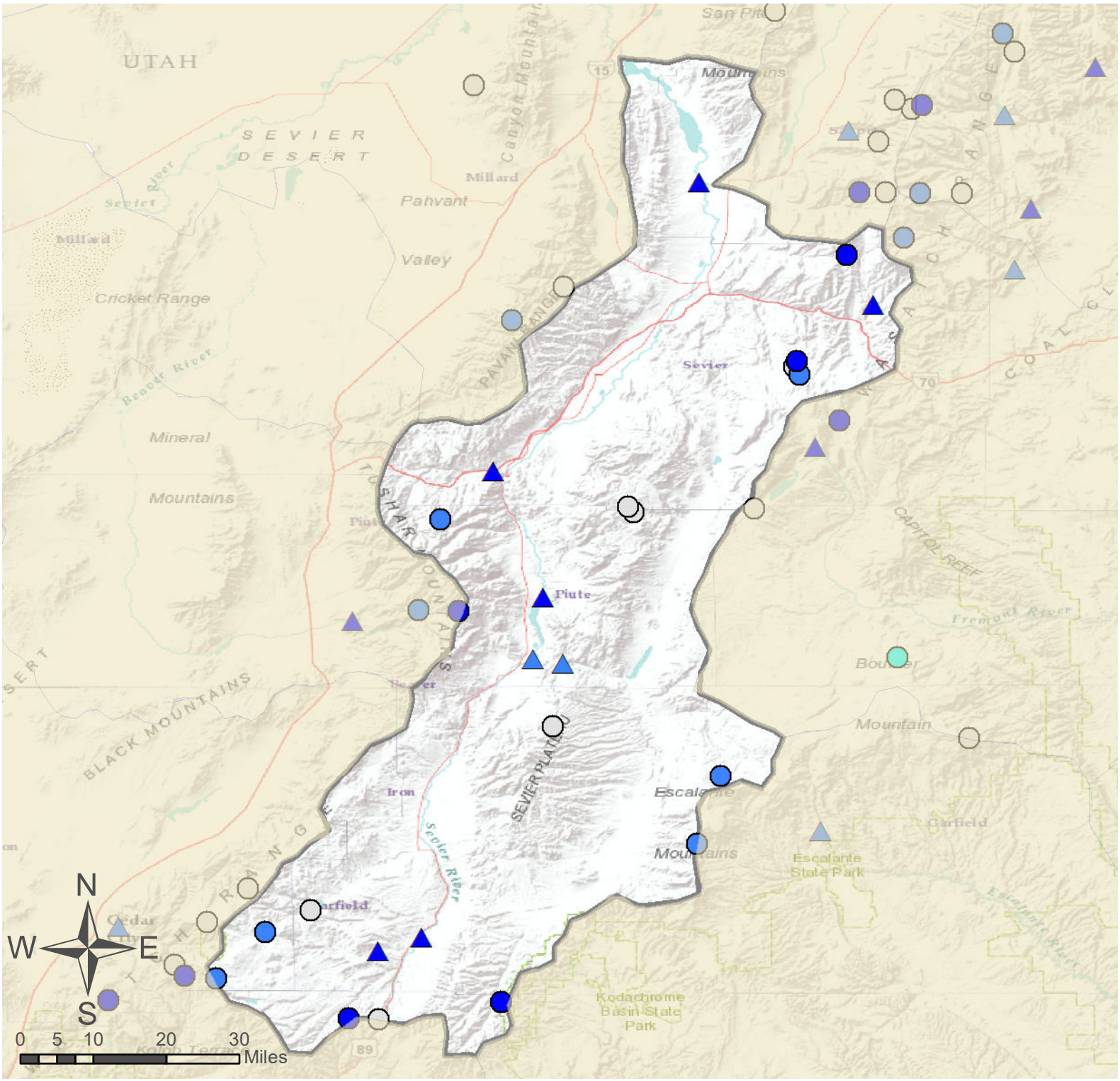
April 1, 2019

Surface Water Supply Index

Basin or Region	Mar EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Upper Sevier	**58.93**	**126.00**	**184.93**	**68**	**1.46**	**81, 82, 87, 93**

*EOM, end of month; #SWSI, Surface Water Supply Index; ^KAF, thousand acre-feet.





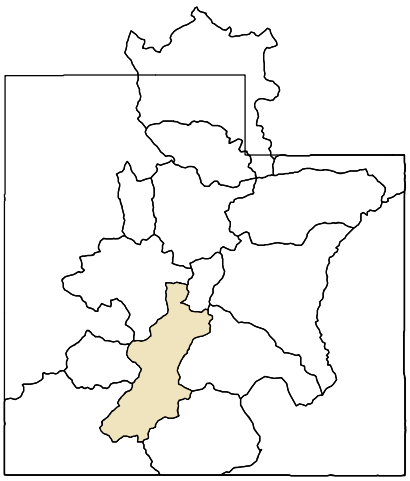
Upper Sevier Basin

SNOTEL Site

Forecast Point

% of Normal

- < 50%
- 50 - 69%
- 70 - 89%
- 90 - 109%
- 110 - 129%
- 130 - 149%
- > 150%
- No Normal



As of April 1, 2019:

