Utah Water Supply Outlook Report

March 1, 2019

Cedar Breaks National Monument

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.

STATE OF UTAH GENERAL OUTLOOK
March 1, 2019

SUMMARY

February was very impressive in terms of storm activity and precipitation accumulation across Utah. We saw, on average, 150% – 250% normal Snow Water Equivalent (SWE) for the month of February. In other words, we got twice the water in our snowpack this past month than what we'd receive over an average February. Individual SNOTEL sites received anywhere from 5 to 14 inches of water in the snowpack across Utah. Southwestern Utah had some very impressive February numbers with over 13 inches of SWE at Kolob and over 10 inches of SWE at Midway Valley- not quite the massive numbers we reported in 2005, but certainly a welcome change from last year. Storm patterns have been tracking up from the south and across central Utah. The Bear, Weber & Ogden, and Northeastern Uinta basins have not benefited as much as the southern basins, but they're doing ok with above average snowpack conditions. Overall, we've seen slight improvements in soil moistures across the state, but the northern basins are still below normal which could reduce runoff efficiency. Dryer soils in these basins are reflected in the lower forecasts ranging between 85% to 100% of normal. Better snowpack numbers and normal soil moisture in the southern basins resulted in the higher forecast numbers with most in the 100% to 150% of normal range. At this time in water year 2017 the snowpack in southern Utah began to melt out, but this year these same basins continue to improve their snowpack numbers. If the storms keep coming through March we'll be in great shape for the runoff season, resulting in much improved reservoir conditions across Utah.

SNOWPACK

Snowpack in Utah is above normal at 124% compared to 58% last year. Above normal snowpack in the northern basins: Bear – 112%, Weber – 119%, and Northeastern Uinta – 110% and up to much above normal to the south: Provo – 127%, Duchesne – 131%, Price-San Rafael – 122%, San Pitch – 127%, Upper Sevier – 143% and Southwest Utah – 162% of normal.

PRECIPITATION

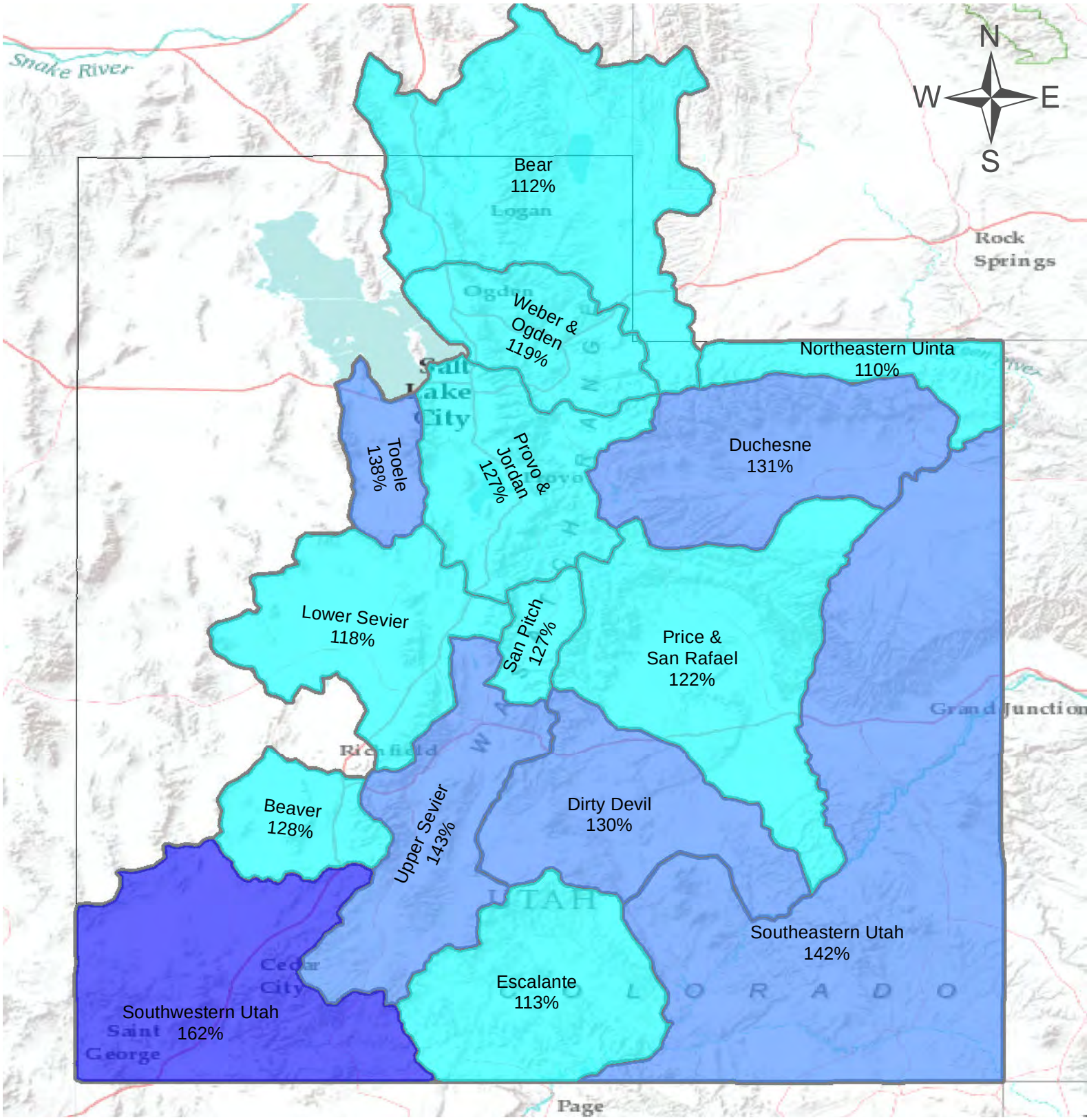
Precipitation across Utah in February was 174% of average bringing the seasonal accumulation (Oct-Feb) to 123% of normal. February precipitation ranged from about 138% in the Northeastern Uinta's to 206% in Southwestern Utah. An active storm pattern will continue through the end of this week and hopefully through the remaining month of March for another above average precipitation month.

RESERVOIRS

Reservoir storage has improved 3% from last month and is at 62% of capacity compared to 75% last year. If our snowpack continues to accumulate through March then we stand a very good chance to fill most small to medium-size reservoirs and improve our storage levels at many of the larger reservoirs such as Bear Lake, Utah Lake, Strawberry Lake, Sevier Bridge, and Piute.

STREAMFLOW

Forecast streamflows are near average to above average. Bear River forecasts range between 85% - 95% and the Weber Ogden Rivers are between 95% - 105%. Forecasts in the remaining basins range from 100% - 150%. Lower forecasts in the Bear and Weber Ogden Rivers are largely due to a combination of slightly lower snowpack numbers and dryer than average soil moistures. All in all, streamflow forecasts look promising and with another storm coming this week and, hopefully, more afterwards these numbers will continue to improve over the next month – assuming the snowpack continues to accumulate.



Statewide Snow Water Equivalent

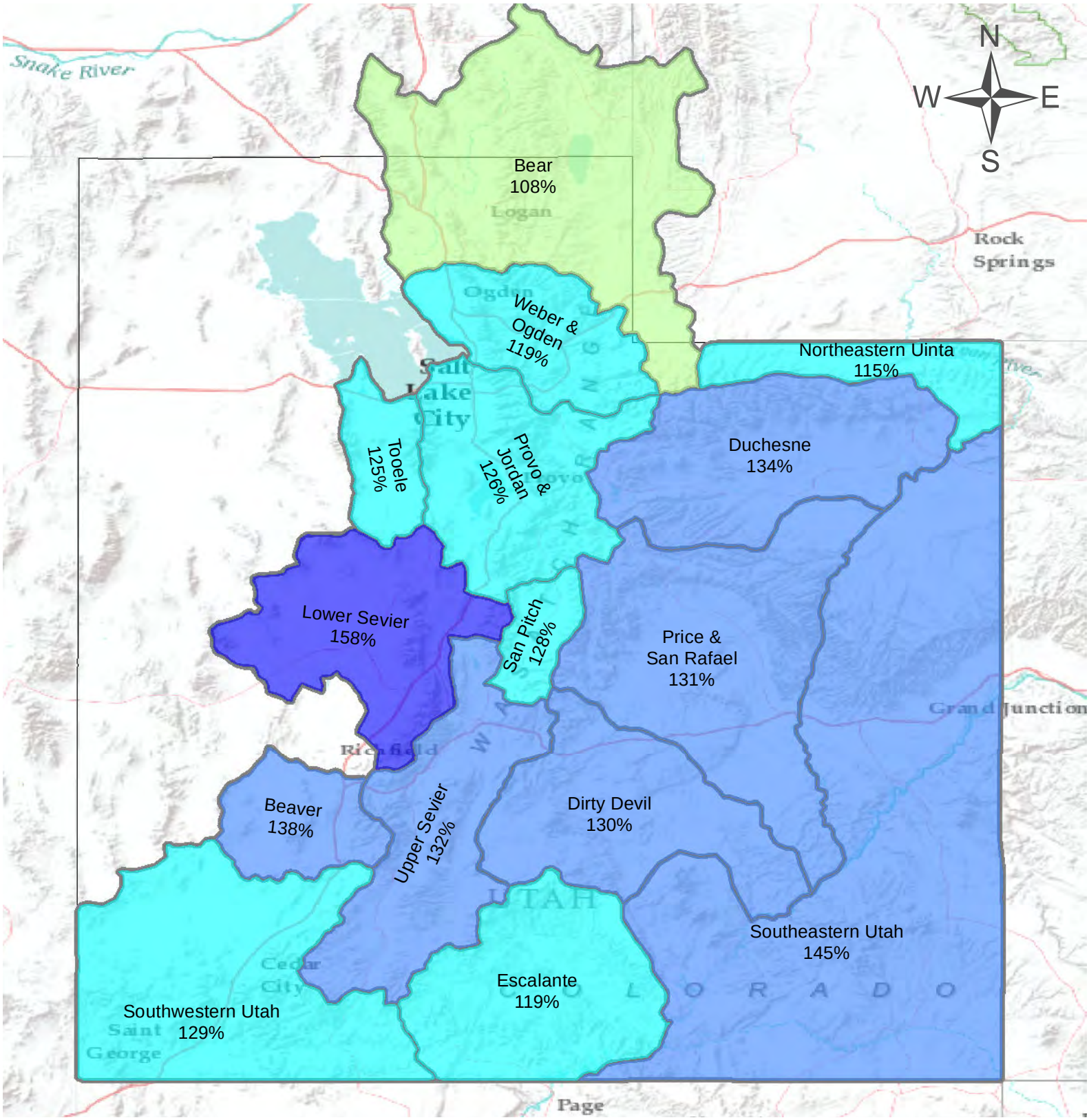
As of March 1, 2019:

124% 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 March 1, 2019:

123% of Normal Precipitation

174% of Normal Precipitation Last Month

0 10 20 40 60 80 100
Miles

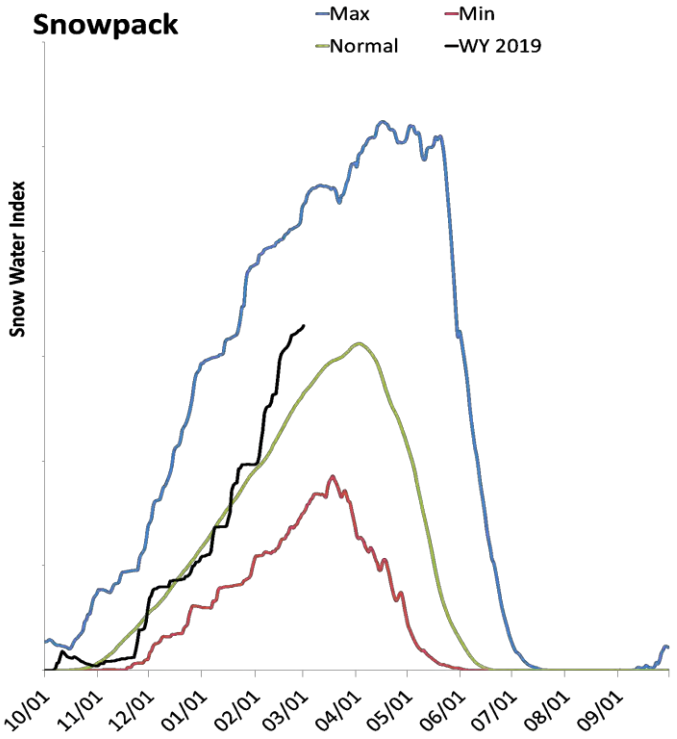
% of Normal

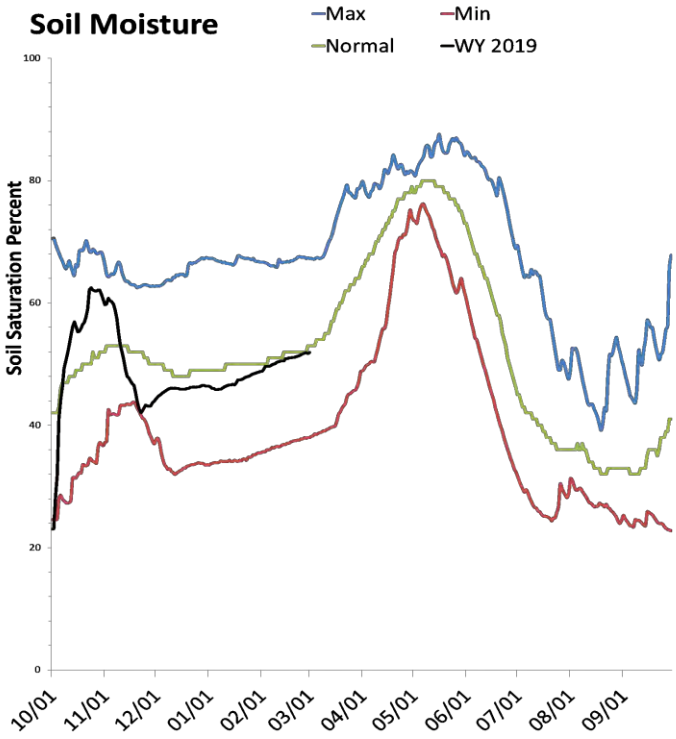
- < 50%
- 50 - 69%
- 70 - 89%
- 90 - 109%
- 110 - 129%
- 130 - 149%
- > 150%

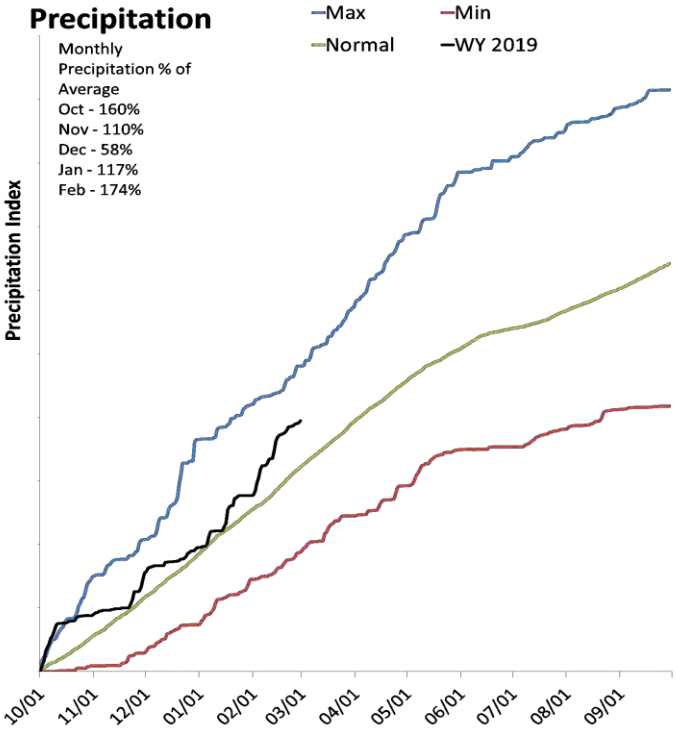
Statewide Utah

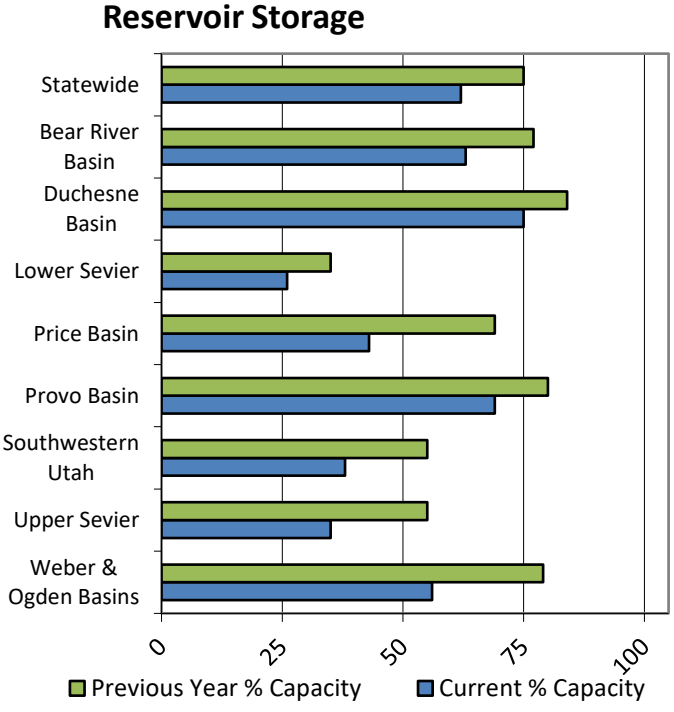
March 1, 2019

Snowpack in Utah is above normal at 124% of normal, compared to 58% last year. Precipitation in February was much above average at 174%, which brings the seasonal accumulation (Oct-Feb) to 123% of average. Soil moisture is at 52% compared to 43% last year. Reservoir storage is at 62% of capacity, compared to 75% last year. Forecast streamflow volumes range from 82% to 152% of average.