162% of Normal SWE

135% of Normal Precipitation

145% of Normal Precipitation Last Month

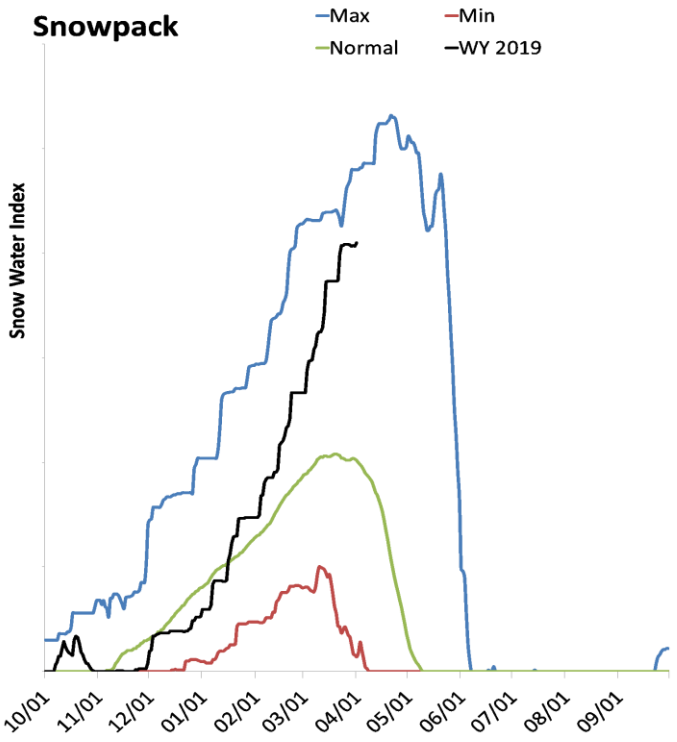
54% Saturation Soil Moisture

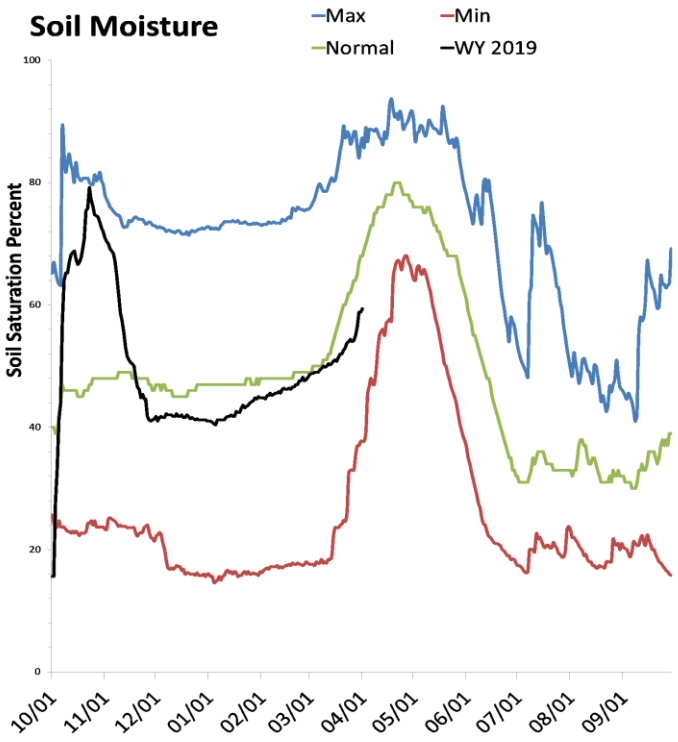
Upper Sevier Basin

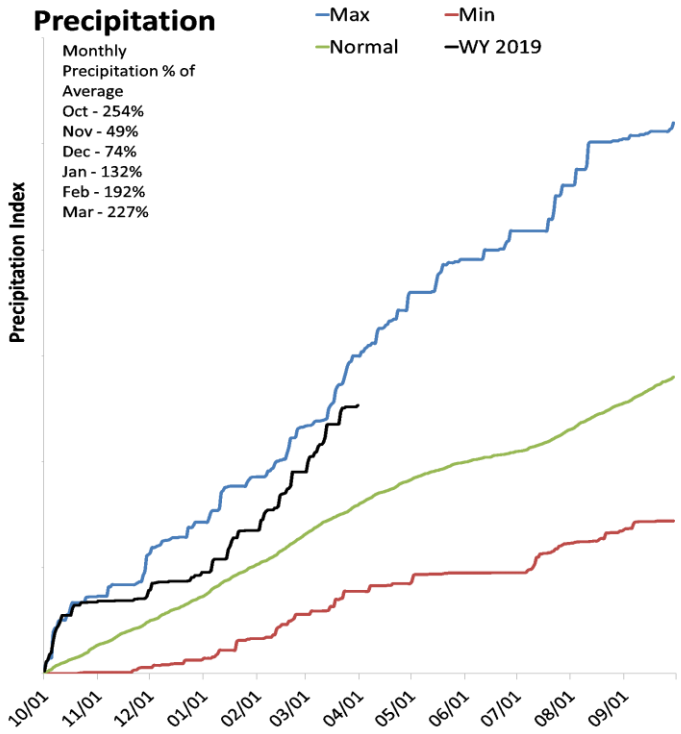
Southeastern Utah

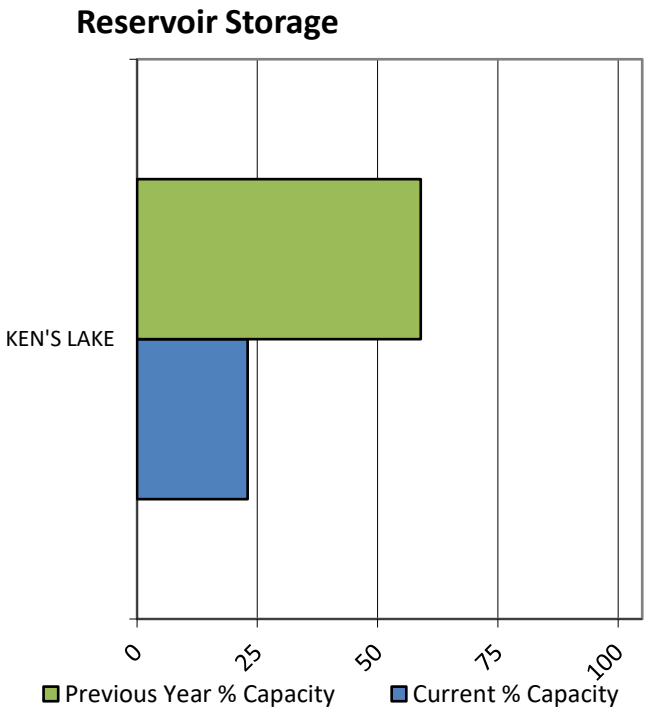
April 1, 2019

Snowpack in the Southeastern Utah is much above normal at 203% of normal, compared to 45% last year. Precipitation in March was much above average at 228%, which brings the seasonal accumulation (Oct-Mar) to 159% of average. Soil moisture is at 59% compared to 45% last year. Reservoir storage is at 23% of capacity, compared to 59% last year. Forecast streamflow volumes range from 145% to 293% of average. The surface water supply index is 94% for Moab.









SNOTEL Data

Data Current as of: 4/3/2019 3:30:37 PM

Southeastern Utah
Streamflow Forecasts - April 1, 2019

Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Southeastern Utah	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Mill Ck at Sheley Tunnel nr Moab								
	APR-JUL	8.1	9.2	10	233%	10.8	11.9	4.3
South Ck ab Resv nr Monticello								
	MAR-JUL	1.68	2.4	3	275%	3.7	4.8	1.09
	APR-JUL	1.62	2.3	2.9	293%	3.6	4.7	0.99
Colorado R nr Cisco [2]								
	APR-JUL	4990	5760	6320	148%	6900	7800	4280
San Juan R near Bluff [2]								
	APR-JUL	1160	1410	1600	145%	1800	2120	1100

1) 90% and 10% exceedance probabilities are actually 95% and 5%
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
3) Median value used in place of average

Reservoir Storage End of March, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Ken's Lake	0.5	1.4	1.3	2.3
Basin-wide Total	0.5	1.4	1.3	2.3
# of reservoirs	1	1	1	1

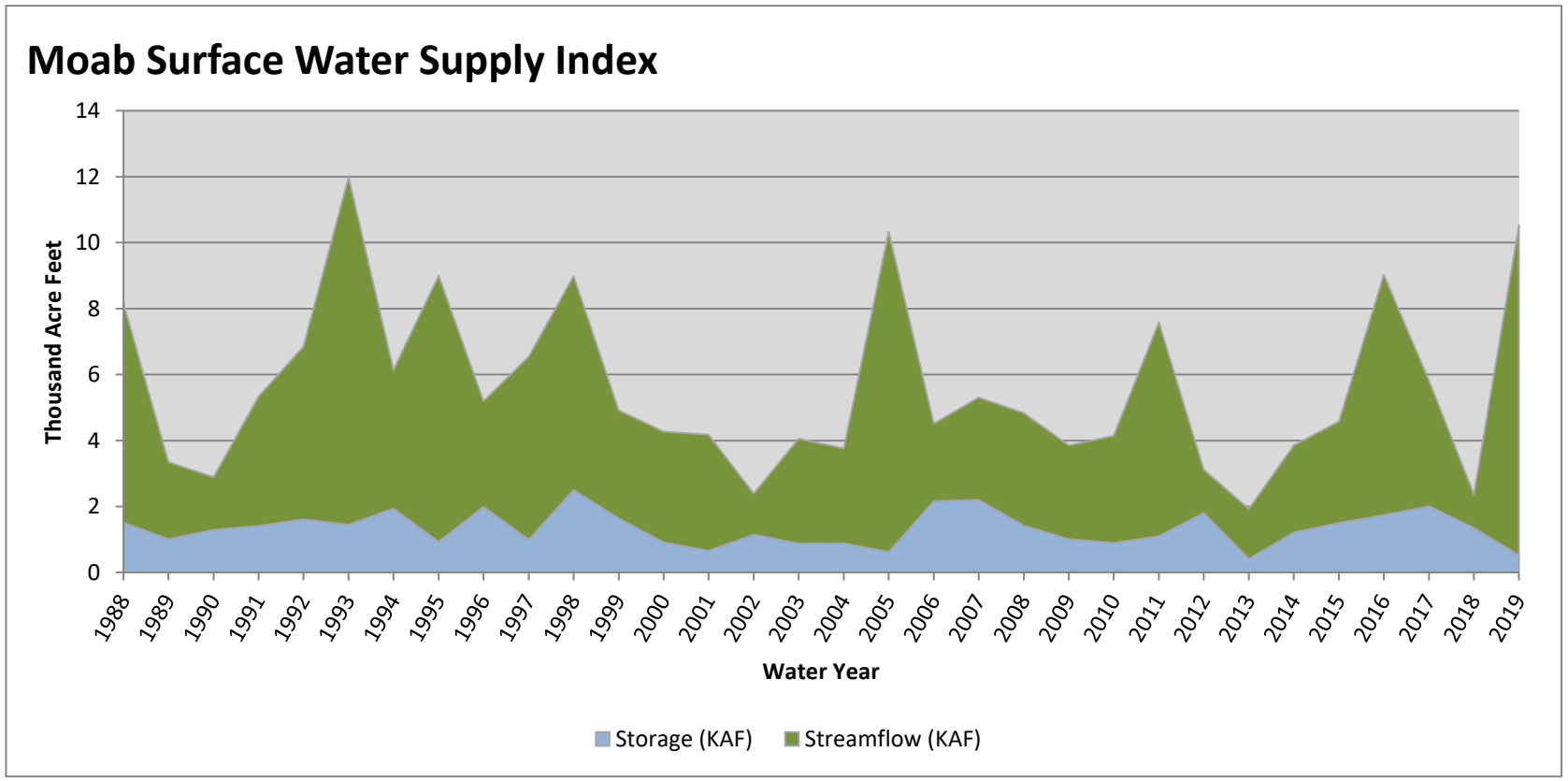
Watershed Snowpack Analysis April 1, 2019	# of Sites	% Median	Last Year % Median
Lasal Mountains	2	187%	68%
Lower San Juan	2	209%	28%
Lower Green	2	166%	49%
Henry Mountains	0		

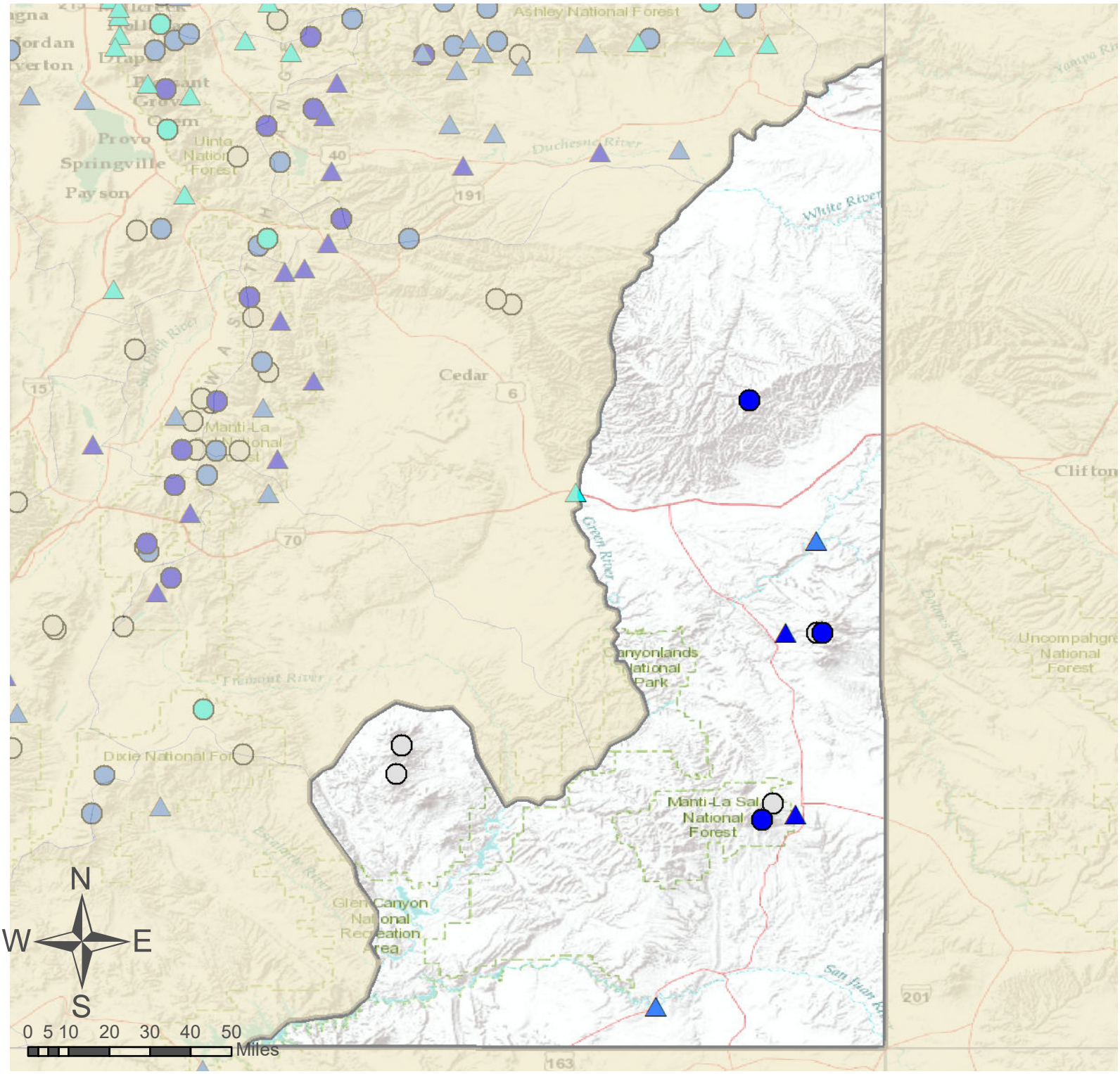
April 1, 2019

Surface Water Supply Index

Basin or Region	Mar EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Moab	**0.52**	**10.00**	**10.52**	**94**	**3.66**	**93, 05, 16, 95**

*EOM, end of month; #SWSI, Surface Water Supply Index; ^KAF, thousand acre-feet.