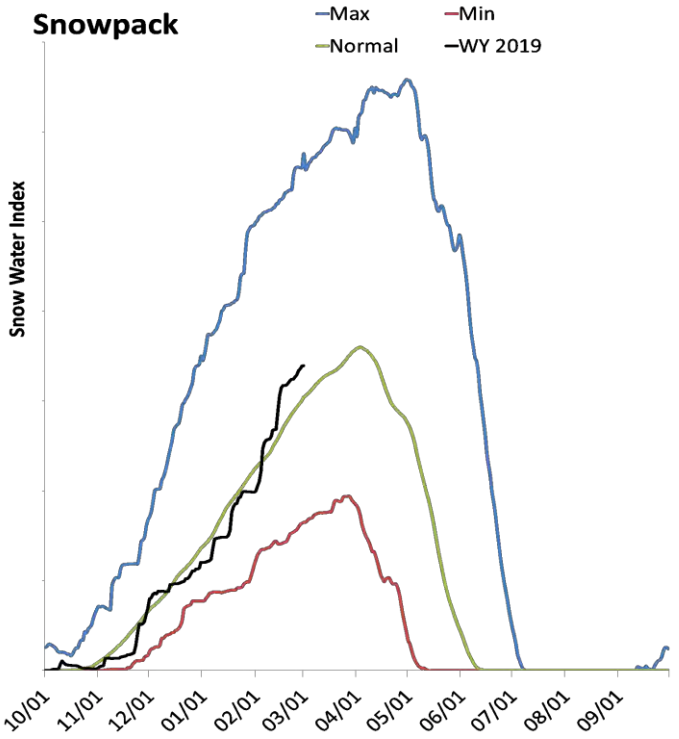


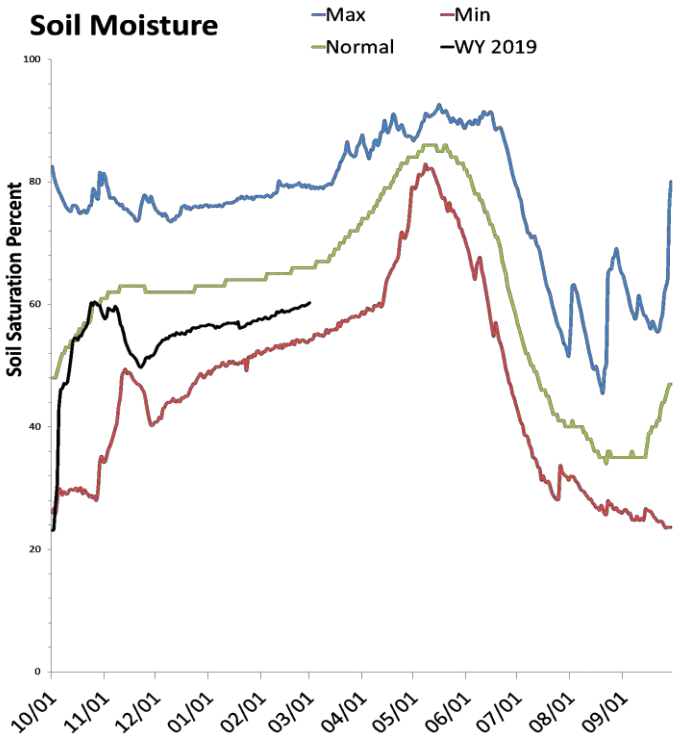
SNOTEL Data

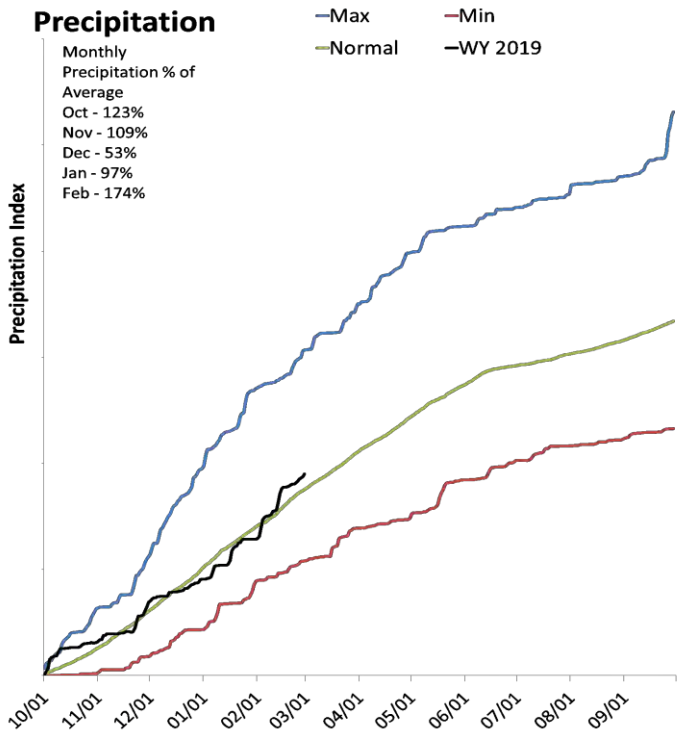
Bear River Basin

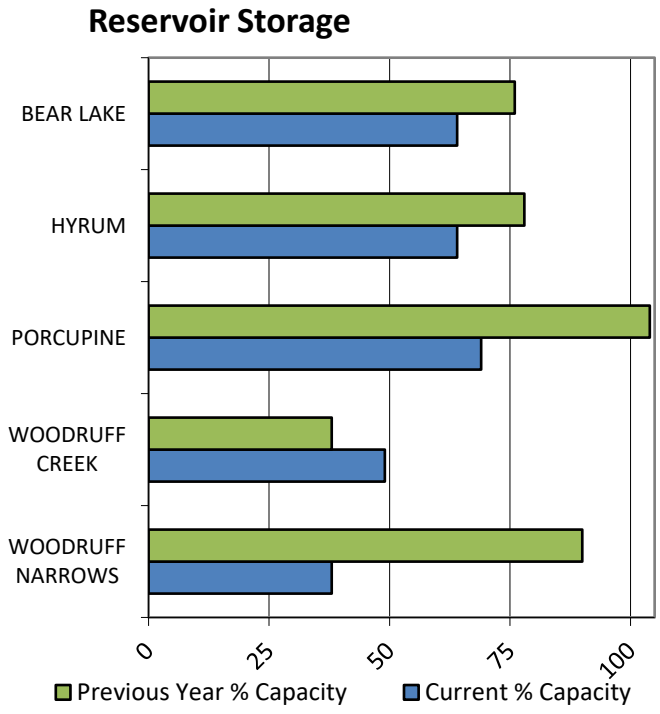
March 1, 2019

Snowpack in the Bear River Basin is above normal at 112% of normal, compared to 76% last year. Precipitation in February was much above average at 175%, which brings the seasonal accumulation (Oct-Feb) to 108% of average. Soil moisture is at 60% compared to 70% last year. Reservoir storage is at 63% of capacity, compared to 77% last year. Forecast streamflow volumes range from 82% to 98% of average. The surface water supply index is 63% for the Bear River, 45% for the Woodruff Narrows, 57% for the Little Bear.









SNOTEL Data

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Bear River
Streamflow Forecasts - March 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	69	90	105	94%	120	141	112
	APR-SEP	73	98	114	93%	130	155	123
Bear R ab Resv nr Woodruff								
	APR-JUL	29	77	113	93%	141	189	121
	APR-SEP	31	83	119	93%	155	205	128
Big Ck nr Randolph								
	NO FORECAST AVAILABLE							
Smiths Fk nr Border								
	APR-JUL	48	65	76	85%	87	104	89
	APR-SEP	55	74	87	84%	100	119	104
Bear R bl Stewart Dam								
	MAR-JUL	60	129	175	85%	220	290	205
	MAR-SEP	65	143	196	85%	250	325	230
	APR-JUL	35	103	150	82%	197	265	183
	APR-SEP	39	117	170	83%	225	300	205
Little Bear at Paradise								
	APR-JUL	20	34	43	96%	52	66	45
Logan R nr Logan								
	APR-JUL	78	95	107	96%	119	136	111
Blacksmith Fk nr Hyrum								
	APR-JUL	21	33	42	98%	51	63	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 February, 2019**	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Bear Lake	833.8	991.5	594.1	1302.0
Hyrum Reservoir	9.8	11.9	11.2	15.3
Porcupine Reservoir	7.8	11.8	7.0	11.3
Woodruff Creek	2.0	1.5	2.6	4.0
Woodruff Narrows Reservoir	22.0	51.6	31.6	57.3
Basin-wide Total	875.3	1068.3	646.5	1389.9
# of reservoirs	5	5	5	5

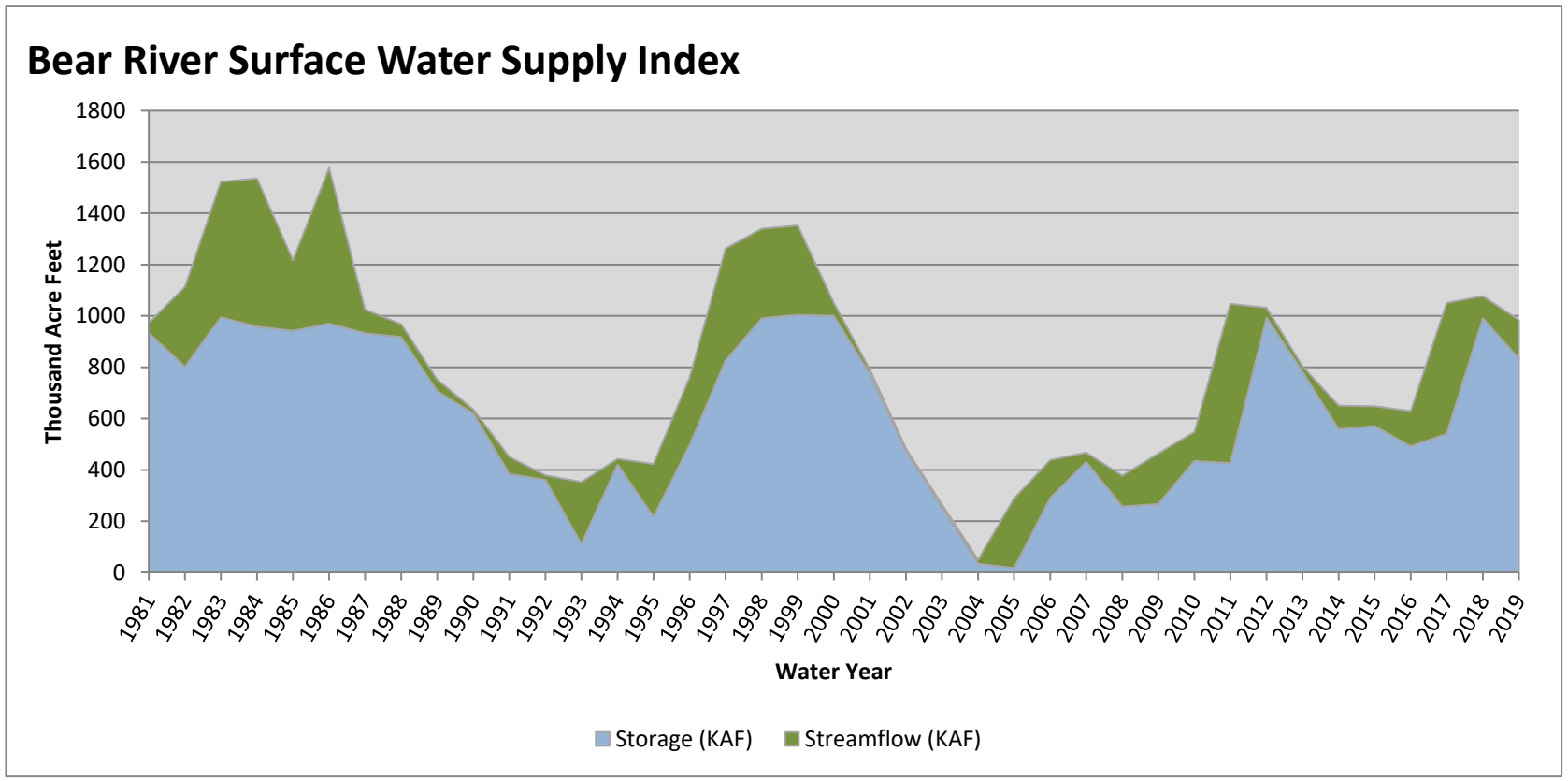
Watershed Snowpack Analysis **March 1, 2019**	# of Sites	% Median	Last Year % Median
Upper Bear	4	118%	72%
Middle Bear	7	109%	82%
Lower Bear	3	115%	59%
Logan River	9	111%	75%

March 1, 2019

Surface Water Supply Index

Basin or Region	Feb EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Bear River	**833.77**	**150.00**	**983.77**	**63**	**1.04**	**88, 81, 87, 12**

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

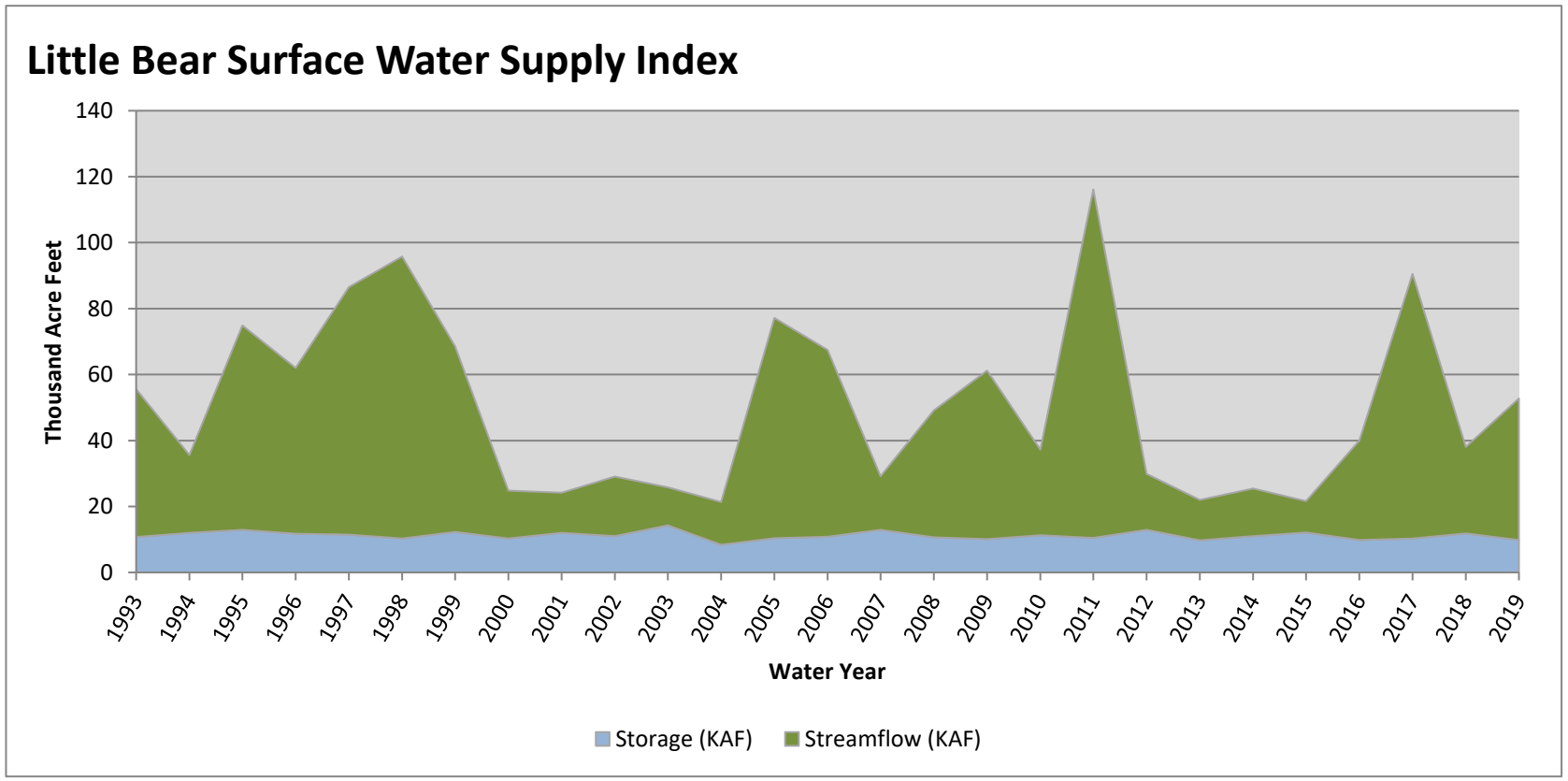


March 1, 2019

Surface Water Supply Index

Basin or Region	Feb EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Little Bear	**9.79**	**43.00**	**52.79**	**57**	**0.6**	**16, 08, 93, 09**