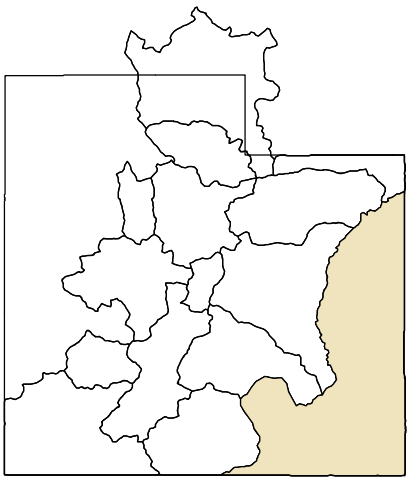
Southeastern Utah

SNOTEL Site

Forecast Point

% of Normal

- < 50%
- 50 - 69%
- 70 - 89%
- 90 - 109%
- 110 - 129%
- 130 - 149%
- > 150%
- No Normal



As of April 1, 2019:

203% of Normal SWE

159% of Normal Precipitation

228% of Normal Precipitation Last Month

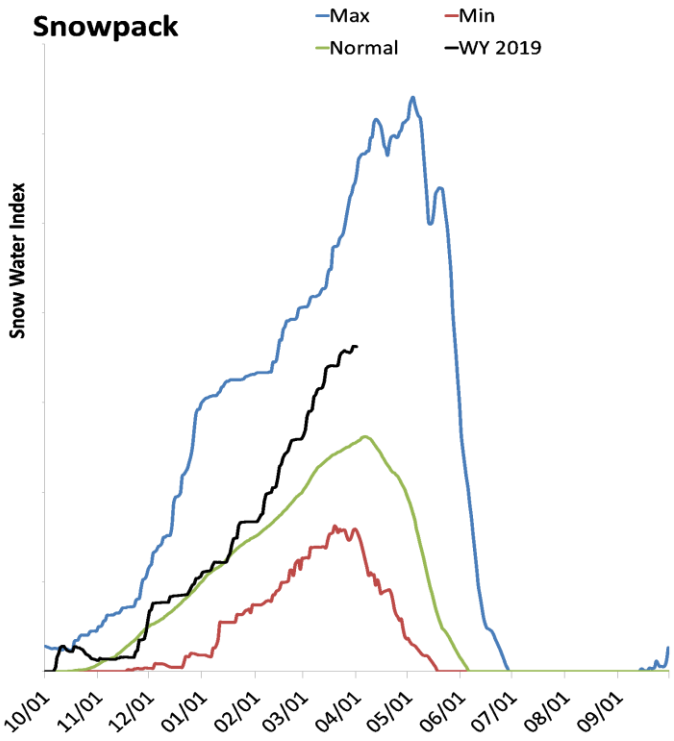
59% Saturation Soil Moisture

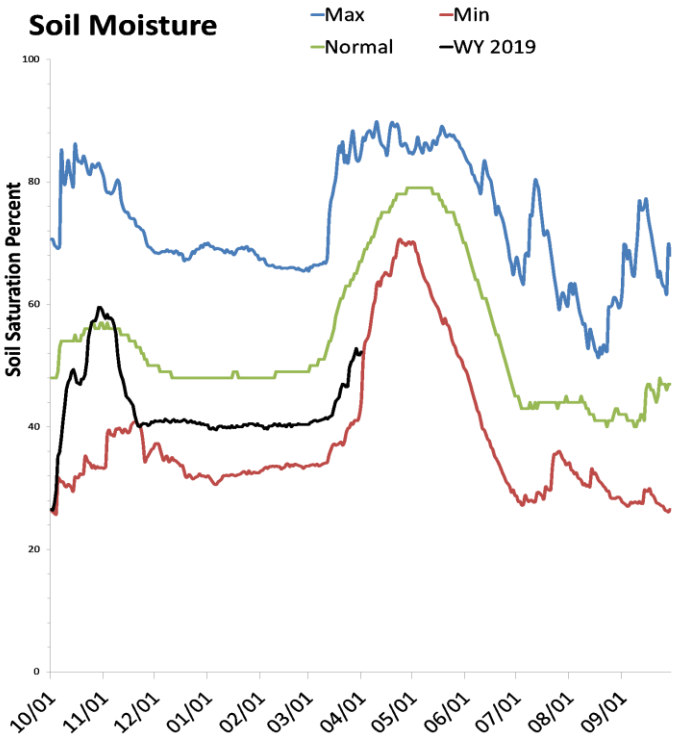
Southeastern Utah

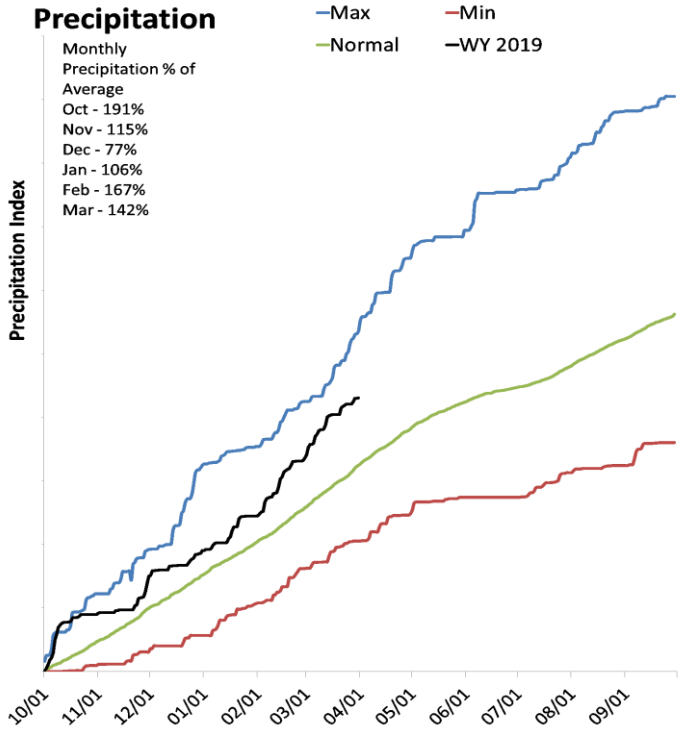
Dirty Devil Basin

April 1, 2019

Snowpack in the Dirty Devil Basin is much above normal at 141% of normal, compared to 65% last year. Precipitation in March was much above average at 142%, which brings the seasonal accumulation (Oct-Mar) to 133% of average. Soil moisture is at 49% compared to 43% last year. Forecast streamflow volumes range from 146% to 151% of average.







SNOTEL Data

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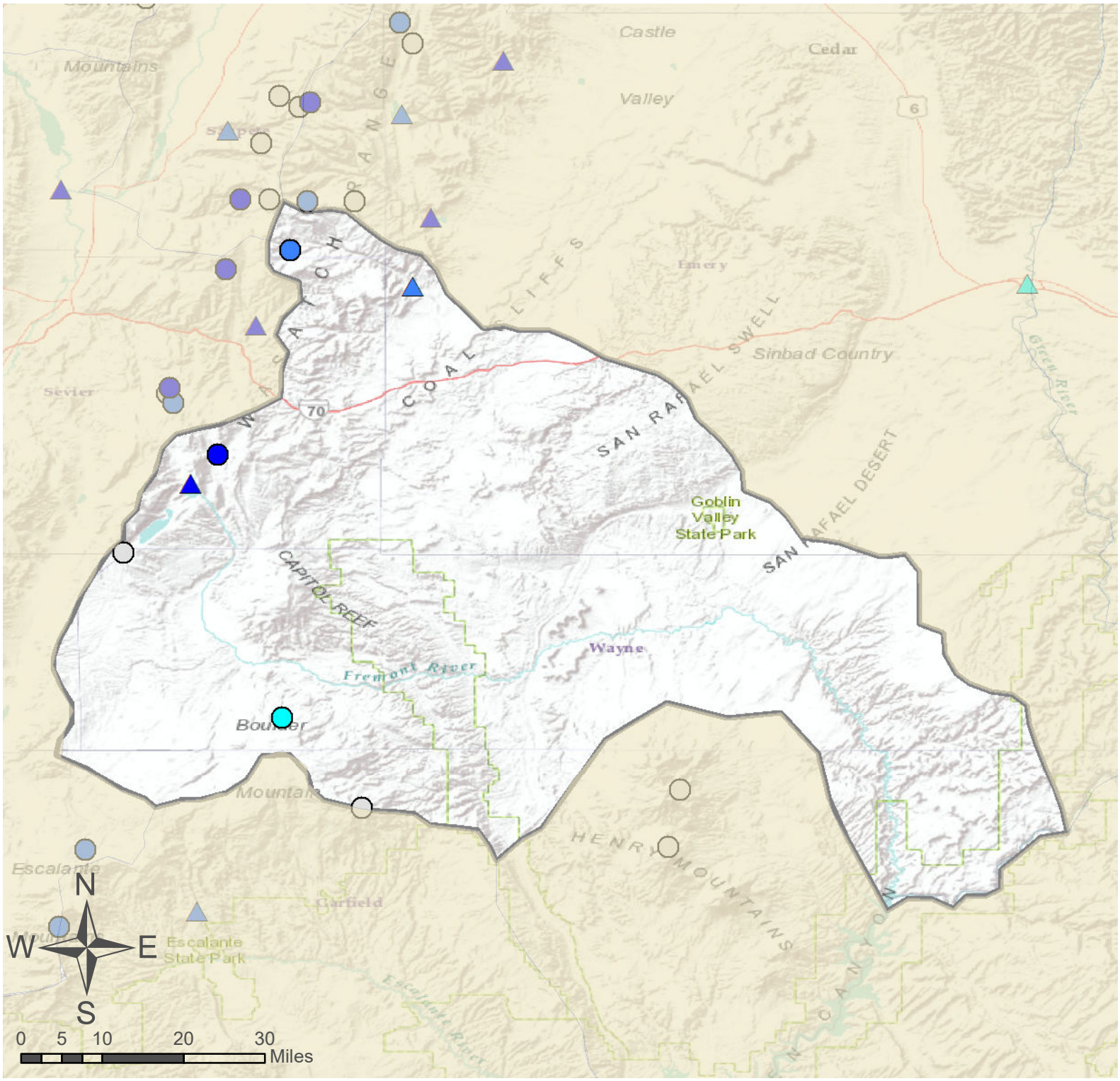
Dirty Devil
Streamflow Forecasts - April 1, 2019