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

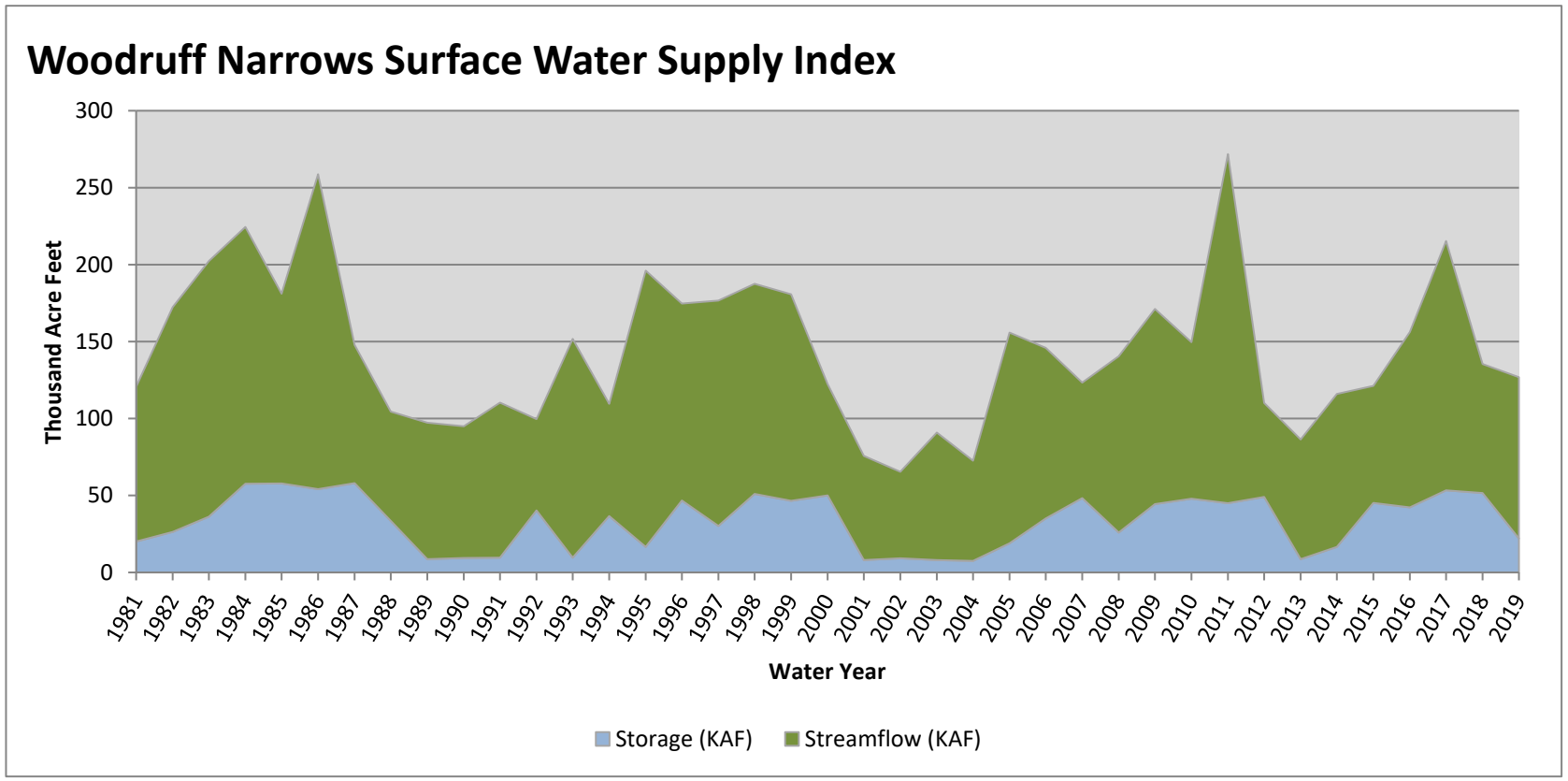


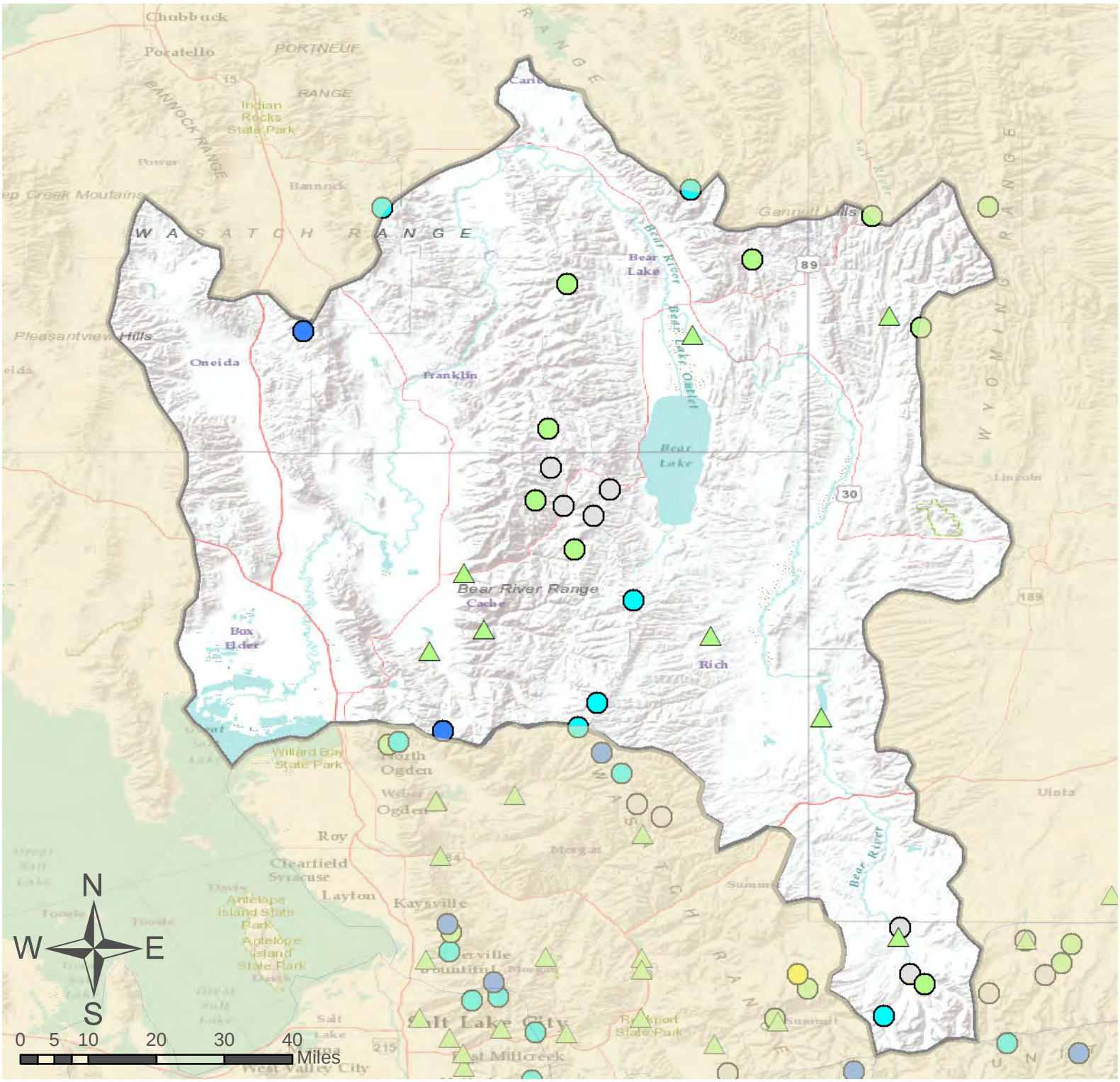
March 1, 2019

Surface Water Supply Index

Basin or Region	Feb EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Woodruff Narrows	**21.95**	**105.00**	**126.95**	**45**	**-0.42**	**00, 07, 18, 08**

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





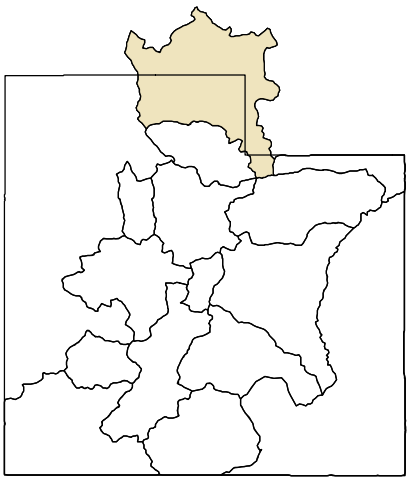
Bear River Basin

SNOTEL Site

Forecast Point

% of Normal

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



As of March 1, 2019:

112% of Normal SWE

108% of Normal Precipitation

175% of Normal Precipitation Last Month

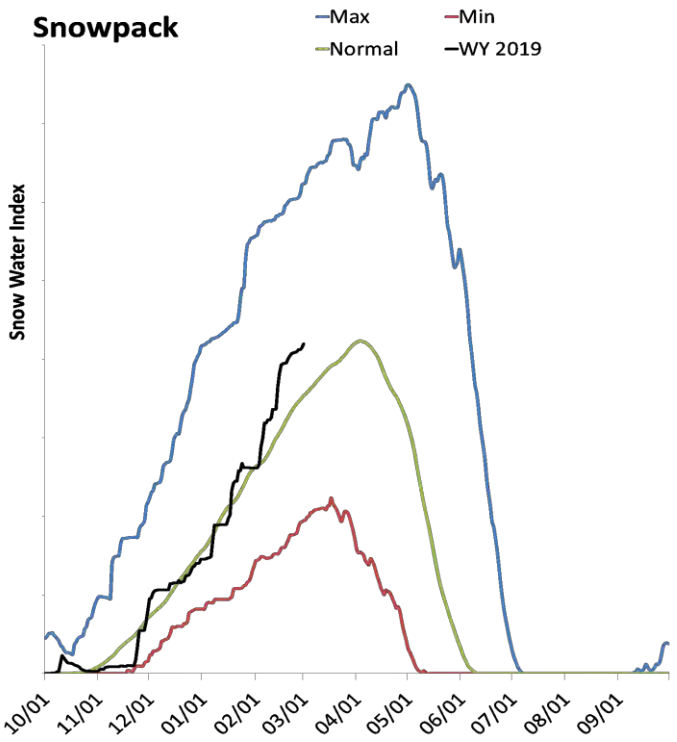
60% Saturation Soil Moisture

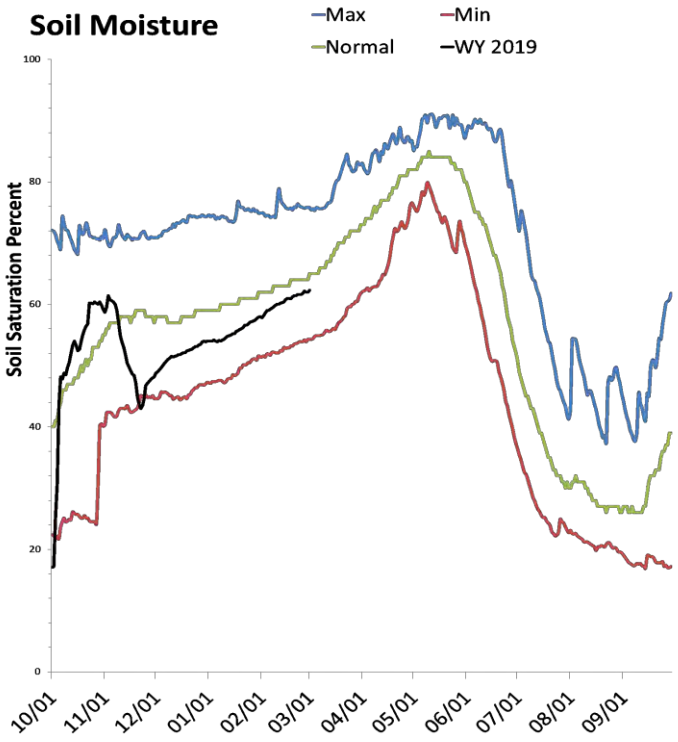
Bear River Basin

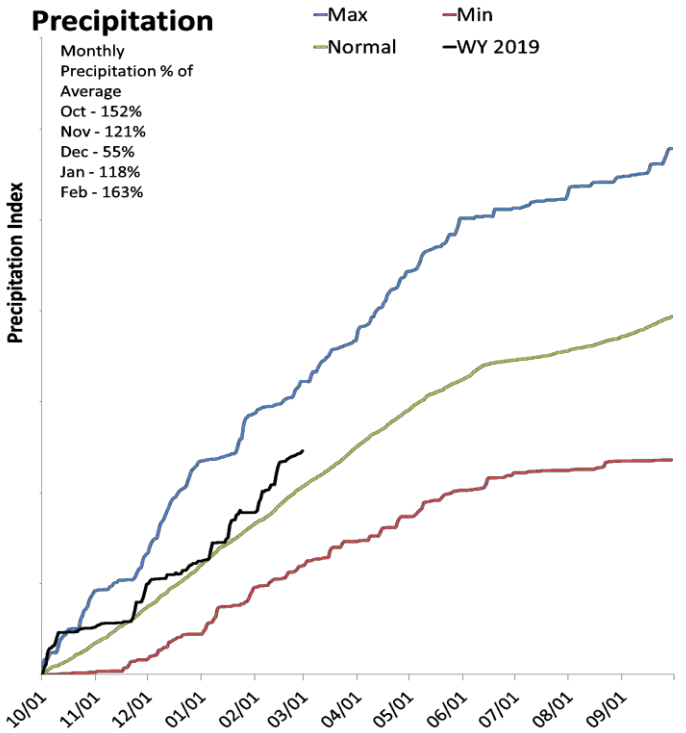
Weber & Ogden River Basins

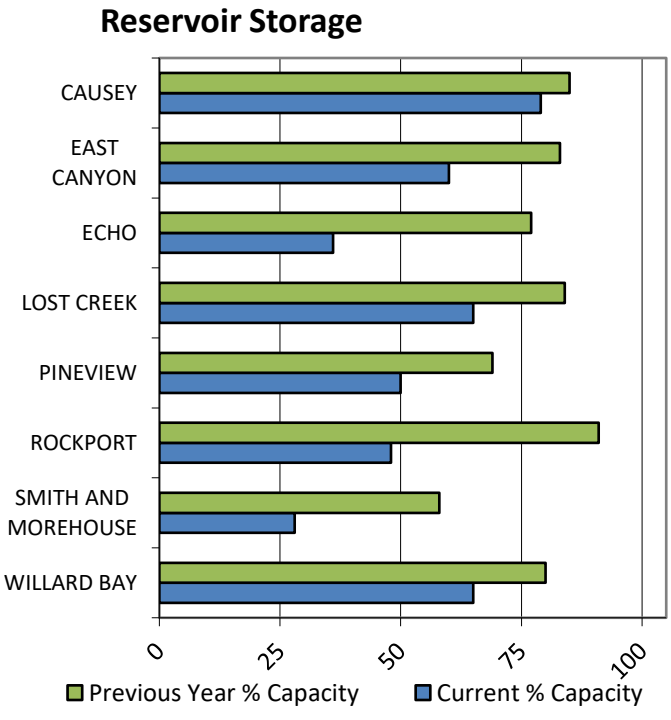
March 1, 2019

Snowpack in the Weber & Ogden River Basins is above normal at 119% of normal, compared to 55% last year. Precipitation in February was much above average at 164%, which brings the seasonal accumulation (Oct-Feb) to 119% of average. Soil moisture is at 62% compared to 65% last year. Reservoir storage is at 56% of capacity, compared to 79% last year. Forecast streamflow volumes range from 93% to 109% of average. The surface water supply index is 58% for the Ogden River, 55% for the Weber River.









SNOTEL Data

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Weber Ogden Rivers
Streamflow Forecasts - March 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	24	29	32	94%	35	40	34
Weber R nr Oakley	APR-JUL	83	100	111	95%	122	139	117
Rockport Reservoir Inflow	APR-JUL	77	99	114	93%	129	151	123
Chalk Ck at Coalville	APR-JUL	17.6	30	39	95%	48	60	41
Weber R nr Coalville	APR-JUL	73	100	118	94%	136	163	126
Echo Reservoir Inflow	APR-JUL	79	127	160	96%	193	240	166
Lost Ck Reservoir Inflow	APR-JUL	4.3	8.6	11.6	96%	14.6	18.9	12.1
East Canyon Ck nr Jeremy Ranch	APR-JUL	6.5	12.5	16.6	109%	21	27	15.2
East Canyon Ck nr Morgan	APR-JUL	12.9	22	29	104%	36	45	28
Weber R at Gateway	APR-JUL	95	215	300	95%	385	505	315
SF Ogden R nr Huntsville	APR-JUL	33	45	55	98%	63	75	56
Pineview Reservoir Inflow	APR-JUL	60	92	114	97%	136	168	118
Wheeler Ck nr Huntsville	APR-JUL	2.9	4.9	6.3	100%	7.5	9.5	6.3
Centerville Ck	APR-JUL	0.47	1.02	1.4	104%	1.78	2.3	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 February, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Causey Reservoir	5.6	6.0	3.2	7.1
East Canyon Reservoir	29.8	41.2	34.9	49.5
Echo Reservoir	26.5	56.7	47.9	73.9
Lost Creek Reservoir	14.7	18.8	12.2	22.5
Pineview Reservoir	55.6	76.2	53.0	110.1
Rockport Reservoir	29.5	55.1	34.8	60.9
Willard Bay	140.3	173.0	138.4	215.0
Smith And Morehouse Reservoir	2.3	4.7	3.6	8.1
Basin-wide Total	304.2	431.9	328.0	547.1
# of reservoirs	8	8	8	8

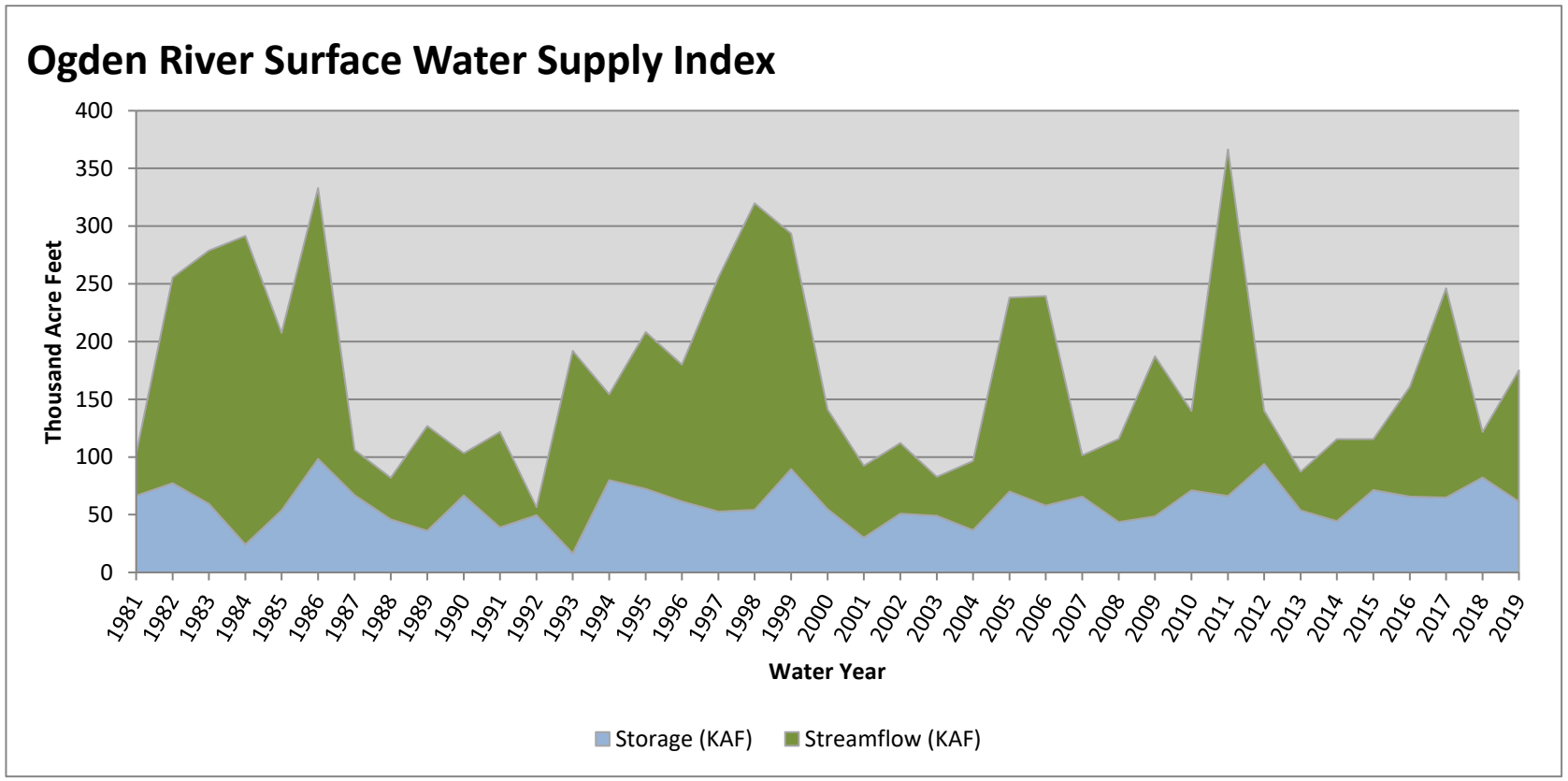
Watershed Snowpack Analysis March 1, 2019	# of Sites	% Median	Last Year % Median
Upper Weber	11	121%	63%
Lower Weber	7	122%	53%
Ogden River	5	118%	51%
Lost Creek	3	122%	71%

March 1, 2019

Surface Water Supply Index

Basin or Region	Feb EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Ogden River	**61.17**	**114.00**	**175.17**	**58**	**0.62**	**94, 16, 96, 09**

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

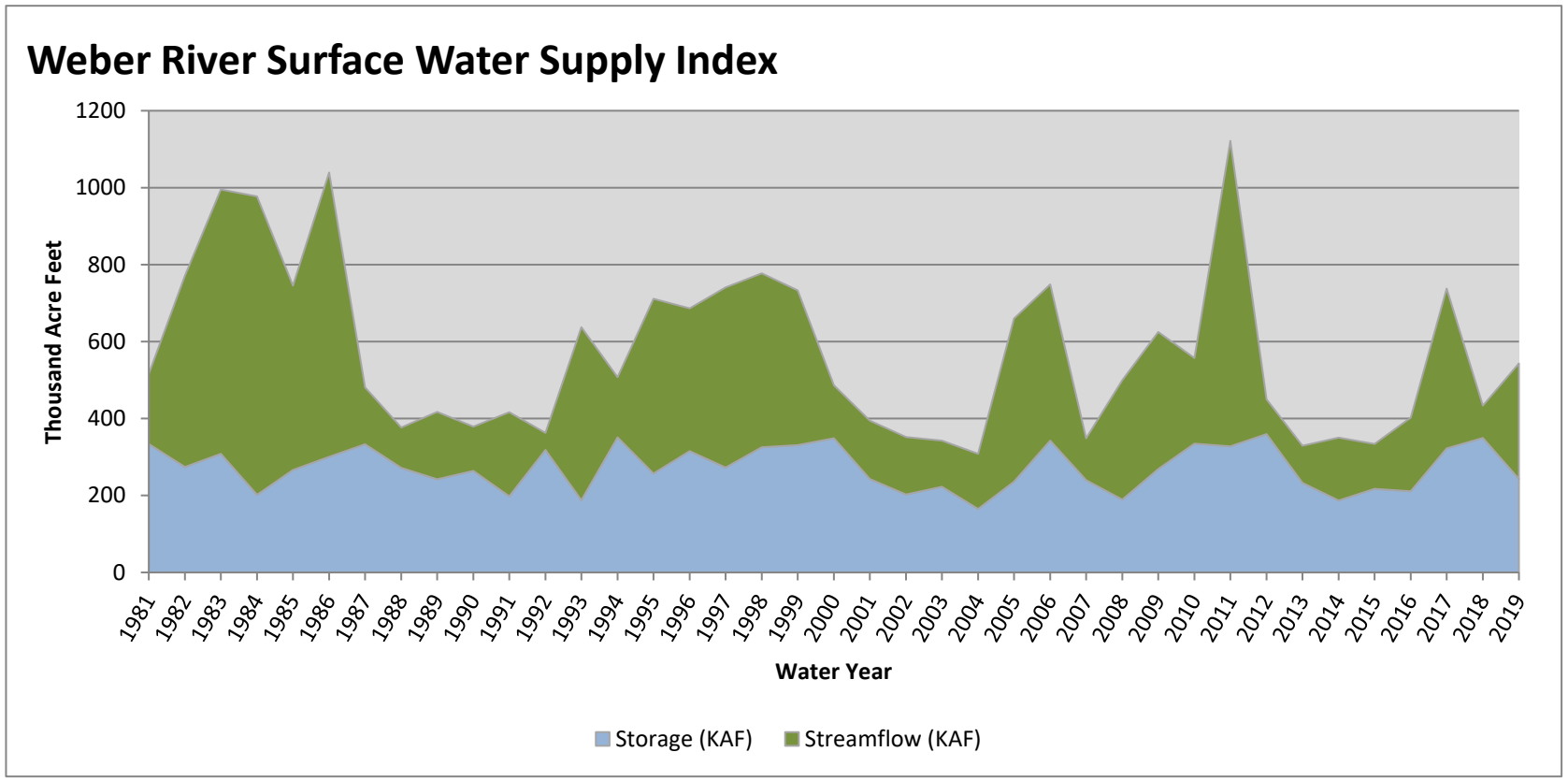


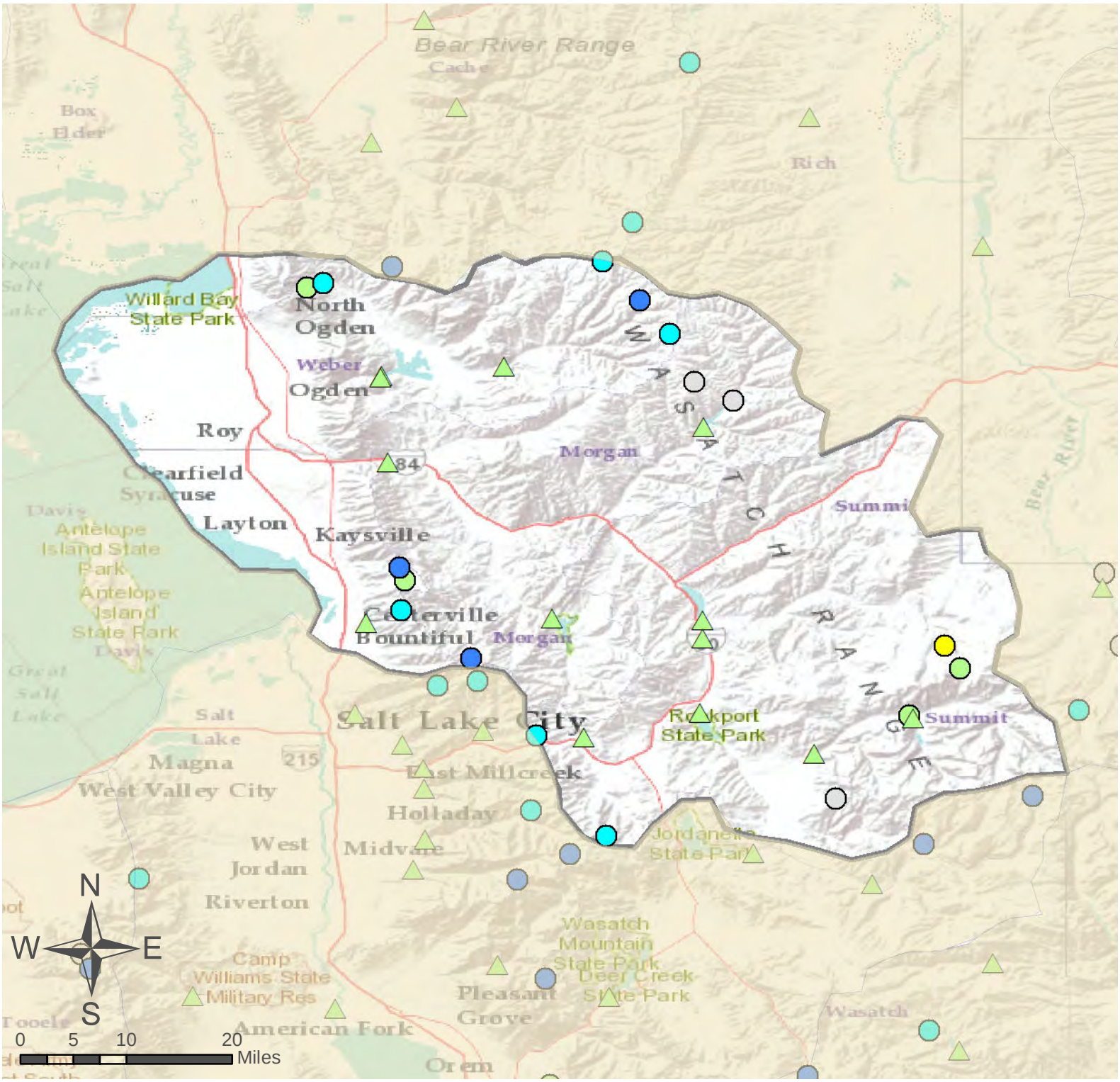
March 1, 2019

Surface Water Supply Index

Basin or Region	Feb EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Weber River	**243.02**	**300.00**	**543.02**	**55**	**0.42**	**94, 81, 10, 09**

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





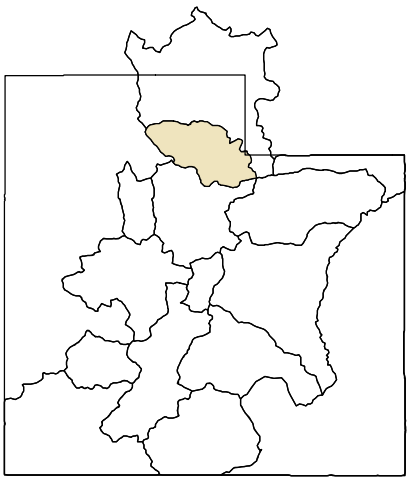
Weber & Ogden River Basins

SNOTEL Site

Forecast Point

% of Normal

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



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

119% of Normal SWE

119% of Normal Precipitation

164% of Normal Precipitation Last Month

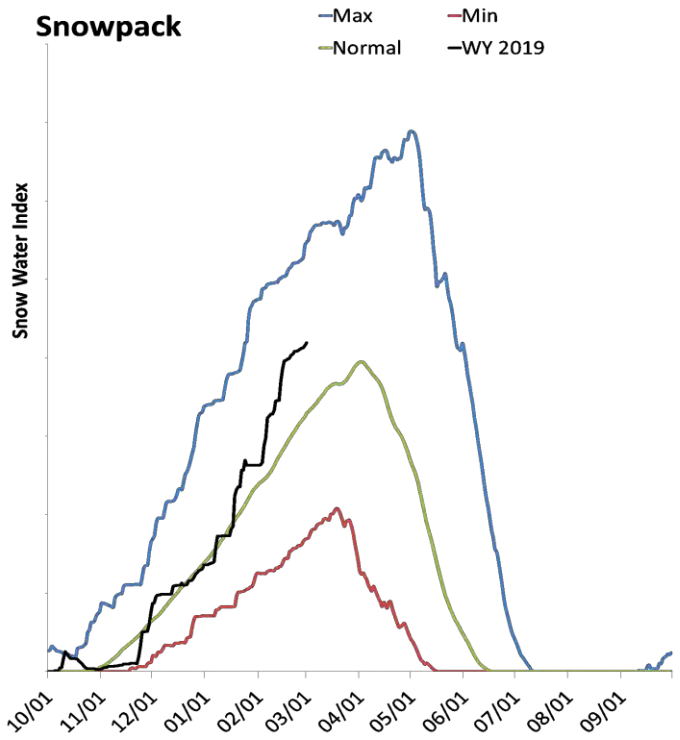
62% Saturation Soil Moisture

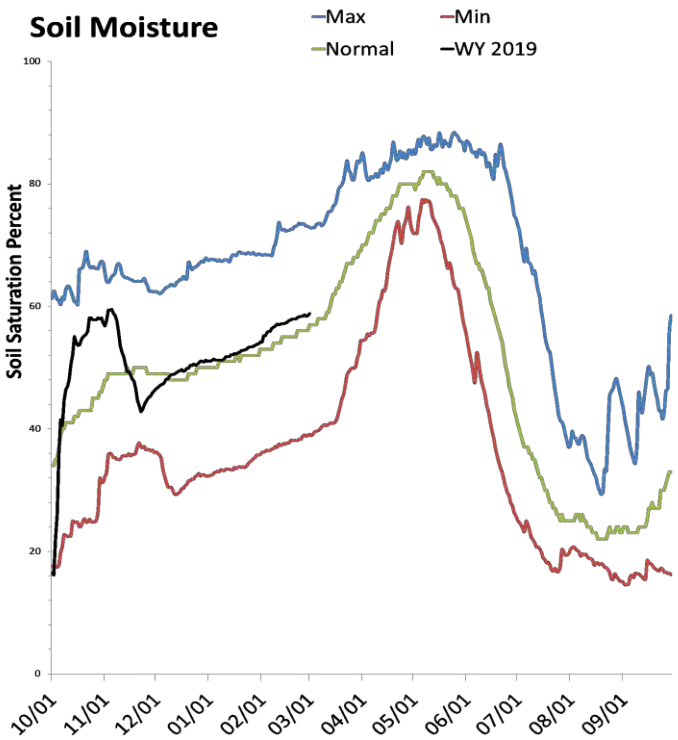
Weber & Ogden River Basins

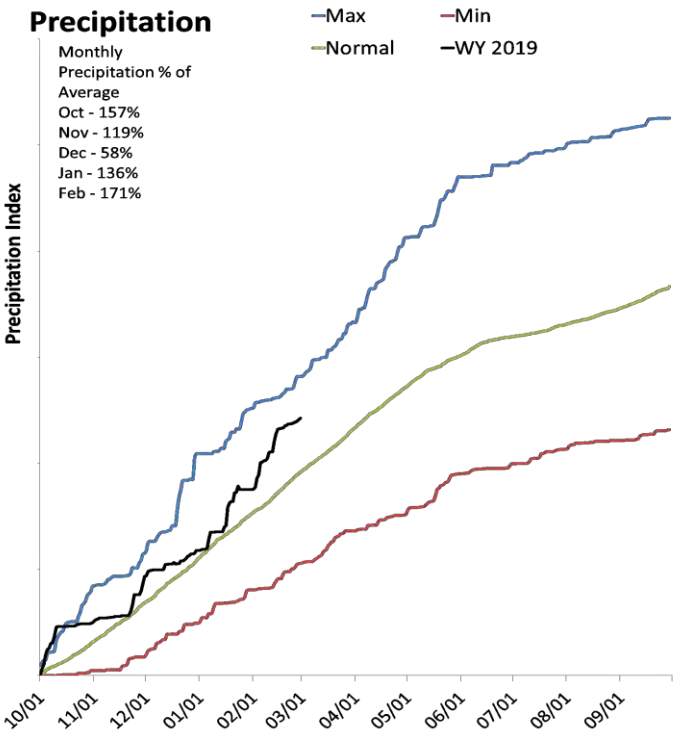
Provo & Jordan River Basins

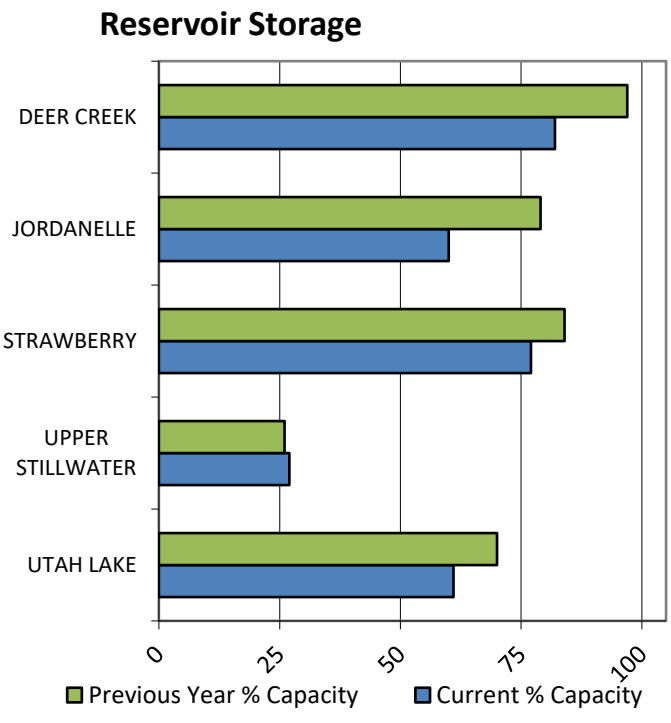
March 1, 2019

Snowpack in the Provo & Jordan River Basins is above normal at 127% of normal, compared to 53% last year. Precipitation in February was much above average at 171%, which brings the seasonal accumulation (Oct-Feb) to 126% of average. Soil moisture is at 58% compared to 47% last year. Reservoir storage is at 69% of capacity, compared to 80% last year. Forecast streamflow volumes range from 103% to 125% of average. The surface water supply index is 23% for the Provo River.