Dirty Devil	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Muddy Ck nr Emery								
	APR-JUL	20	25	29	146%	33	39	19.9
Seven Mile Ck nr Fish Lake								
	APR-JUL	7.5	9.5	11	151%	12.6	15.2	7.3

1) 90% and 10% exceedance probabilities are actually 95% and 5%
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
3) Median value used in place of average

Watershed Snowpack Analysis April 1, 2019	# of Sites	% Median	Last Year % Median
Muddy Creek	3	145%	59%
Fremont River	4	146%	62%
Henry Mountains	0		



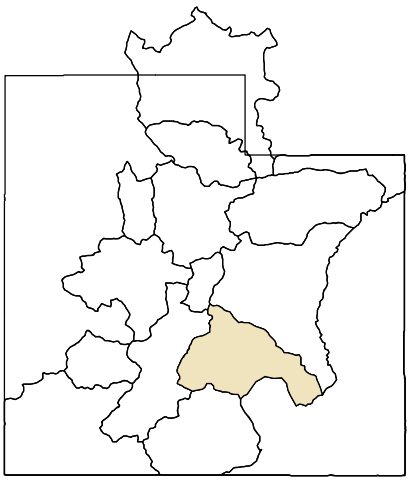
Dirty Devil Basin

SNOTEL Site

Forecast Point

% of Normal

- < 50%
- 50 - 69%
- 70 - 89%
- 90 - 109%
- 110 - 129%
- 130 - 149%
- > 150%
- No Normal



As of April 1, 2019:

141% of Normal SWE

133% of Normal Precipitation

142% of Normal Precipitation Last Month

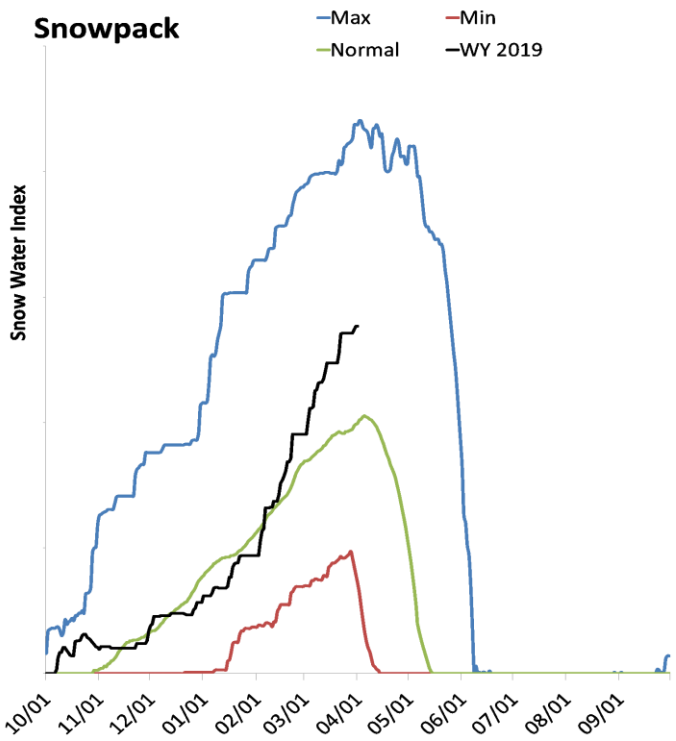
49% Saturation Soil Moisture

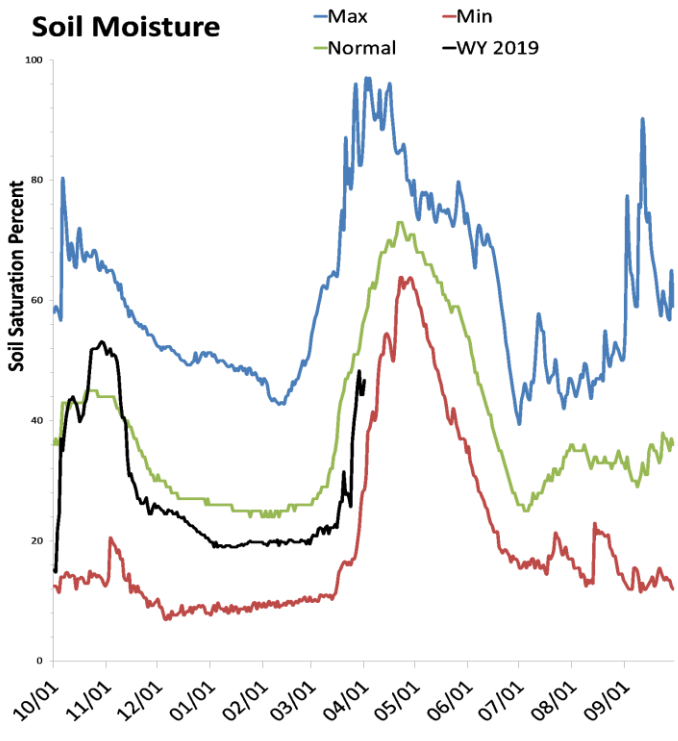
Dirty Devil Basin

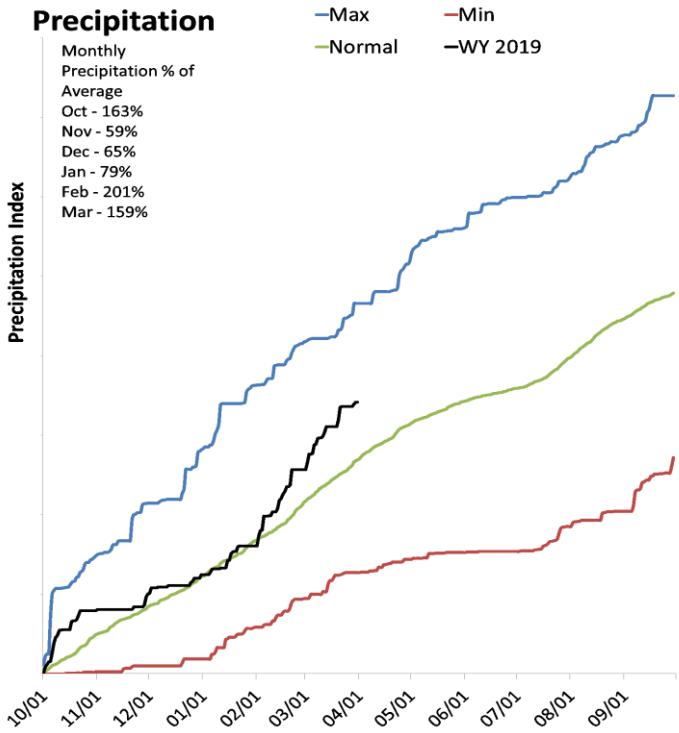
Escalante River Basin

April 1, 2019

Snowpack in the Escalante River Basin is much above normal at 139% of normal, compared to 53% last year. Precipitation in March was much above average at 159%, which brings the seasonal accumulation (Oct-Mar) to 127% of average. Soil moisture is at 40% compared to 30% last year. The forecast streamflow volume for Pine Creek is 129% of average.







SNOTEL Data

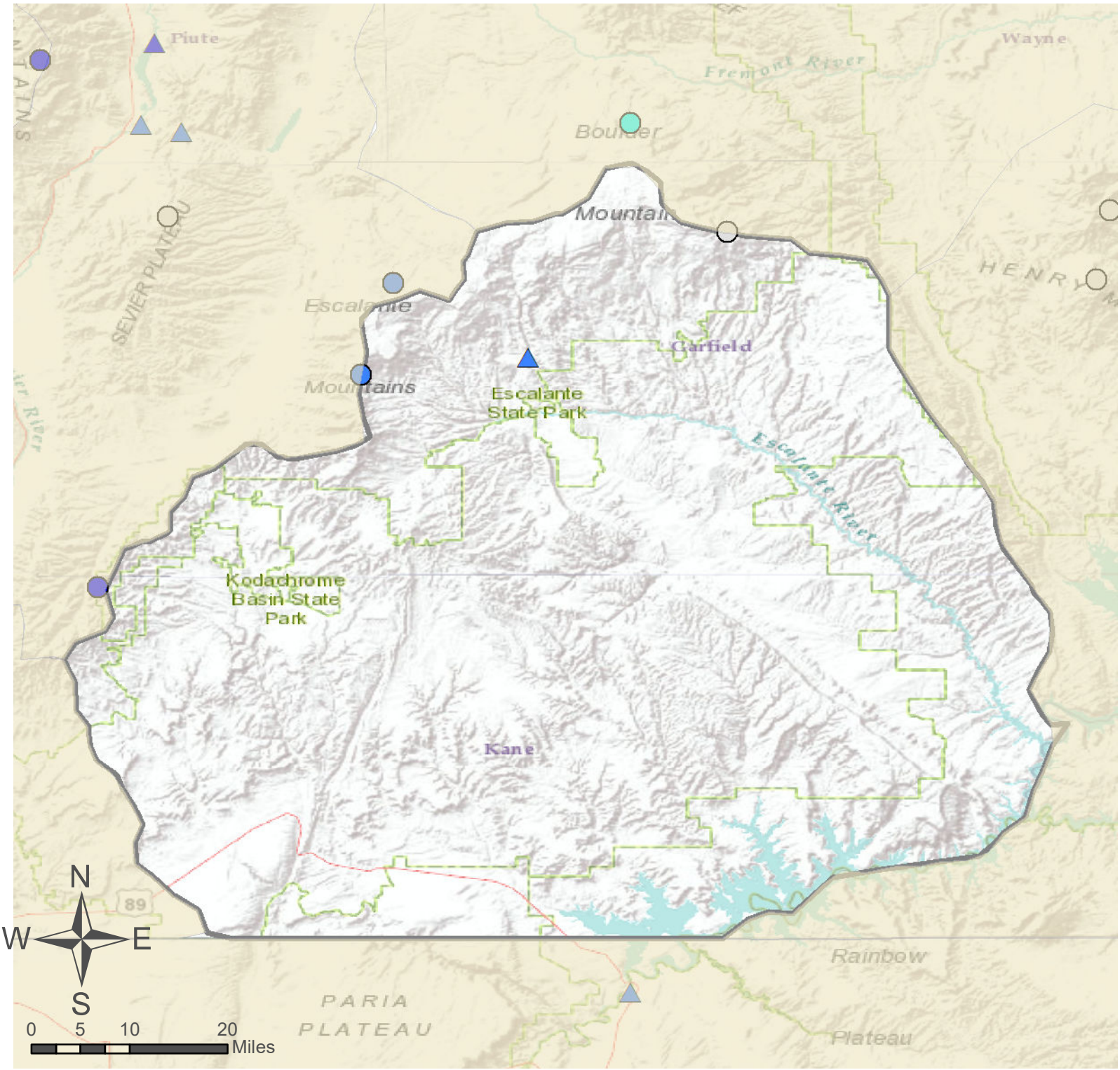
Data Current as of: 4/3/2019 3:31:17 PM

Escalante River
Streamflow Forecasts - April 1, 2019

		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Escalante River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Pine Ck nr Escalante								
	APR-JUL	1.63	2.4	3.1	129%	3.8	4.9	2.4

1) 90% and 10% exceedance probabilities are actually 95% and 5%
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
3) Median value used in place of average

Watershed Snowpack Analysis April 1, 2019	# of Sites	% Median	Last Year % Median
Escalante River	3	139%	53%
Paria River	3	262%	29%



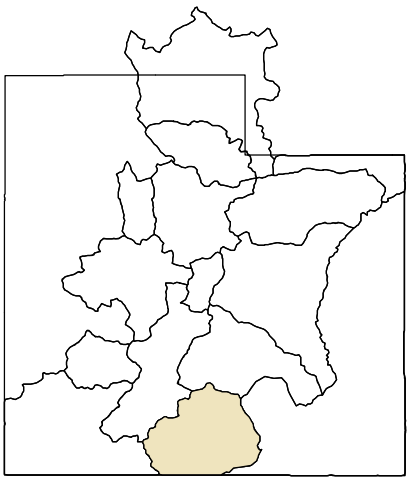
Escalante River Basin

SNOTEL Site

Forecast Point

% of Normal

- < 50%
- 50 - 69%
- 70 - 89%
- 90 - 109%
- 110 - 129%
- 130 - 149%
- > 150%
- No Normal



As of April 1, 2019:

139% of Normal SWE

127% of Normal Precipitation

159% of Normal Precipitation Last Month

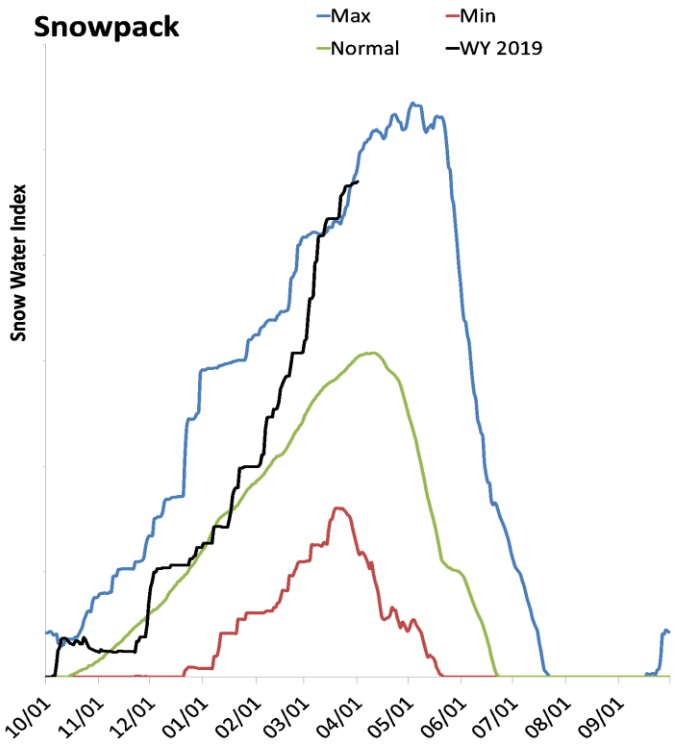
40% Saturation Soil Moisture

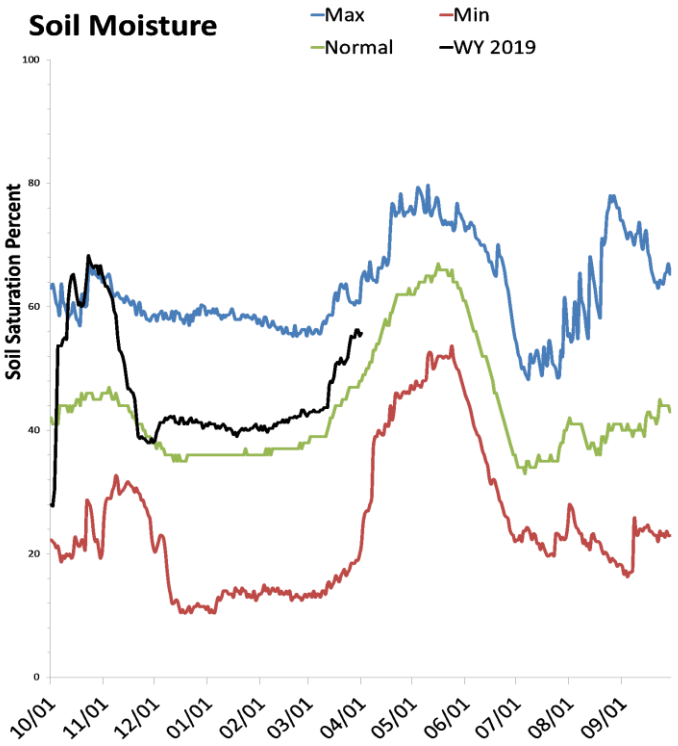
Escalante River Basin

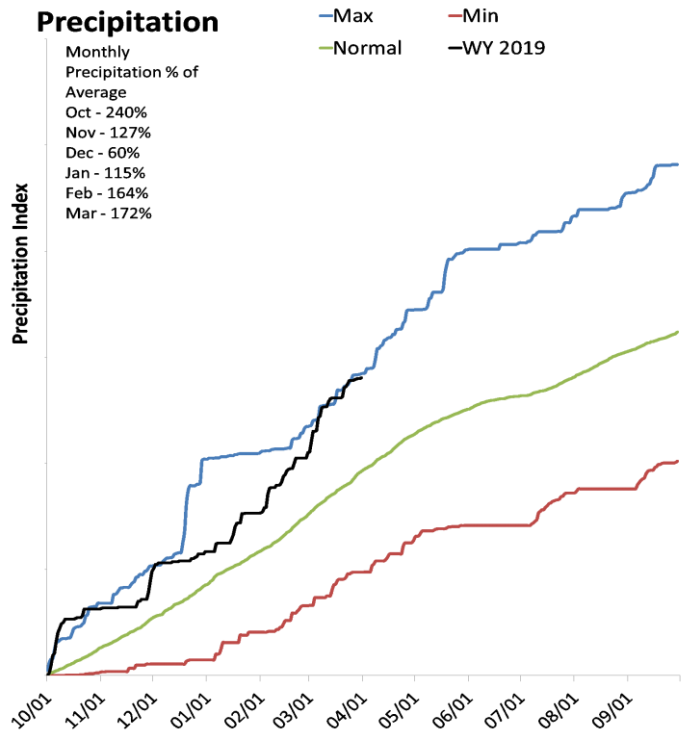
Beaver River Basin

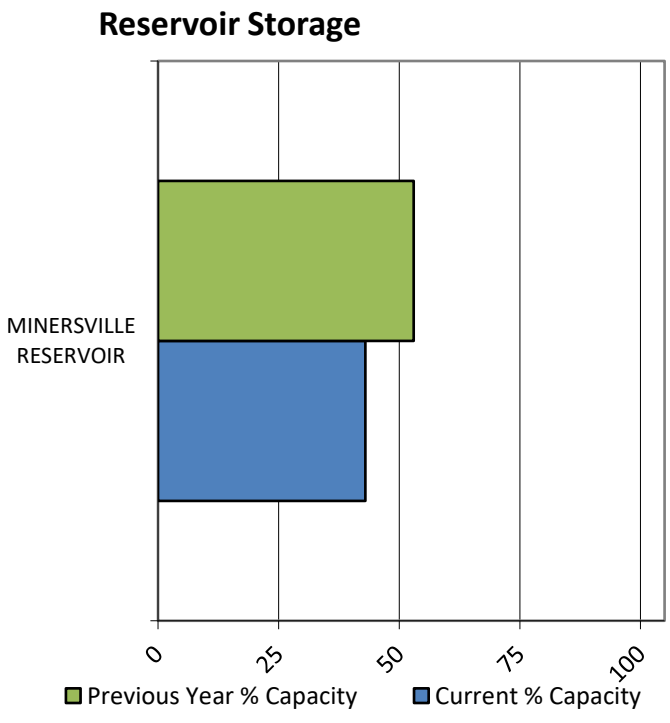
April 1, 2019

Snowpack in the Beaver River Basin is much above normal at 155% of normal, compared to 53% last year. Precipitation in March was much above average at 171%, which brings the seasonal accumulation (Oct-Mar) to 145% of average. Soil moisture is at 56% compared to 38% last year. Reservoir storage is at 43% of capacity, compared to 53% last year. The forecast streamflow volume for the Beaver River is 165% of average. The surface water supply index is 78% for the Beaver River.