SNOTEL Data

Data Current as of: 3/6/2019 9:55:11 AM

Provo Jordan Rivers
Streamflow Forecasts - March 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	68	90	106	106%	124	153	100
Provo R at Hailstone	APR-JUL	71	95	113	105%	133	165	108
Provo R bl Deer Ck Dam	APR-JUL	87	110	125	108%	140	163	116
Spanish Fk at Castilla	APR-JUL	44	65	81	117%	99	129	69
American Fk ab Upper Powerplant	APR-JUL	22	30	35	109%	40	48	32
Utah Lake Inflow	APR-JUL	40	151	290	109%	495	945	265
W Canyon Ck nr Cedar Fort	APR-JUL	1.2	1.79	2.2	125%	2.6	3.2	1.76
Little Cottonwood Ck nr SLC	APR-JUL	28	34	39	103%	44	51	38
Big Cottonwood Ck nr SLC	APR-JUL	25	32	37	103%	42	49	36
Mill Ck nr SLC	APR-JUL	3.3	5.5	7	109%	8.5	10.7	6.4
Parleys Ck nr SLC	APR-JUL	6.3	11.5	15	106%	18.5	24	14.2
Dell Fk nr SLC	APR-JUL	2.9	4.5	5.8	105%	7.4	10.1	5.5
Emigration Ck nr SLC	APR-JUL	1.84	3.2	4.4	110%	5.9	8.7	4
City Ck nr SLC	APR-JUL	3.7	6.3	8.1	105%	9.9	12.5	7.7
Salt Ck at Nephi	APR-JUL	4.9	7.4	9.8	103%	13	19.7	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 February, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Deer Creek Reservoir	122.1	145.8	112.0	149.7
Strawberry Reservoir	849.4	931.8	660.5	1105.9
Utah Lake	533.1	611.6	785.8	870.9
Jordanelle Reservoir	190.8	253.0	239.4	314.0
Basin-wide Total	1695.4	1942.2	1797.7	2440.5
# of reservoirs	4	4	4	4

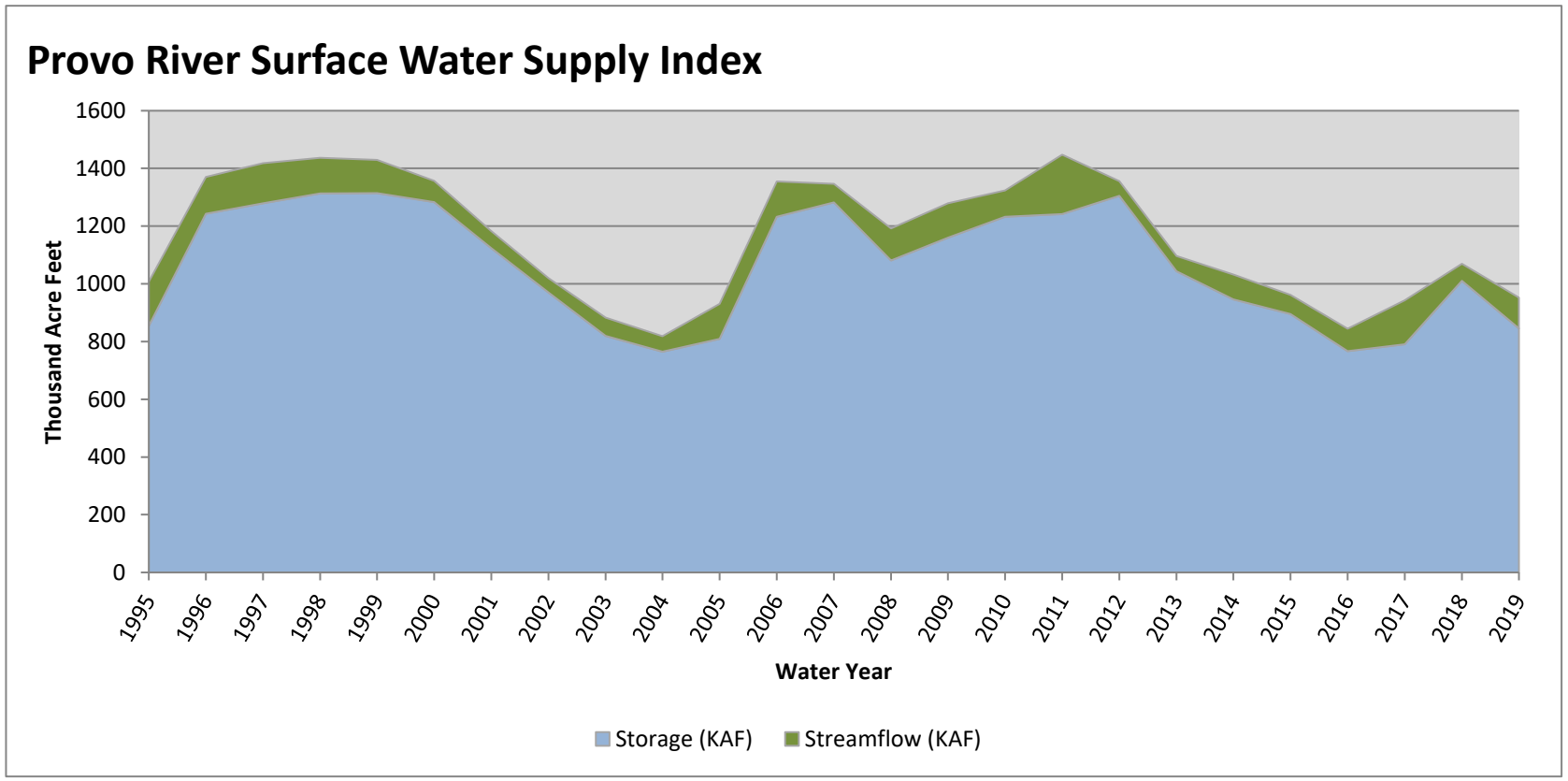
Watershed Snowpack Analysis March 1, 2019	# of Sites	% Median	Last Year % Median
Provo River	7	128%	52%
Jordan River	16	124%	59%
Utah Lake	13	127%	50%
Spanish Fork River	5	129%	46%
Six Creeks	15	124%	59%
Cottonwood Creeks	7	124%	61%

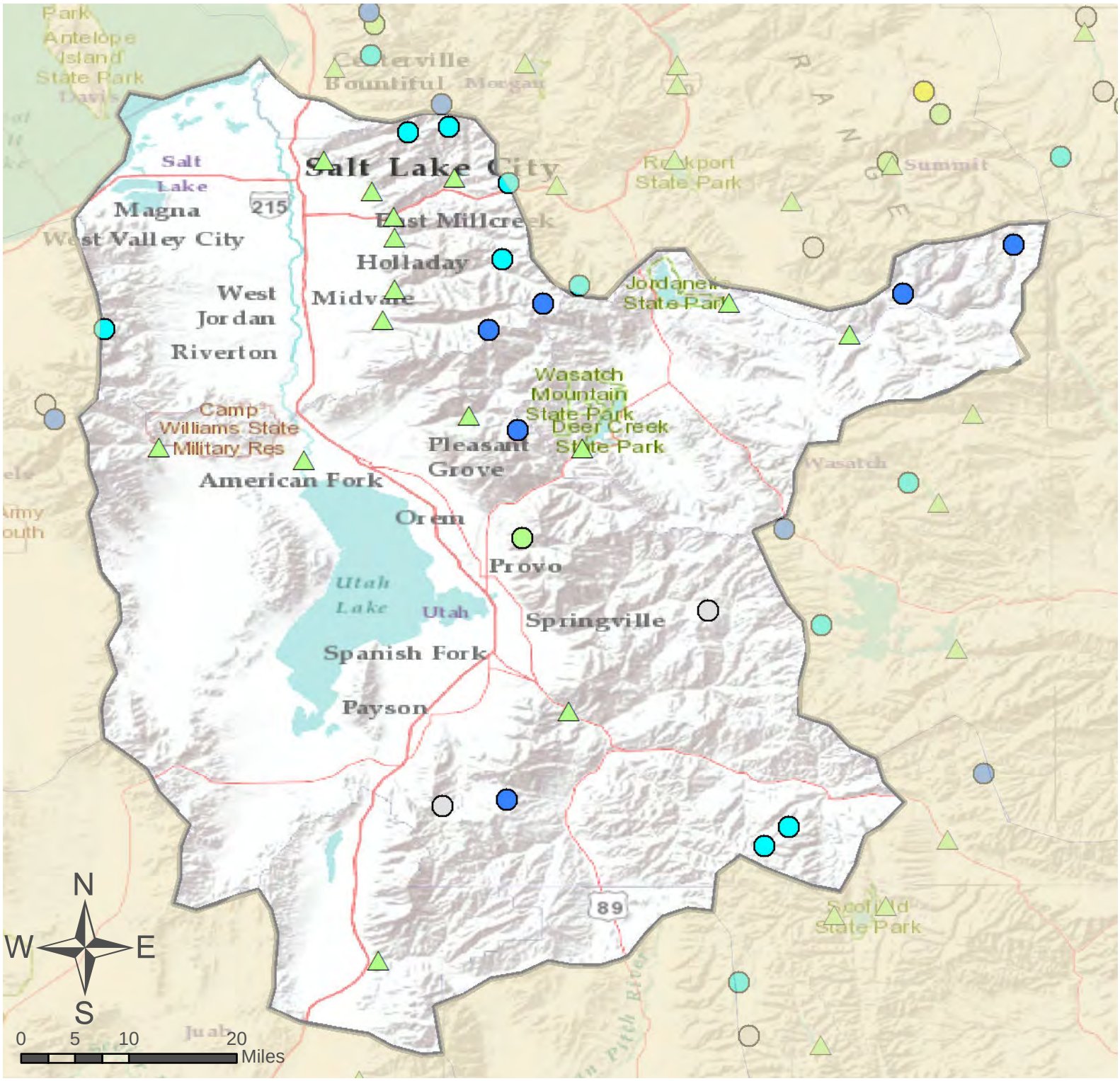
March 1, 2019

Surface Water Supply Index

Basin or Region	Feb EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Provo River	**845.99**	**106.00**	**951.99**	**23**	**-2.24**	**05, 17, 15, 95**

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





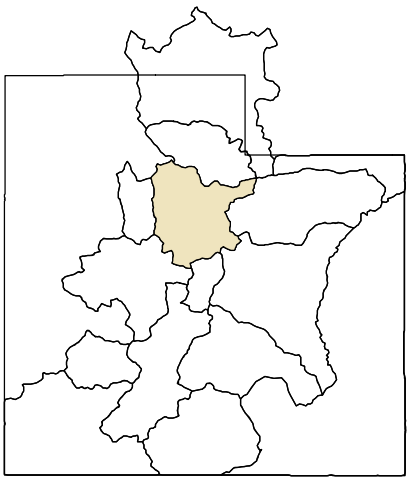
Provo & Jordan River Basins

SNOTEL Site

Forecast Point

% of Normal

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



As of March 1, 2019:

127% of Normal SWE

126% of Normal Precipitation

171% of Normal Precipitation Last Month

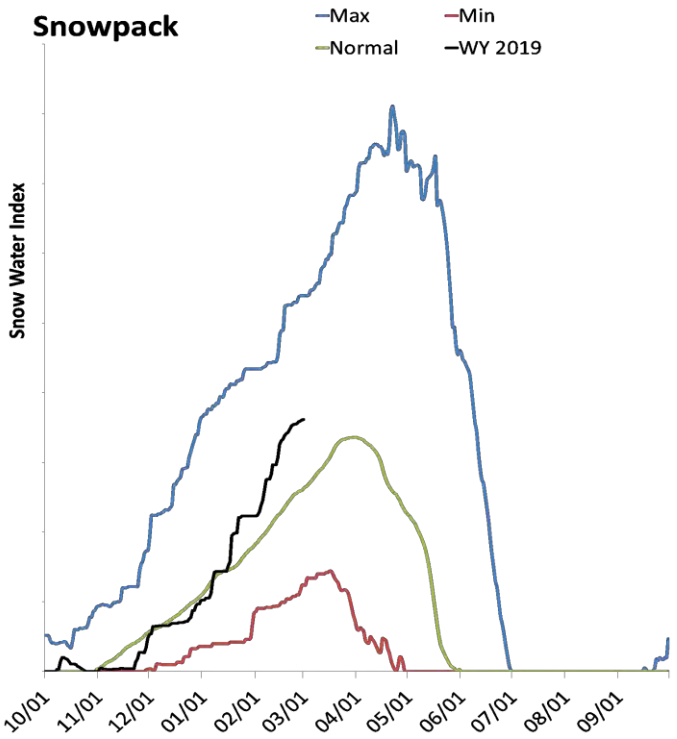
58% Saturation Soil Moisture

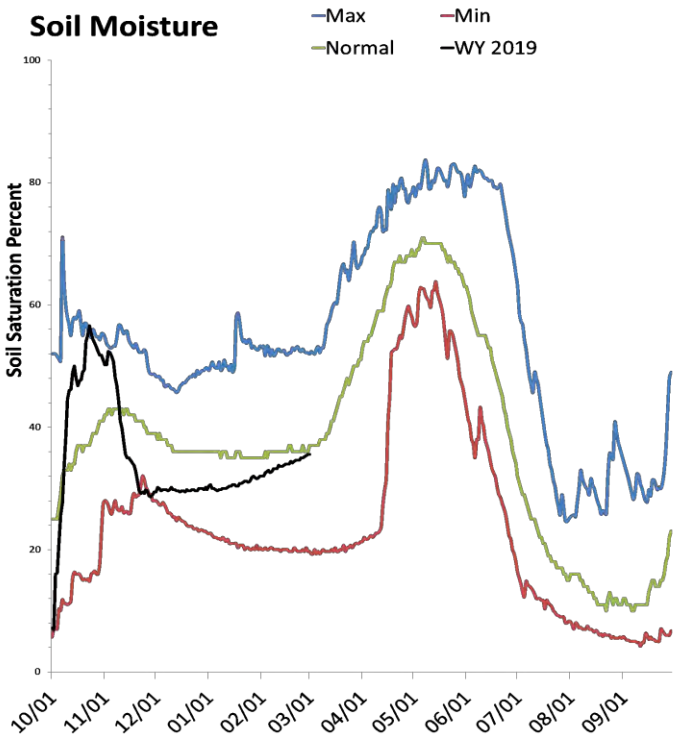
Provo & Jordan River Basins

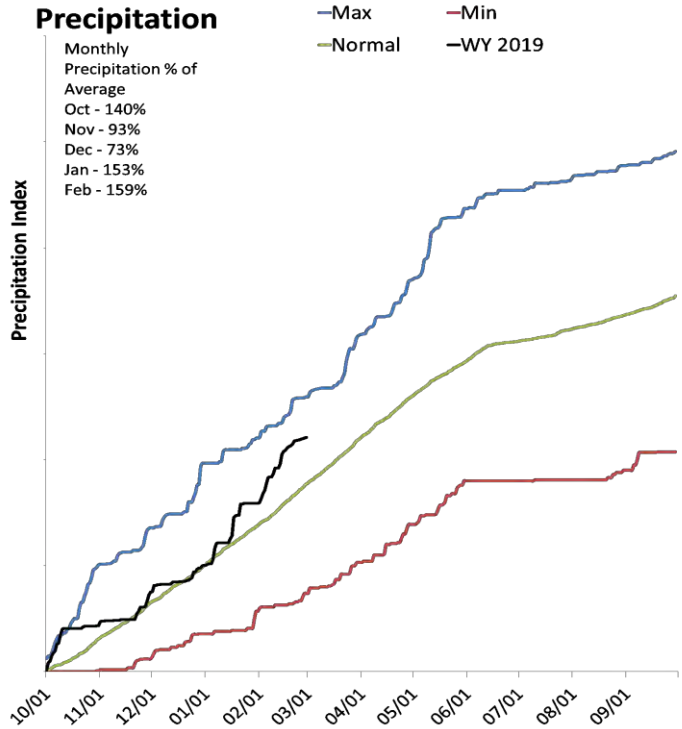
Tooele Valley & West Desert Basins

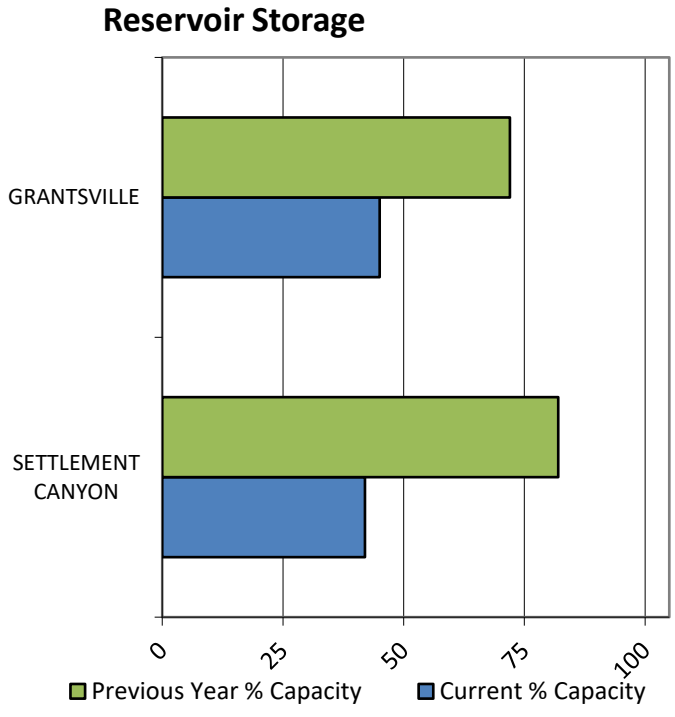
March 1, 2019

Snowpack in the Tooele Valley & West Desert Basins is much above normal at 138% of normal, compared to 52% last year. Precipitation in February was much above average at 159%, which brings the seasonal accumulation (Oct-Feb) to 125% of average. Soil moisture is at 36% compared to 23% last year. Reservoir storage is at 45% of capacity, compared to 75% last year. Forecast streamflow volumes range from 97% to 125% of average.









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Tooele Valley West Desert
Streamflow Forecasts - March 1, 2019

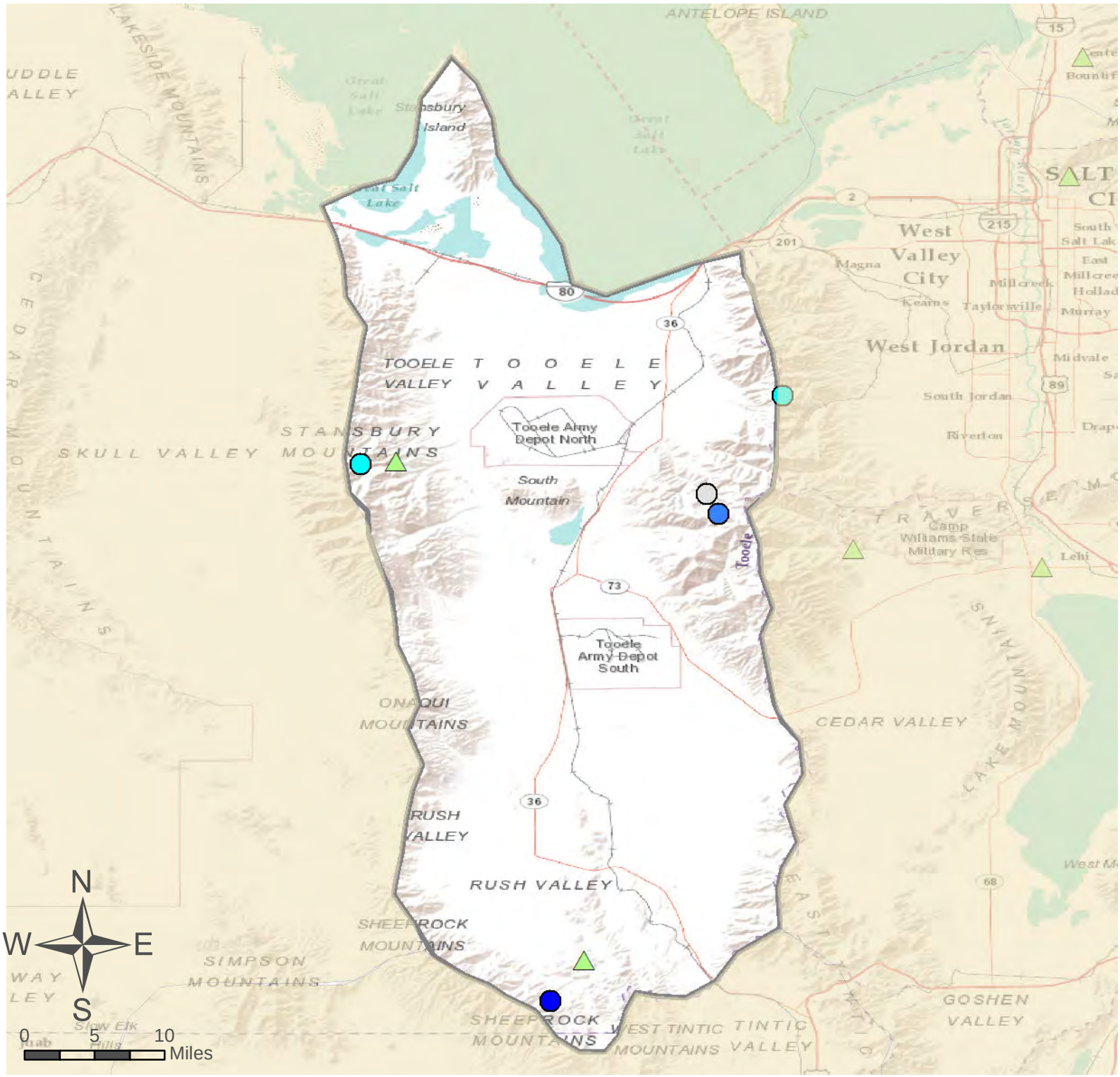
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	0.8	1.23	1.6	115%	2	2.8	1.39
S Willow Ck nr Grantsville	APR-JUL	2.3	3	3.5	113%	4.1	5	3.1
Dunn Ck nr Park Valley	APR-JUL	1.54	2.3	2.8	97%	3.3	4.1	2.9
W Canyon Ck nr Cedar Fort	APR-JUL	1.2	1.79	2.2	125%	2.6	3.2	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 February, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Settlement Canyon Reservoir	0.4	0.8	0.7	1.0
Grantsville Reservoir	1.5	2.4	2.1	3.3
Basin-wide Total	1.9	3.2	2.8	4.3
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis March 1, 2019	# of Sites	% Median	Last Year % Median
Tooele Valley	3	125%	53%
Raft River	5	115%	66%
Deep Creek	0		
Northwestern Utah	3	138%	55%



Tooele Valley & West Desert Basins

SNOTEL Site

Forecast Point

As of March 1, 2019:

138% of Normal SWE

125% of Normal Precipitation

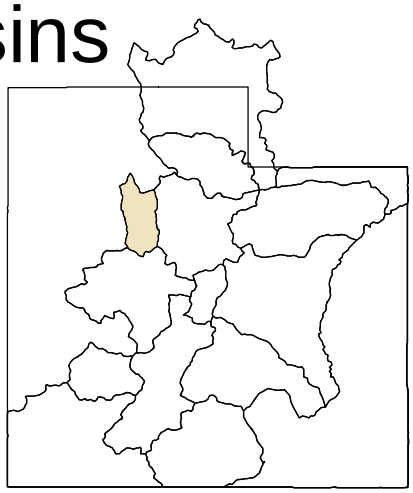
159% of Normal Precipitation Last Month

36% Saturation Soil Moisture

Tooele Valley & West Desert Basins

% of Normal

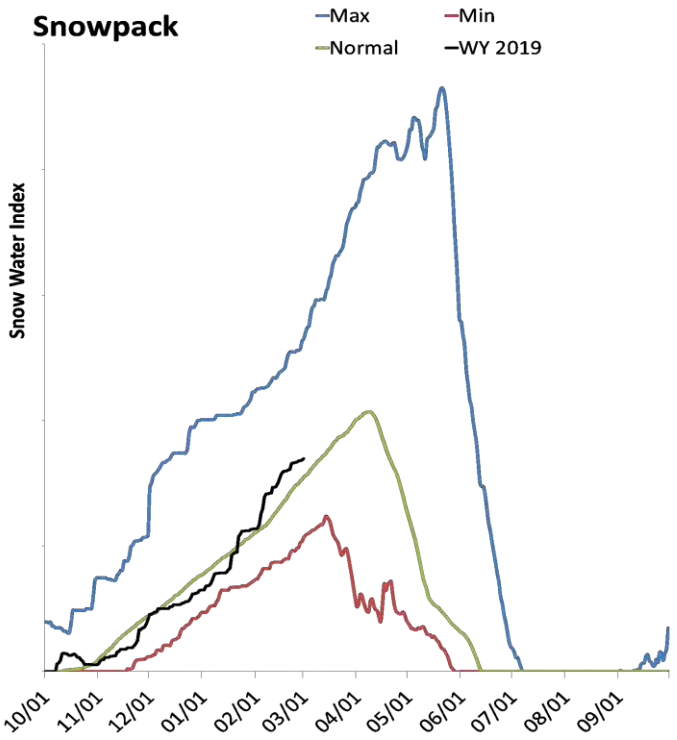
- < 50%
- 50 - 69%
- 70 - 89%
- 90 - 109%
- 110 - 129%
- 130 - 149%
- > 150%
- No Normal

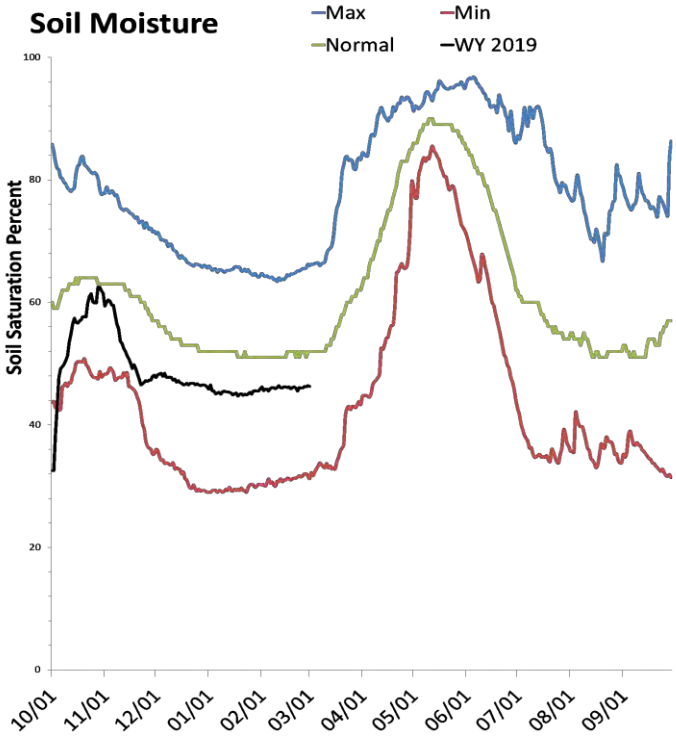


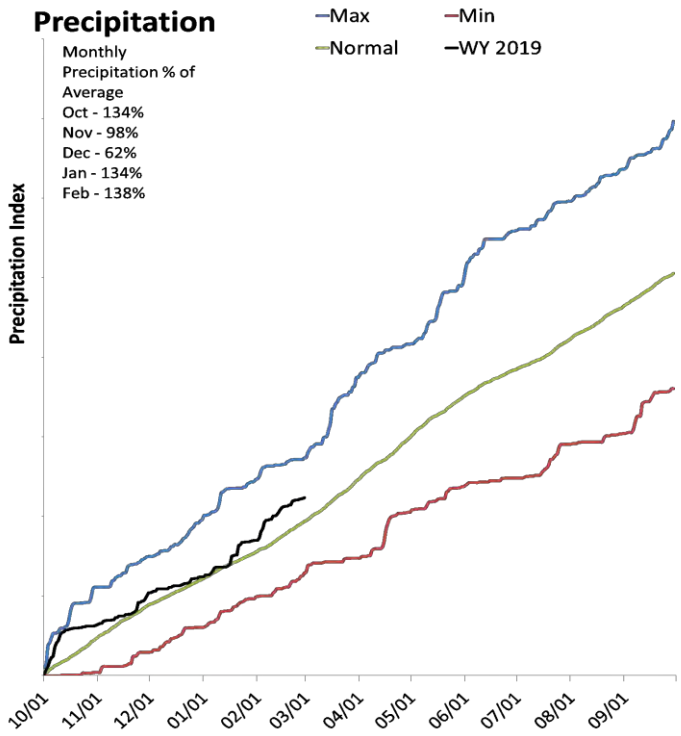
Northeastern Uinta Basin

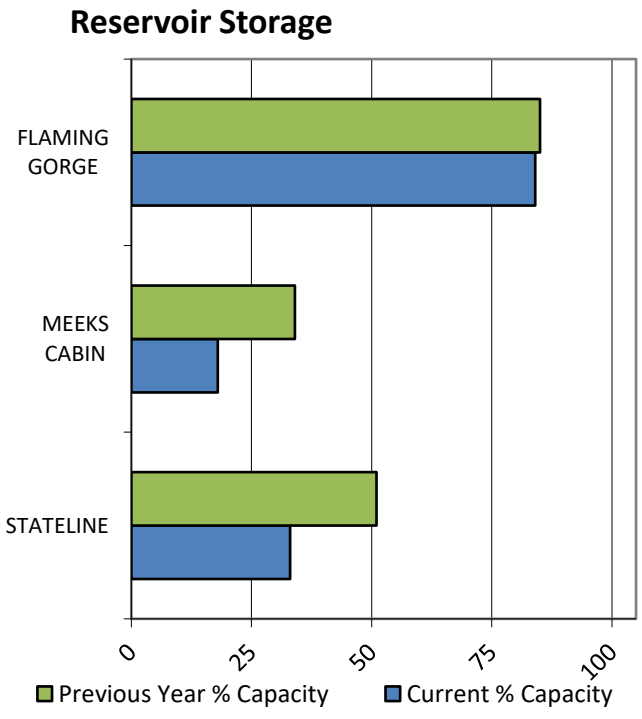
March 1, 2019

Snowpack in the Northeastern Uinta Basin is above normal at 110% of normal, compared to 82% last year. Precipitation in February was much above average at 136%, which brings the seasonal accumulation (Oct-Feb) to 115% of average. Soil moisture is at 45% compared to 46% last year. Reservoir storage is at 83% of capacity, compared to 85% last year. Forecast streamflow volumes range from 94% to 110% of average. The surface water supply index is 46% for the Blacks Fork, 54% for the Smiths Creek.









SNOTEL Data

Data Current as of: 3/6/2019 9:55:28 AM

Northeastern Uintas
Streamflow Forecasts - March 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	66	83	95	110%	107	124	86
EF of Smiths Fork nr Robertson [2]	APR-JUL	17.4	23	27	100%	32	39	27
Flaming Gorge Reservoir Inflow [2]	APR-JUL	485	745	925	94%	1100	1370	980
Ashley Ck nr Vernal	APR-JUL	32	45	54	108%	64	81	50
Big Brush Ck ab Red Fleet Reservoir	APR-JUL	14	18.9	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 February, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Flaming Gorge Reservoir	3148.8	3194.0	3014.0	3749.0
Stateline Reservoir	3.9	6.1	5.2	12.0
Meeks Cabin Reservoir	5.9	11.1	11.9	32.5
Basin-wide Total	3158.6	3211.2	3031.1	3793.5
# of reservoirs	3	3	3	3

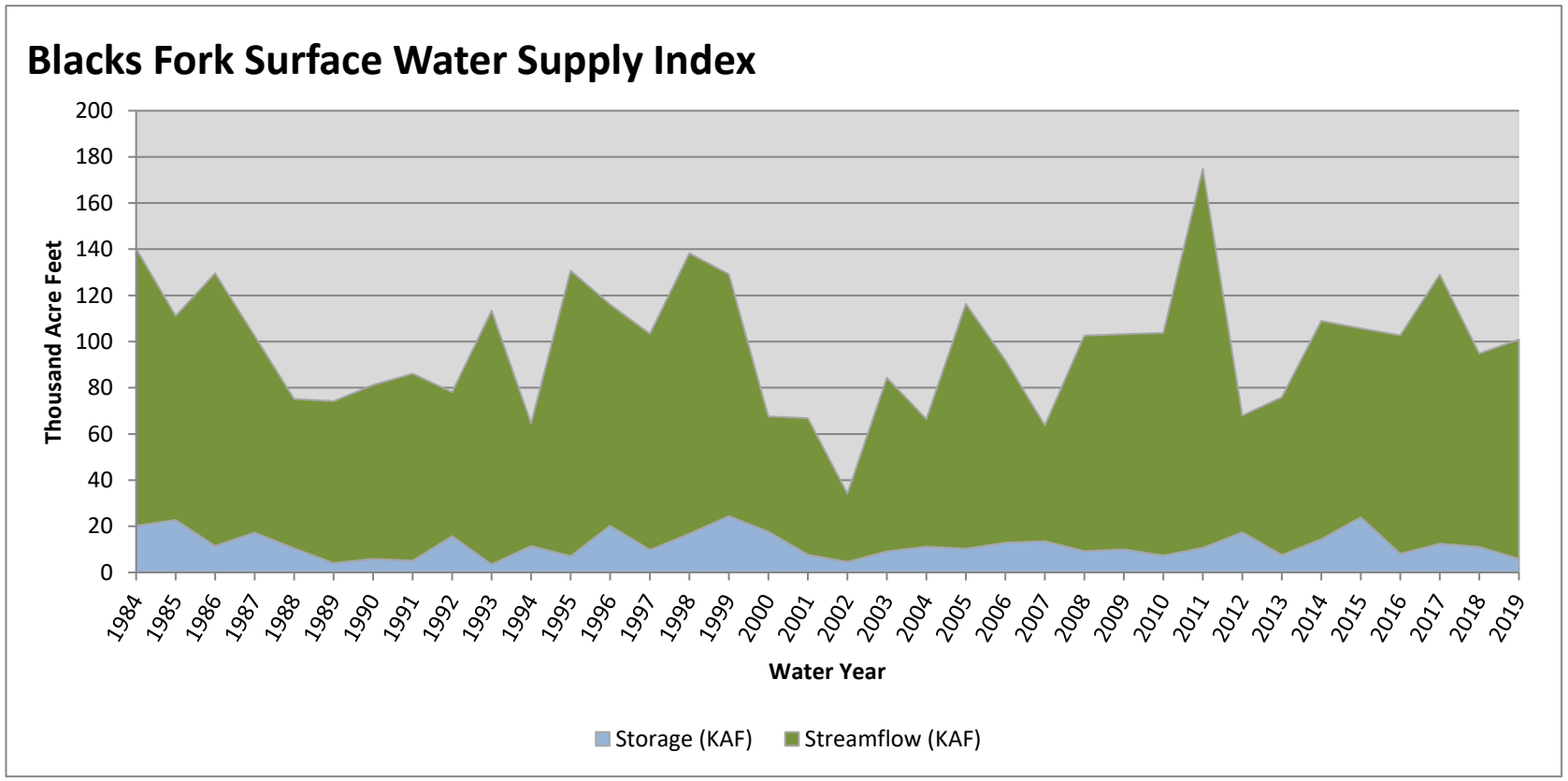
Watershed Snowpack Analysis March 1, 2019	# of Sites	% Median	Last Year % Median
Blacks Fork River	5	116%	78%
Upper Green	2	96%	93%
Ashley Brush Creeks	4	128%	57%

March 1, 2019

Surface Water Supply Index

Basin or Region	Feb EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Blacks Fork	**5.91**	**95.00**	**100.91**	**46**	**-0.34**	**06, 18, 87, 08**