SNOTEL Data

Data Current as of: 4/3/2019 3:31:10 PM

Beaver River
Streamflow Forecasts - April 1, 2019

		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Beaver River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Beaver R nr Beaver								
	APR-JUL	30	38	43	165%	48	56	26

1) 90% and 10% exceedance probabilities are actually 95% and 5%
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
3) Median value used in place of average

Reservoir Storage End of March, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Minersville Reservoir	10.1	12.4	16.8	23.3
Basin-wide Total	10.1	12.4	16.8	23.3
# of reservoirs	1	1	1	1

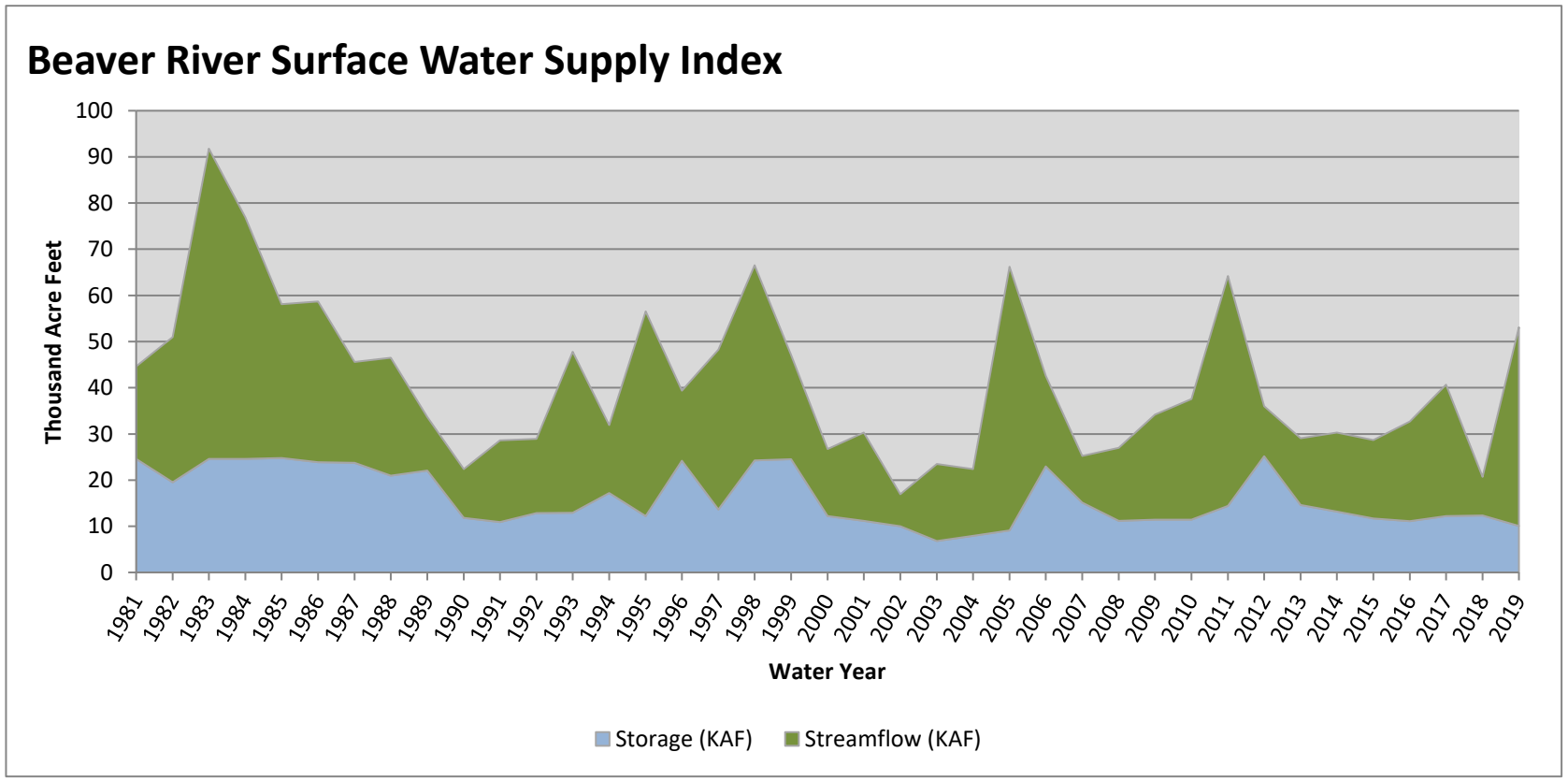
Watershed Snowpack Analysis April 1, 2019	# of Sites	% Median	Last Year % Median
Beaver River	3	155%	53%

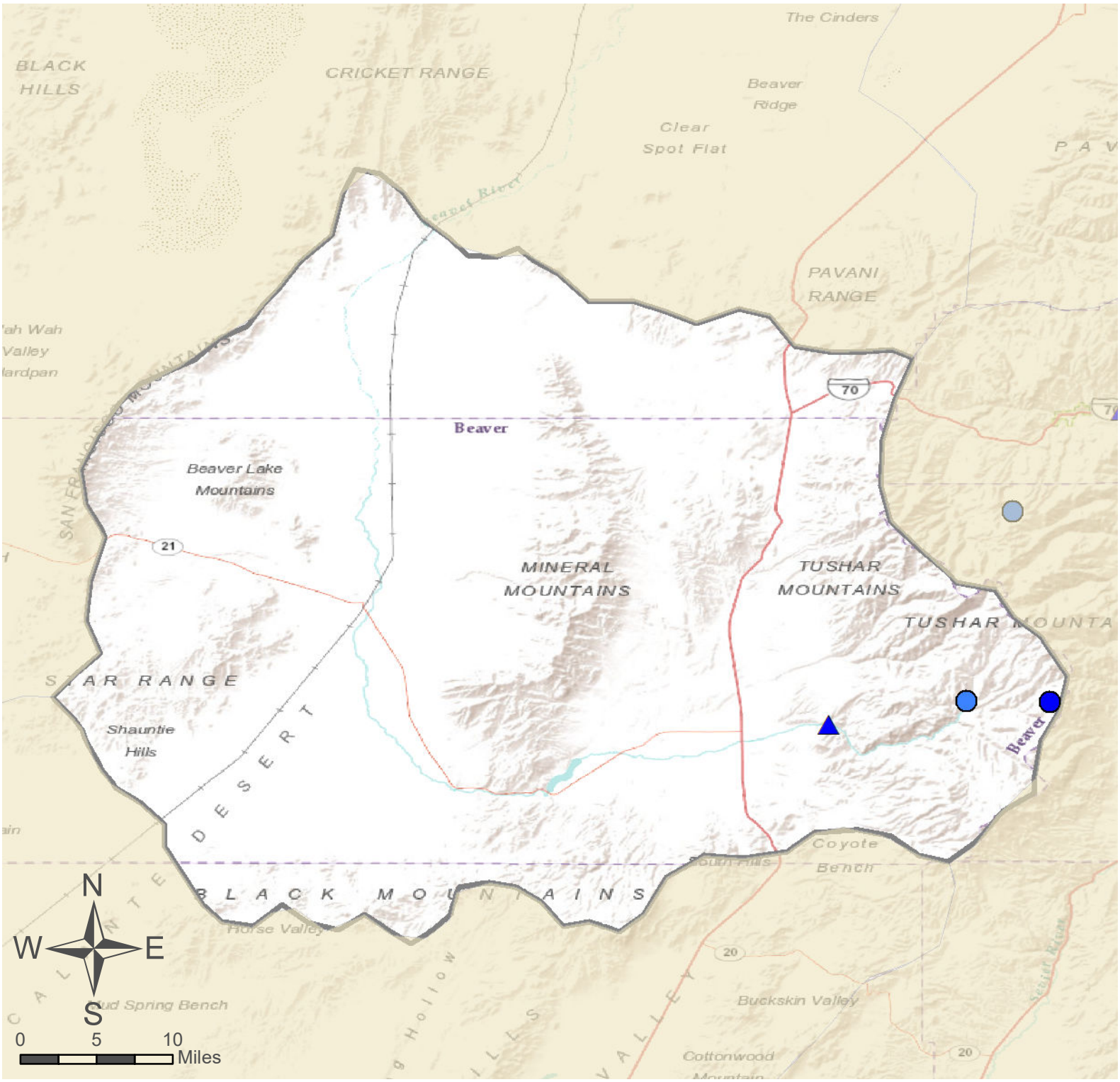
April 1, 2019

Surface Water Supply Index

Basin or Region	Mar EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Beaver River	**10.10**	**43.00**	**53.10**	**78**	**2.29**	**97, 82, 95, 85**

*EOM, end of month; #SWSI, Surface Water Supply Index; ^KAF, thousand acre-feet.





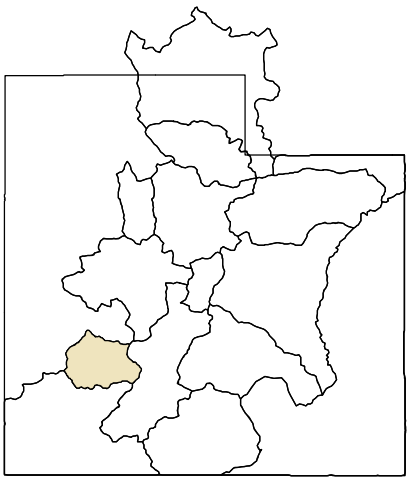
Beaver River Basin

SNOTEL Site

Forecast Point

% of Normal

- < 50%
- 50 - 69%
- 70 - 89%
- 90 - 109%
- 110 - 129%
- 130 - 149%
- > 150%
- No Normal



As of April 1, 2019:

155% of Normal SWE

145% of Normal Precipitation

171% of Normal Precipitation Last Month

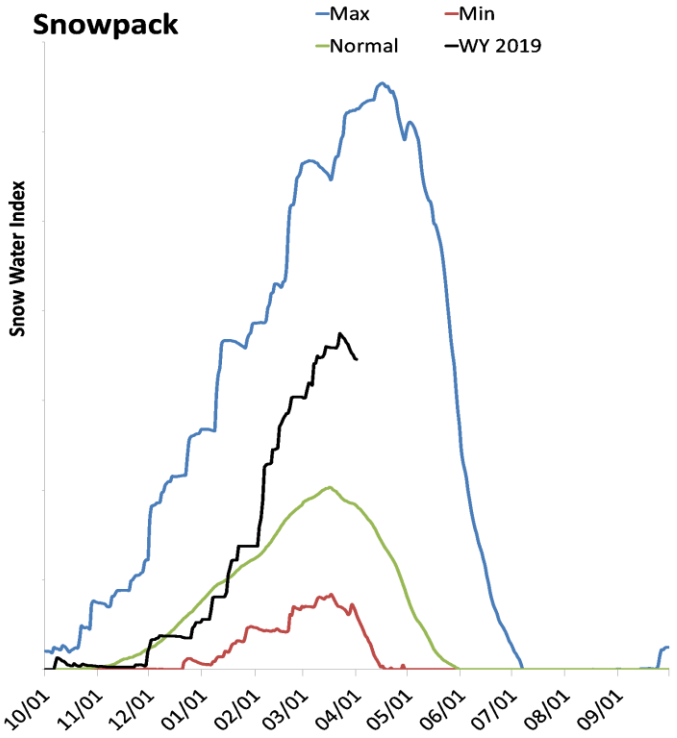
56% Saturation Soil Moisture

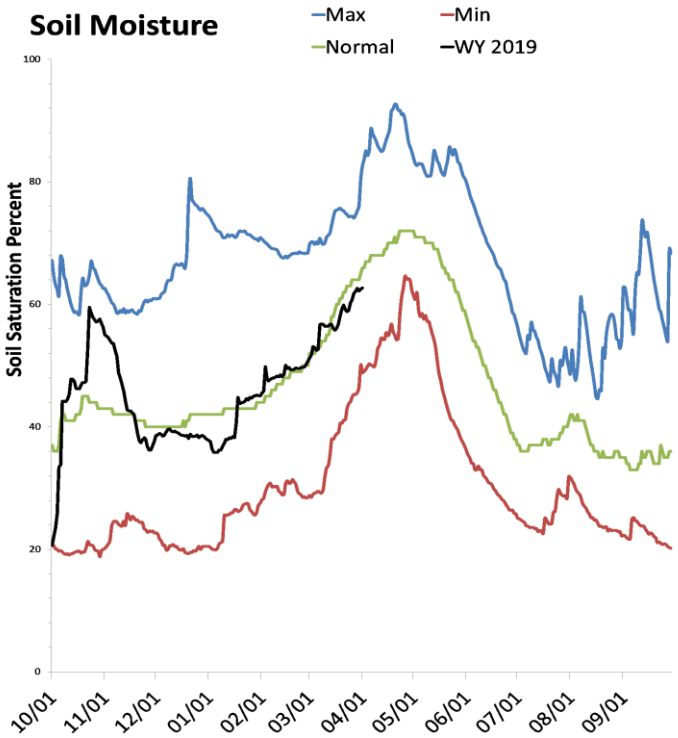
Beaver River Basin

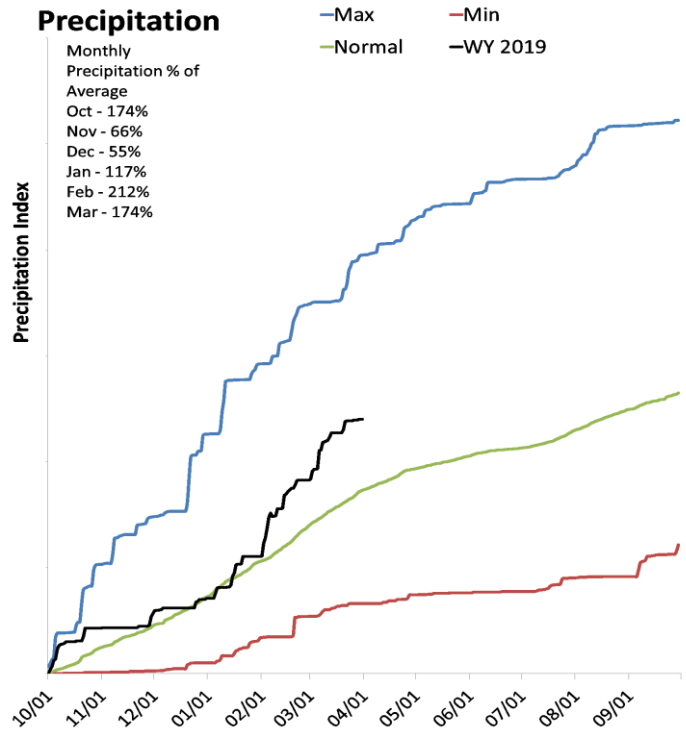
Southwestern Utah

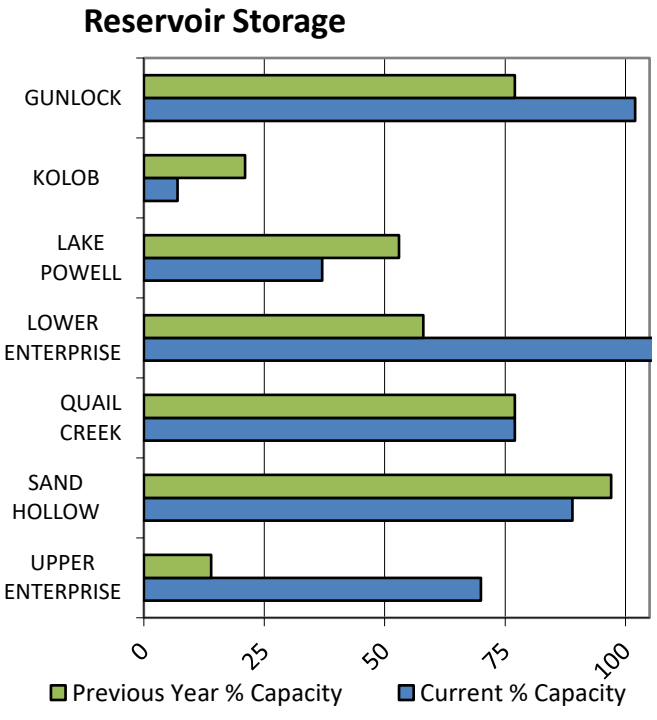
April 1, 2019

Snowpack in the Southwestern Utah is much above normal at 190% of normal, compared to 56% last year. Precipitation in March was much above average at 173%, which brings the seasonal accumulation (Oct-Mar) to 139% of average. Soil moisture is at 62% compared to 54% last year. Reservoir storage is at 37% of capacity, compared to 53% last year. Forecast streamflow volumes range from 118% to 173% of average. The surface water supply index is 79% for the Virgin River.









SNOTEL Data

Data Current as of: 4/3/2019 3:31:25 PM

Southwestern Utah
Streamflow Forecasts - April 1, 2019

		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Southwestern Utah	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Lake Powell Inflow [2]	APR-JUL	7290	8980	10200	142%	11500	13600	7160
Virgin R nr Hurricane	APR-JUL	77	96	109	173%	121	140	63
Virgin R at Virgin	APR-JUL	58	71	80	138%	90	105	58
Santa Clara R nr Pine Valley	APR-JUL	4	5.1	5.9	118%	6.8	8.2	5
Coal Ck nr Cedar City	APR-JUL	21	25	28	144%	31	35	19.4

1) 90% and 10% exceedance probabilities are actually 95% and 5%
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
3) Median value used in place of average

Reservoir Storage End of March, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Powell	9049.0	12956.1	16942.0	24322.0
Lower Enterprise	2.8	1.5	1.4	2.6
Upper Enterprise	7.0	1.4	5.3	10.0
Kolob Reservoir	0.4	1.2		5.6
Gunlock	10.6	8.0	6.8	10.4
Sand Hollow Reservoir	44.5	48.5		50.0
Quail Creek	30.8	30.8	31.1	40.0
Basin-wide Total	9100.2	12997.8	16986.6	24385.0
# of reservoirs	5	5	5	5

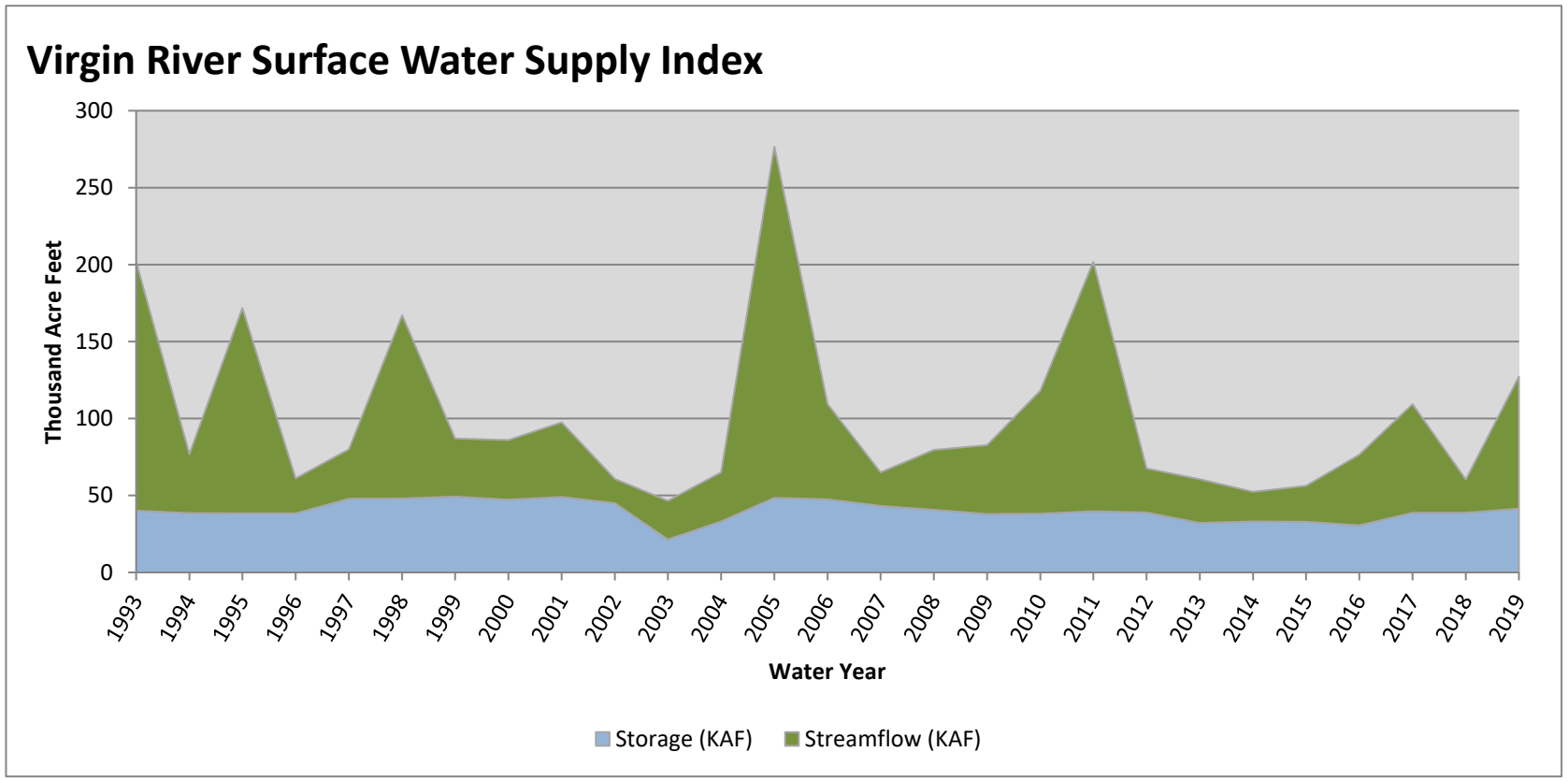
Watershed Snowpack Analysis April 1, 2019	# of Sites	% Median	Last Year % Median
Upper Virgin	8	196%	52%
Lower Virgin	2	187%	0%
Coal Parowan Creeks	4	157%	65%