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

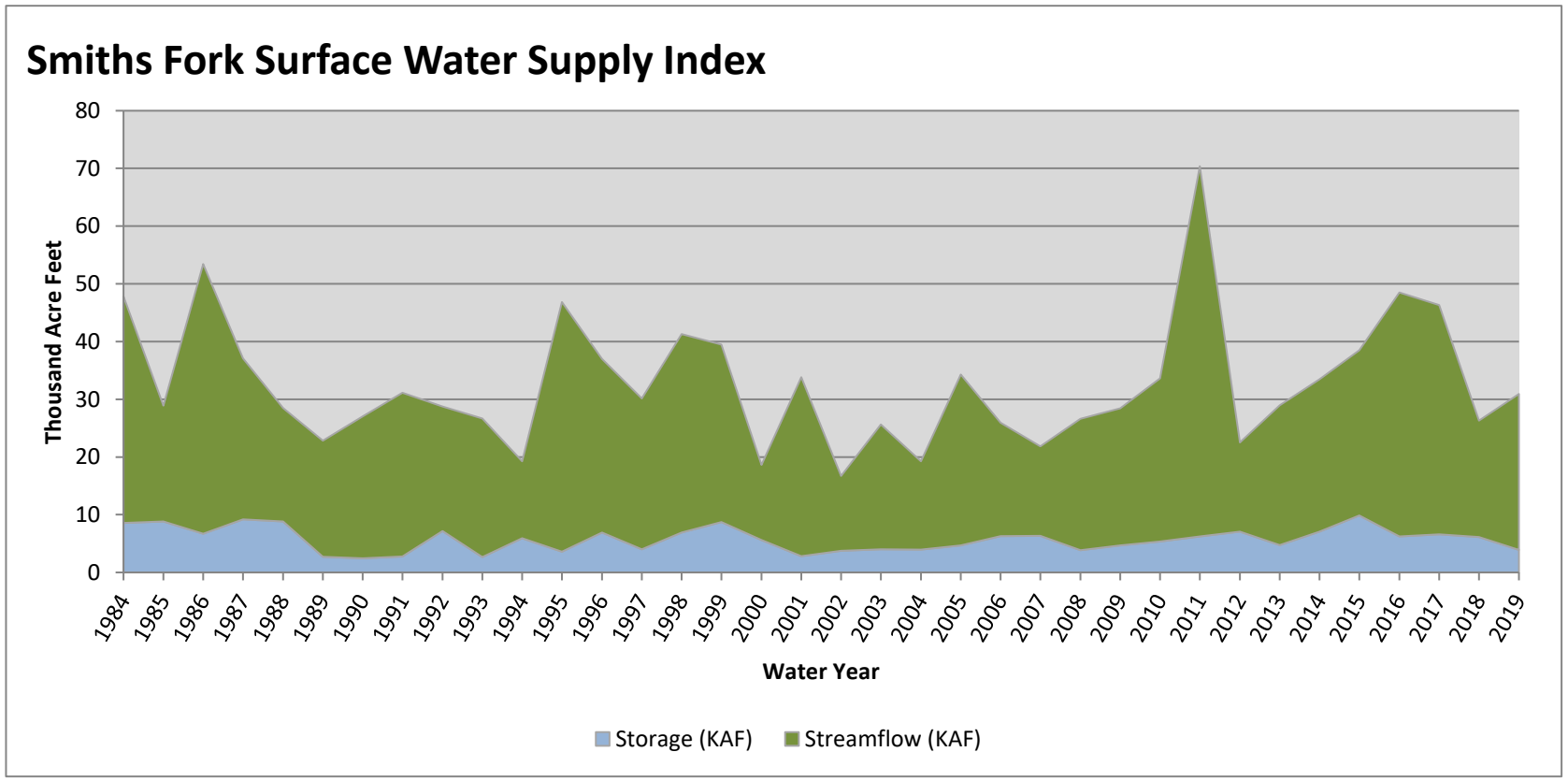


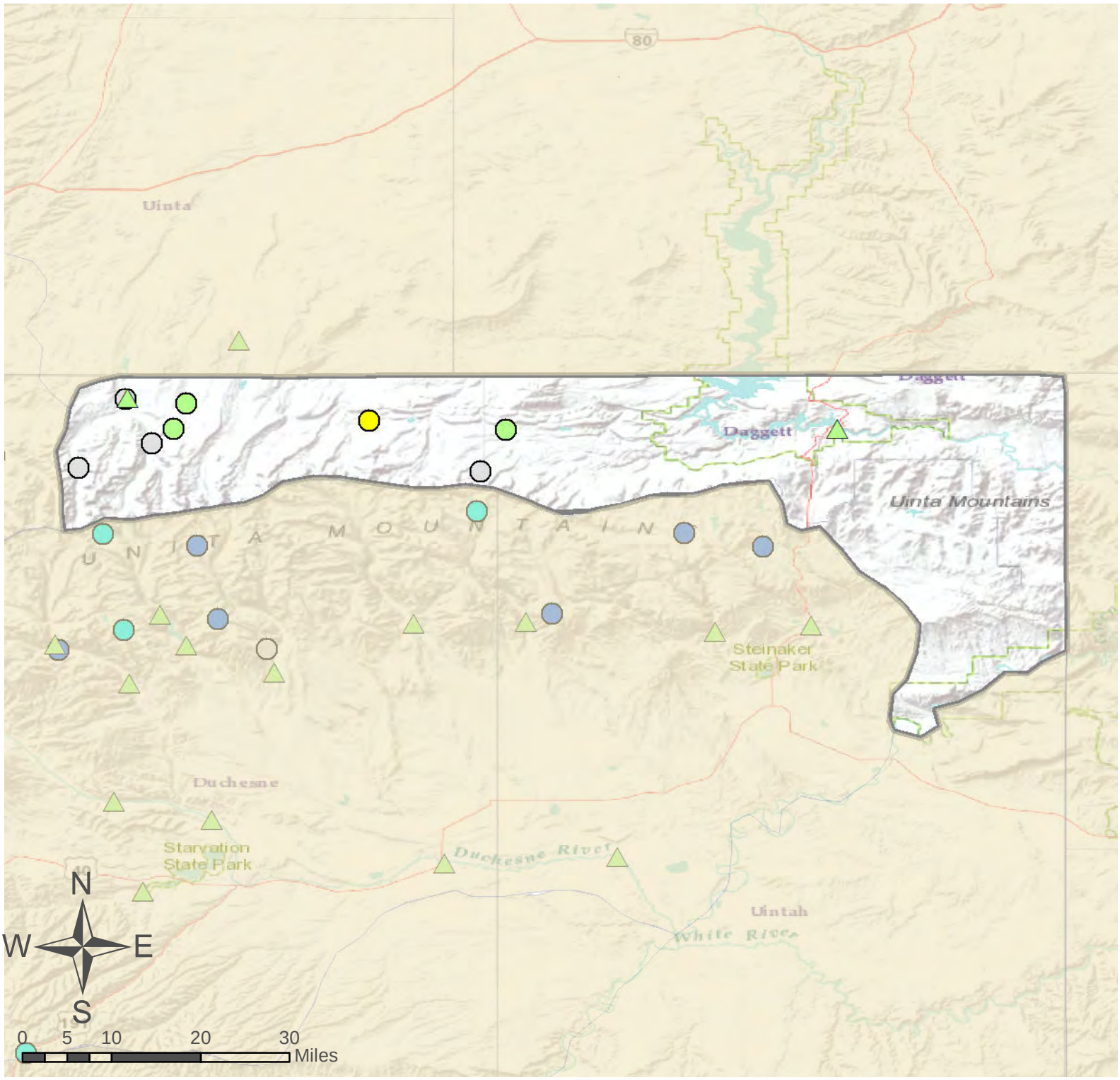
March 1, 2019

Surface Water Supply Index

Basin or Region	Feb EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Smiths Fork	**3.91**	**27.00**	**30.91**	**54**	**0.34**	**13, 97, 91, 14**

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





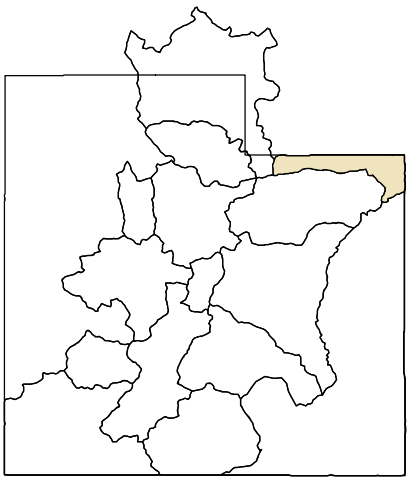
Northeastern Uinta Basin

SNOTEL Site

Forecast Point

% of Normal

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



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

110% of Normal SWE

115% of Normal Precipitation

136% of Normal Precipitation Last Month

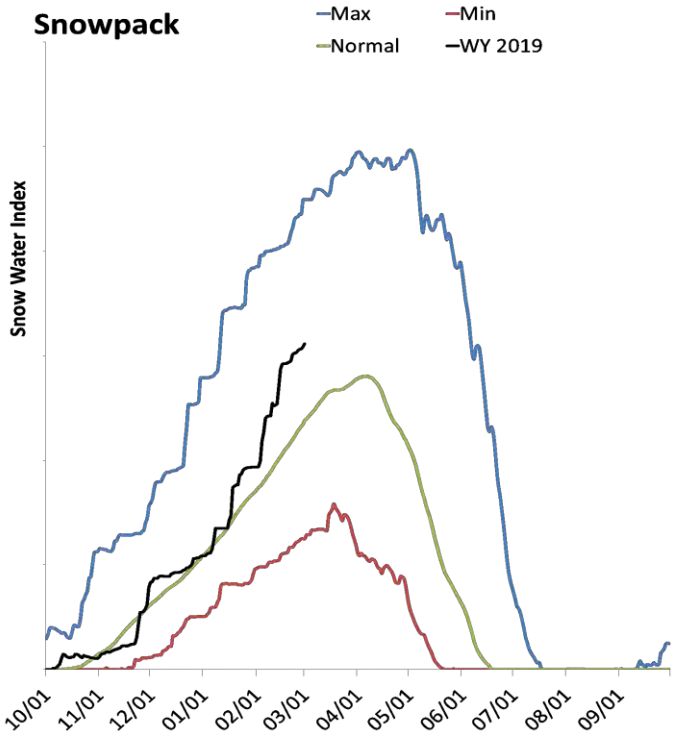
45% Saturation Soil Moisture

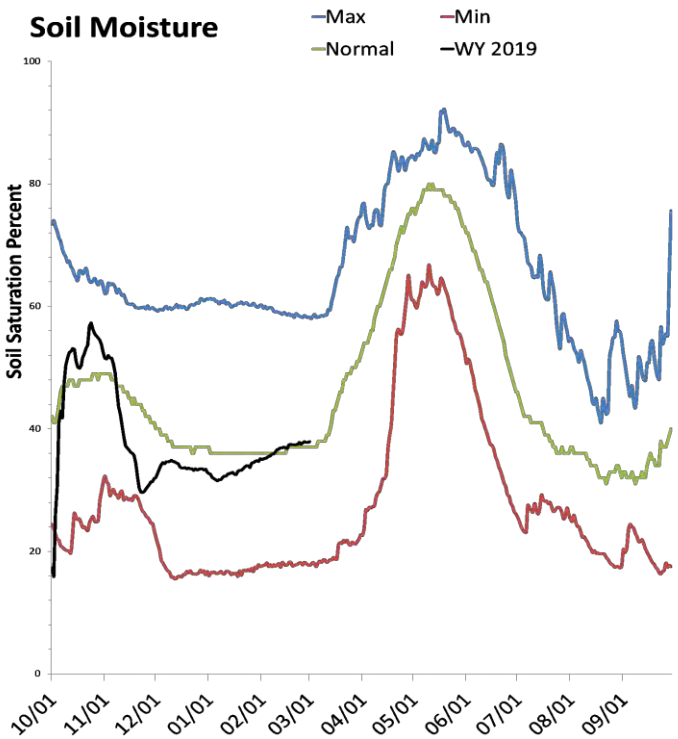
Northeastern Uinta Basin

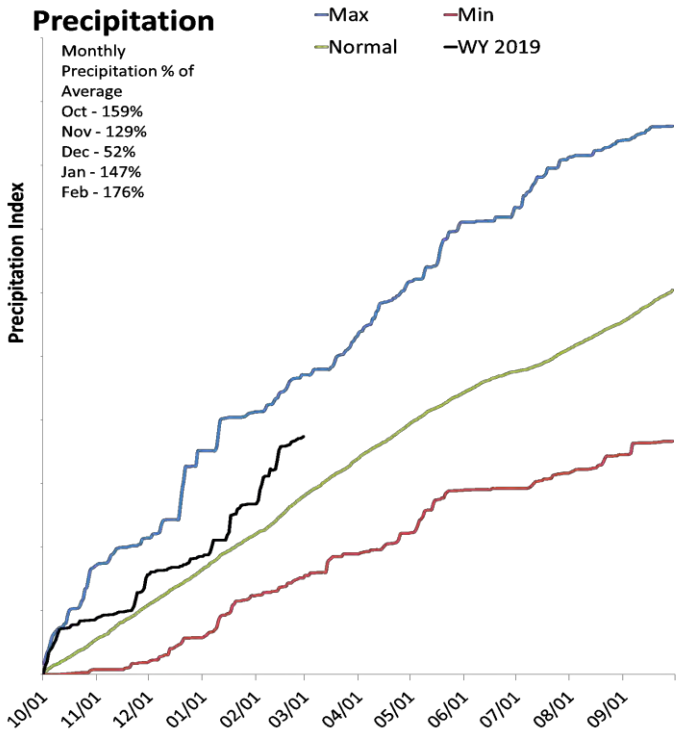
Duchesne River Basin

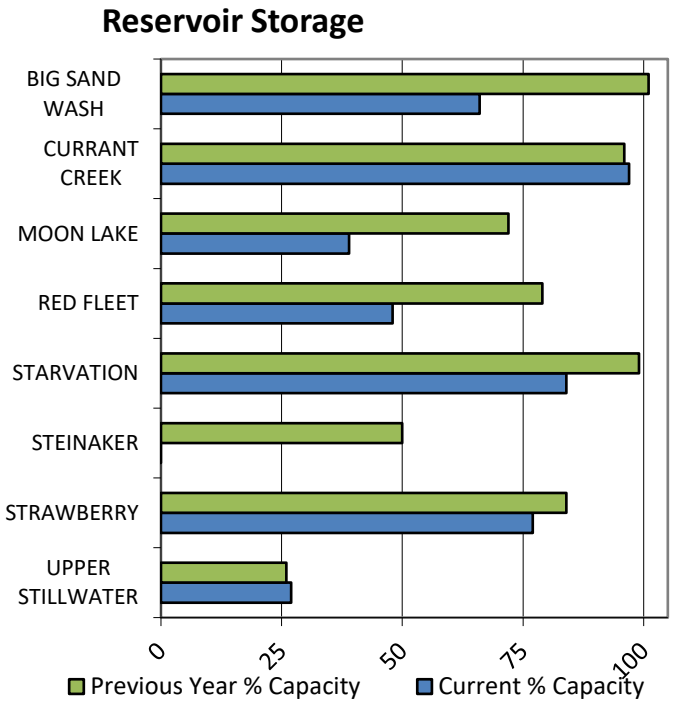
March 1, 2019

Snowpack in the Duchesne River Basin is much above average at 131% of normal, compared to 53% last year. Precipitation in February was much above average at 177%, which brings the seasonal accumulation (Oct-Feb) to 134% of average. Soil moisture is at 38% compared to 25% last year. Reservoir storage is at 75% of capacity, compared to 84% last year. Forecast streamflow volumes range from 108% to 152% of average. The surface water supply index is 65% for the Western Uintas, 28% for the Eastern Uintas.









SNOTEL Data

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Duchesne River
Streamflow Forecasts - March 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	16.1	21	24	129%	28	34	18.6
Duchesne R nr Tabiona [2]	APR-JUL	89	110	126	117%	143	170	108
Upper Stillwater Reservoir Inflow[2]	APR-JUL	62	75	85	115%	96	112	74
Rock Ck nr Mountain Home [2]	APR-JUL	74	89	100	114%	112	130	88
Duchesne R ab Knight Diversion [2]	APR-JUL	164	199	225	115%	255	295	195
Currant Ck Reservoir Inflow[2]	APR-JUL	17.2	23	27	135%	32	39	20
Strawberry R nr Soldier Springs [2]	APR-JUL	51	72	88	152%	106	134	58
Strawberry R nr Duchesne [2]	APR-JUL	97	135	165	147%	198	250	112
Lake Fork R ab Moon Lake Reservoir	APR-JUL	51	65	76	125%	87	106	61
Lake Fk R Bl Moon Lk nr Mountain Home[2]	APR-JUL	57	70	80	121%	90	107	66
Yellowstone R nr Altonah	APR-JUL	49	63	74	121%	85	103	61
Duchesne R at Myton [2]	APR-JUL	275	365	435	132%	510	630	330
Uinta R bl Powerplant Diversion nr Neola[2]	APR-JUL	53	75	93	126%	113	145	74
Whiterocks R nr Whiterocks	APR-JUL	35	48	59	109%	71	90	54
Duchesne R nr Randlett [2]	APR-JUL	290	405	500	130%	600	770	385
Ashley Ck nr Vernal	APR-JUL	32	45	54	108%	64	81	50
Big Brush Ck ab Red Fleet Reservoir	APR-JUL	14	18.9	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 February, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Steinaker Reservoir	-3.8	16.8	23.1	33.4
Red Fleet Reservoir	12.4	20.4	18.3	25.7
Big Sand Wash Reservoir	16.9	25.9		25.7
Upper Stillwater Reservoir	8.9	8.5	7.6	32.5
Starvation Reservoir	139.2	163.5	144.5	164.1
Moon Lake Reservoir	13.9	25.7	26.3	35.8
Currant Creek Reservoir	15.0	14.8	14.8	15.5
Strawberry Reservoir	849.4	931.8	660.5	1105.9
Basin-wide Total	1038.9	1164.7	872.0	1379.5
# of reservoirs	6	6	6	6

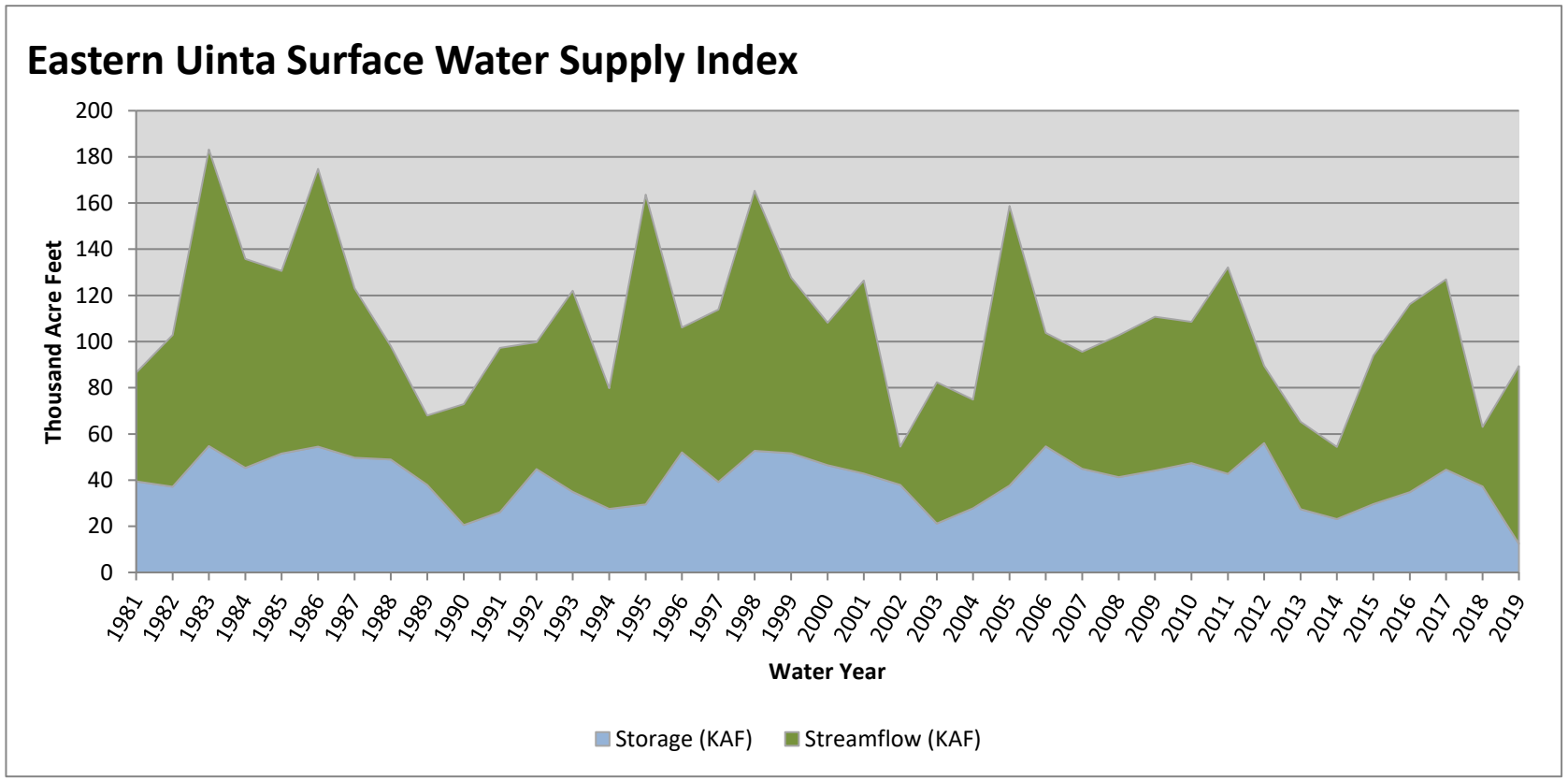
Watershed Snowpack Analysis March 1, 2019	# of Sites	% Median	Last Year % Median
Strawberry River	5	132%	46%
Lakefork Yellowstone Rivers	7	130%	60%
Uinta Whiterocks River	2	125%	48%