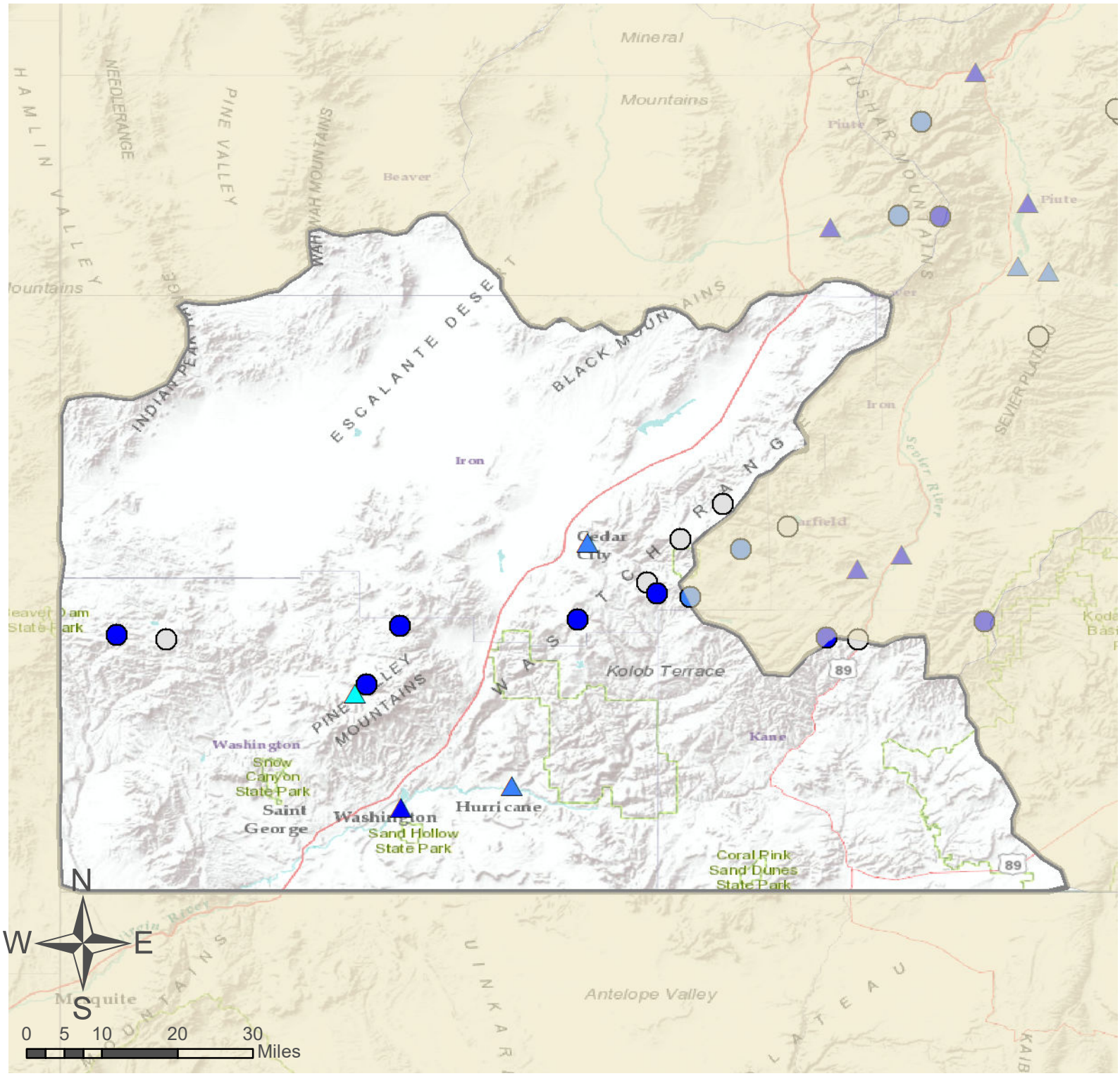
April 1, 2019

Surface Water Supply Index

Basin or Region	Mar EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Virgin River	**41.41**	**85.90**	**127.31**	**79**	**2.38**	**17, 10, 98, 95**

*EOM, end of month; #SWSI, Surface Water Supply Index; ^KAF, thousand acre-feet.





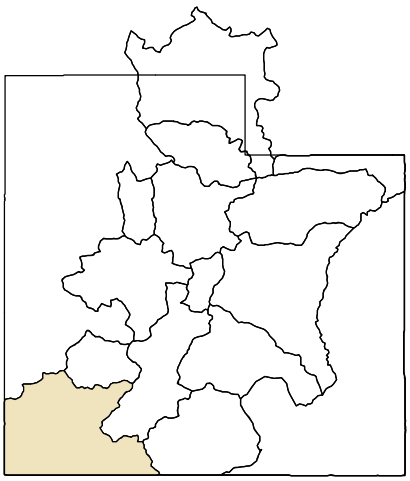
Southwestern Utah

SNOTEL Site

Forecast Point

% of Normal

- < 50%
- 50 - 69%
- 70 - 89%
- 90 - 109%
- 110 - 129%
- 130 - 149%
- > 150%
- No Normal



<u>As of April 1, 2019:</u>

190% of Normal SWE

139% of Normal Precipitation

173% of Normal Precipitation Last Month

62% Saturation Soil Moisture

Southwestern Utah

April 1, 2019

Surface Water Supply Index

Basin or Region	Mar EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF ^	*KAF ^*	*KAF ^*	*%*		
Bear River	**853.7**	**192.0**	**1045.7**	**65**	**1.25**	**88, 00, 87, 12**
Woodruff Narrows	**25.3**	**125.0**	**150.3**	**53**	**0.21**	**08, 87, 10, 06**
Little Bear	**10.2**	**48.0**	**58.2**	**57**	**0.6**	**16, 08, 93, 09**
Ogden River	**73.6**	**140.0**	**213.6**	**63**	**1.04**	**16, 09, 85, 95**
Weber River	**285.3**	**380.0**	**665.3**	**58**	**0.62**	**81, 10, 96, 09**
Provo River	**903.1**	**119.0**	**1022.1**	**27**	**-1.92**	**15, 17, 14, 02**
Western Uinta	**155.6**	**125.0**	**280.6**	**70**	**1.67**	**06, 98, 96, 99**
Eastern Uinta	**13.3**	**79.0**	**92.3**	**30**	**-1.67**	**81, 12, 15, 07**
Blacks Fork	**6.8**	**99.0**	**105.8**	**62**	**1.01**	**10, 87, 15, 14**
Smiths Fork	**4.2**	**29.0**	**33.2**	**57**	**0.56**	**97, 91, 14, 10**
Price River	**28.6**	**76.0**	**104.6**	**85**	**2.92**	**98, 82, 11, 85**
Joe's Valley	**30.0**	**80.0**	**110.0**	**75**	**2.08**	**97, 05, 82, 06**
Ferron Creek	**4.7**	**57.0**	**61.7**	**83**	**2.71**	**06, 95, 86, 17**
Moab	**0.5**	**10.0**	**10.5**	**94**	**3.66**	**93, 05, 16, 95**
Upper Sevier	**58.9**	**126.0**	**184.9**	**68**	**1.46**	**81, 82, 87, 93**
San Pitch	**2.5**	**22.0**	**24.5**	**38**	**-1.04**	**17, 01, 08, 10**
Lower Sevier	**79.3**	**240.0**	**319.3**	**78**	**2.29**	**82, 99, 97, 95**
Beaver River	**10.1**	**43.0**	**53.1**	**78**	**2.29**	**97, 82, 95, 85**
Virgin River	**41.4**	**85.9**	**127.3**	**79**	**2.38**	**17, 10, 98, 95**

**EOM, end of month; # SWSI, surface water supply index; ^KAF, thousand acre-feet.*

What is a Surface Water Supply Index?

The Surface Water Supply Index (SWSI) is a predictive indicator of total surface water availability within a watershed for the spring and summer water use seasons. The index is calculated by combining pre-runoff reservoir storage (carryover) with forecasts of spring and summer streamflow which are based on current snowpack and other hydrologic variables. SWSI 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. SWSI's are calculated in this fashion to be consistent with other hydroclimatic indicators such as the Palmer Drought Index and the Precipitation index.

Utah Snow Surveys has also chosen to display the SWSI value as well as a PERCENT CHANCE OF NON-EXCEEDANCE. While this is a cumbersome name, it has the simplest 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 SWSI 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 SWSI 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 SWSI 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.

For more information on the SWSI go to: www.ut.nrcs.usda.gov/snow/ on the water supply page. The entire period of historical record for reservoir storage and streamflow is available.

Issued by

Matt Lohr
Chief
Natural Resources Conservation Service
U.S. Department of Agriculture

Released by

Timothy Wilson
State Conservationist
Natural Resources Conservation Service
Salt Lake City, Utah

Prepared by
Snow Survey Staff:
Troy Brosten, Assistant Supervisor
Jordan Clayton, Hydrologist
Kent Sutcliffe, Soil Scientist

YOU MAY OBTAIN THIS PRODUCT AS WELL AS CURENT SNOW, PRECIPITATION, TEMPERATURE AND SOIL MOISTURE, RESERVOIR, SURFACE WATER SUPPLY INDEX, AND OTHER DATA BY VISITING OUR WEB SITE @:
https://www.nrcs.usda.gov/wps/portal/nrcs/main/ut/snow/

Snow Survey, NRCS, USDA
245 North Jimmy Doolittle Road
Salt Lake City, UT 84116
(385) 285-3114

Utah Water Supply Outlook Report

Natural Resources Conservation Service
Salt Lake City, UT