March 1, 2019

Surface Water Supply Index

Basin or Region	Feb EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Eastern Uinta	**12.38**	**77.00**	**89.38**	**28**	**-1.88**	**03, 81, 12, 15**

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

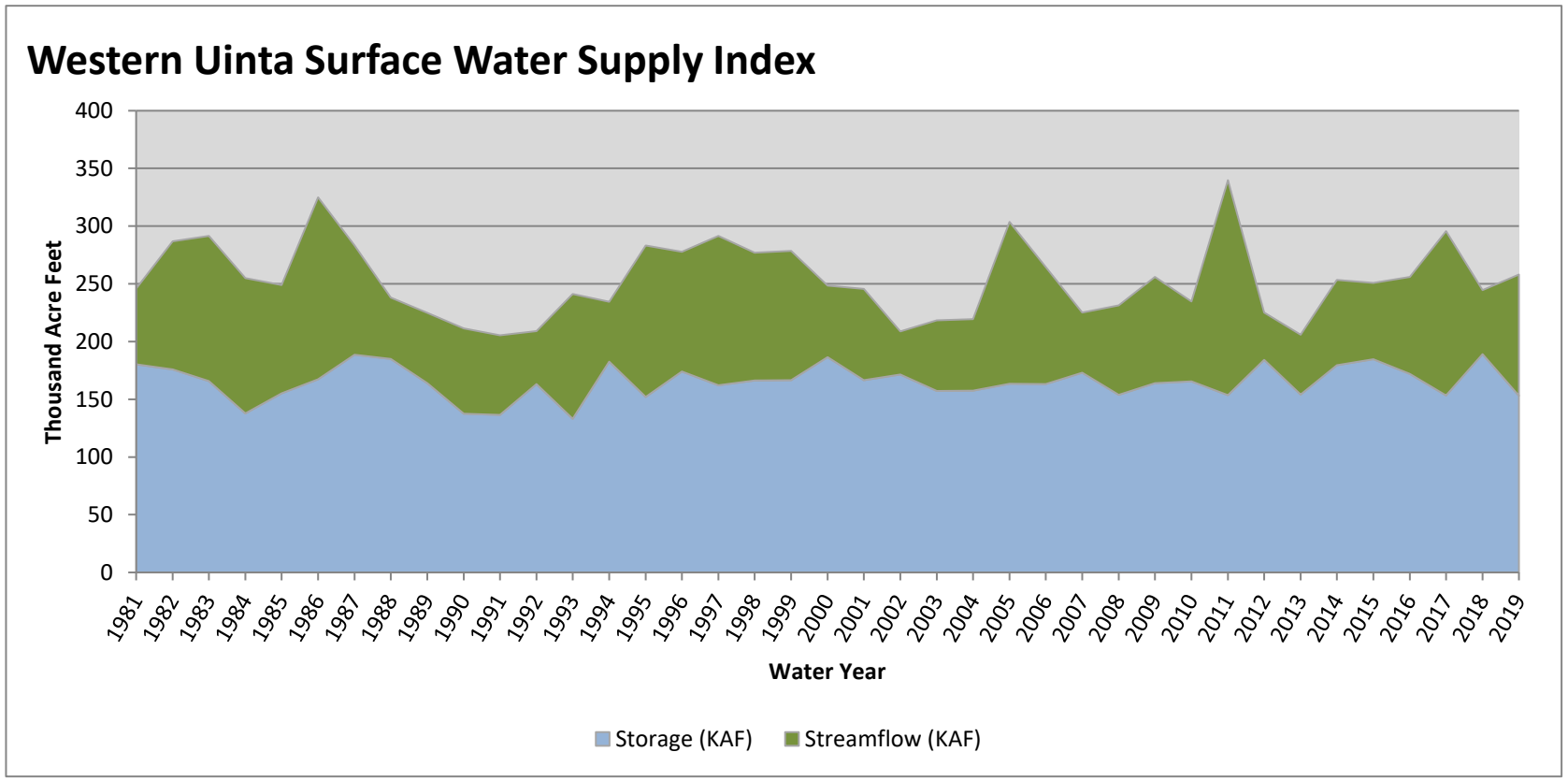


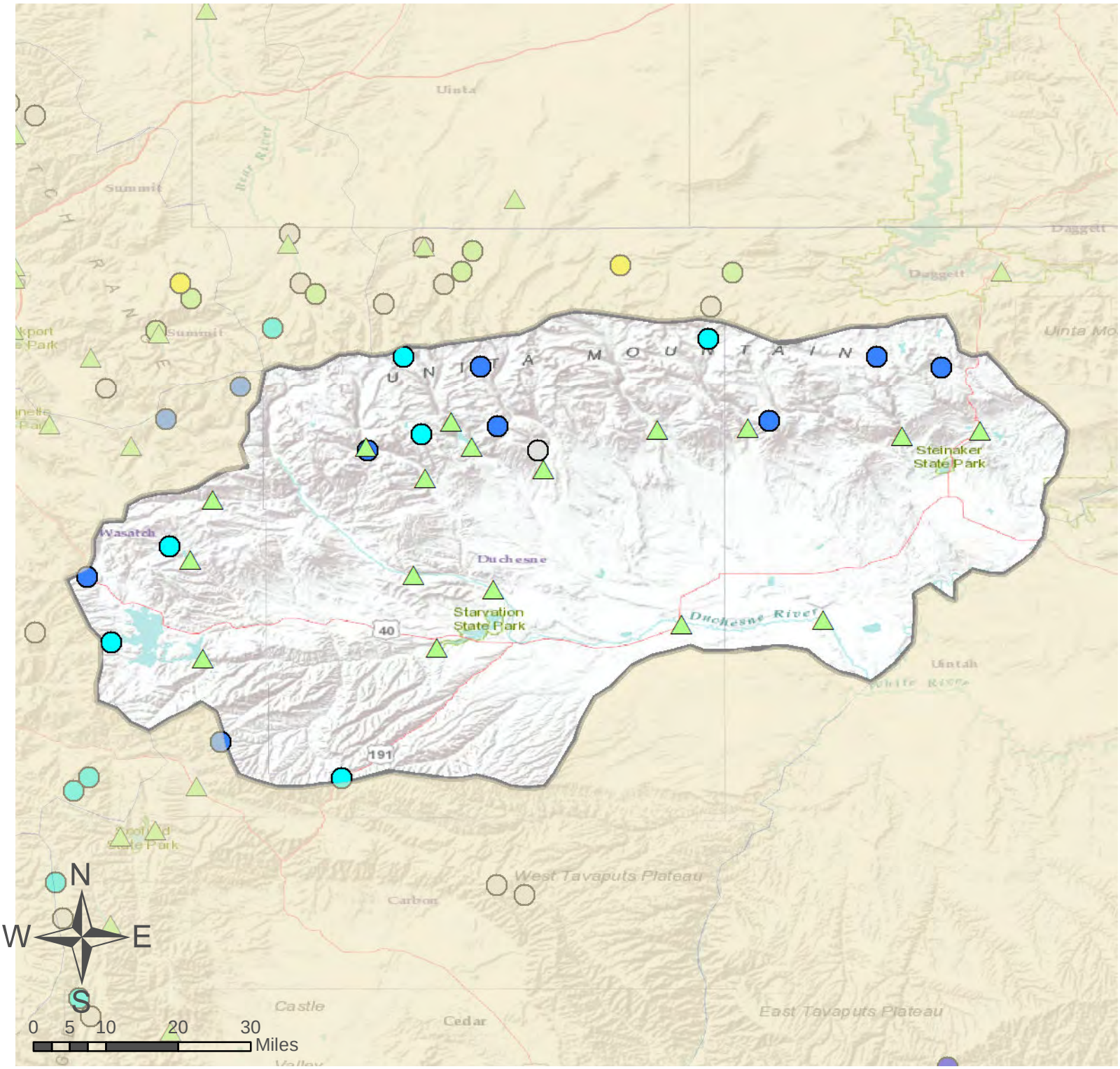
March 1, 2019

Surface Water Supply Index

Basin or Region	Feb EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Western Uinta	**153.16**	**105.00**	**258.16**	**65**	**1.25**	**16, 09, 06, 98**

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





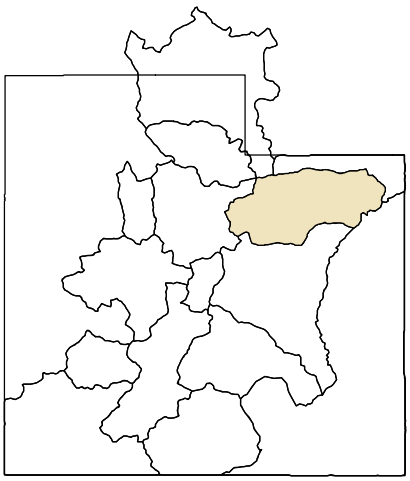
Duchesne River Basin

SNOTEL Site

Forecast Point

% of Normal

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



As of March 1, 2019:

131% of Normal SWE

134% of Normal Precipitation

177% of Normal Precipitation Last Month

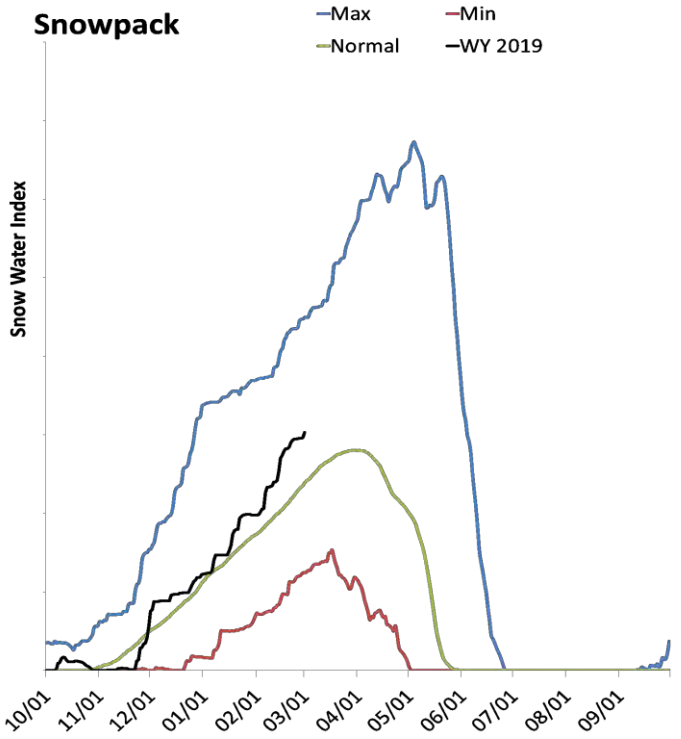
38% Saturation Soil Moisture

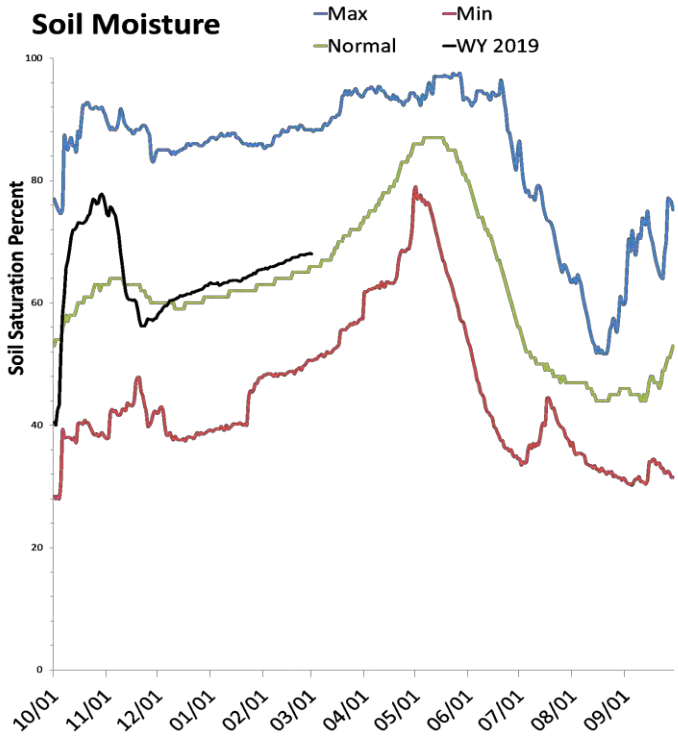
Duchesne River Basin

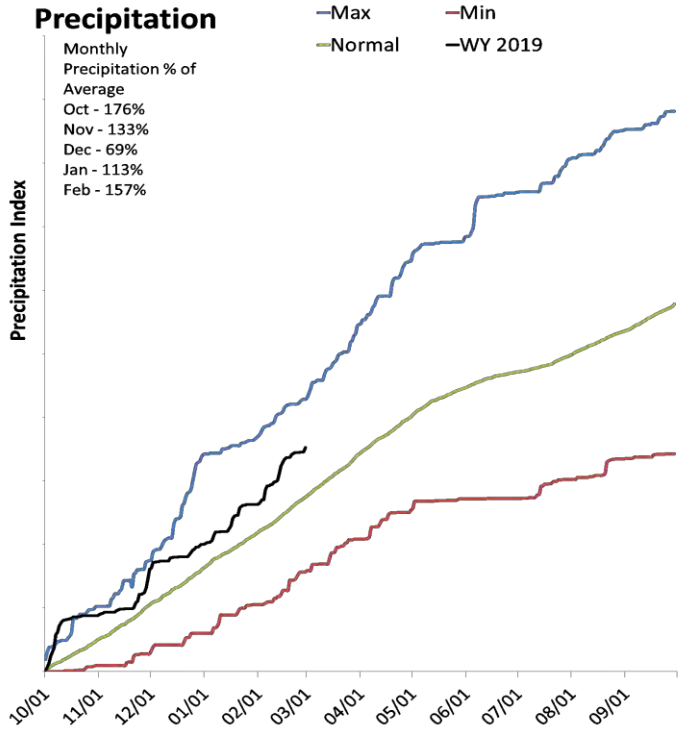
San Pitch River Basin

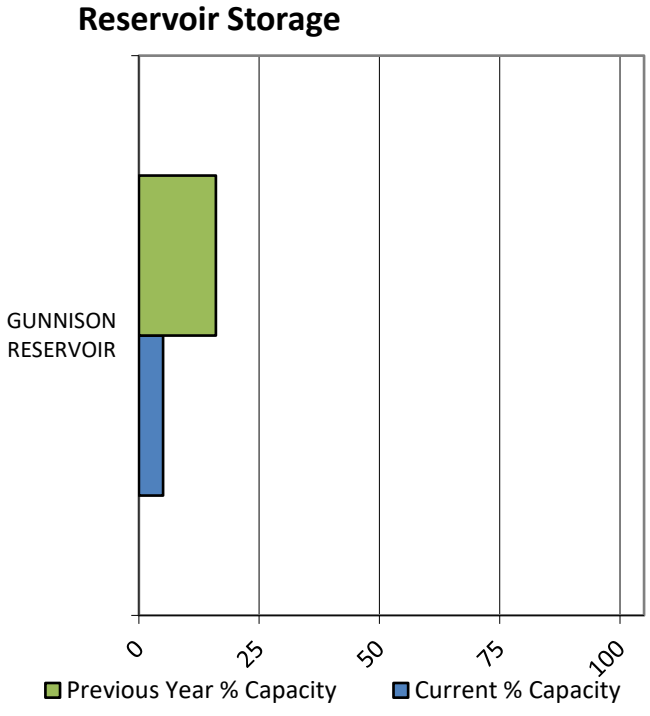
March 1, 2019

Snowpack in the San Pitch River Basin is above normal at 127% of normal, compared to 54% last year. Precipitation in February was much above average at 159%, which brings the seasonal accumulation (Oct-Feb) to 128% of average. Soil moisture is at 68% compared to 52% last year. Reservoir storage is at 5% of capacity, compared to 16% last year. The forecast streamflow volumes range from 120% to 123% of average. The surface water supply index is 43% for the San Pitch.









SNOTEL Data

Data Current as of: 3/6/2019 9:56:17 AM

San Pitch River
Streamflow Forecasts - March 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	13.1	17	20	120%	23	28	16.7
Sevier R nr Gunnison								
	APR-JUL	71	101	122	123%	143	173	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 February, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Gunnison Reservoir	1.0	3.2	13.0	20.3
Basin-wide Total	1.0	3.2	13.0	20.3
# of reservoirs	1	1	1	1

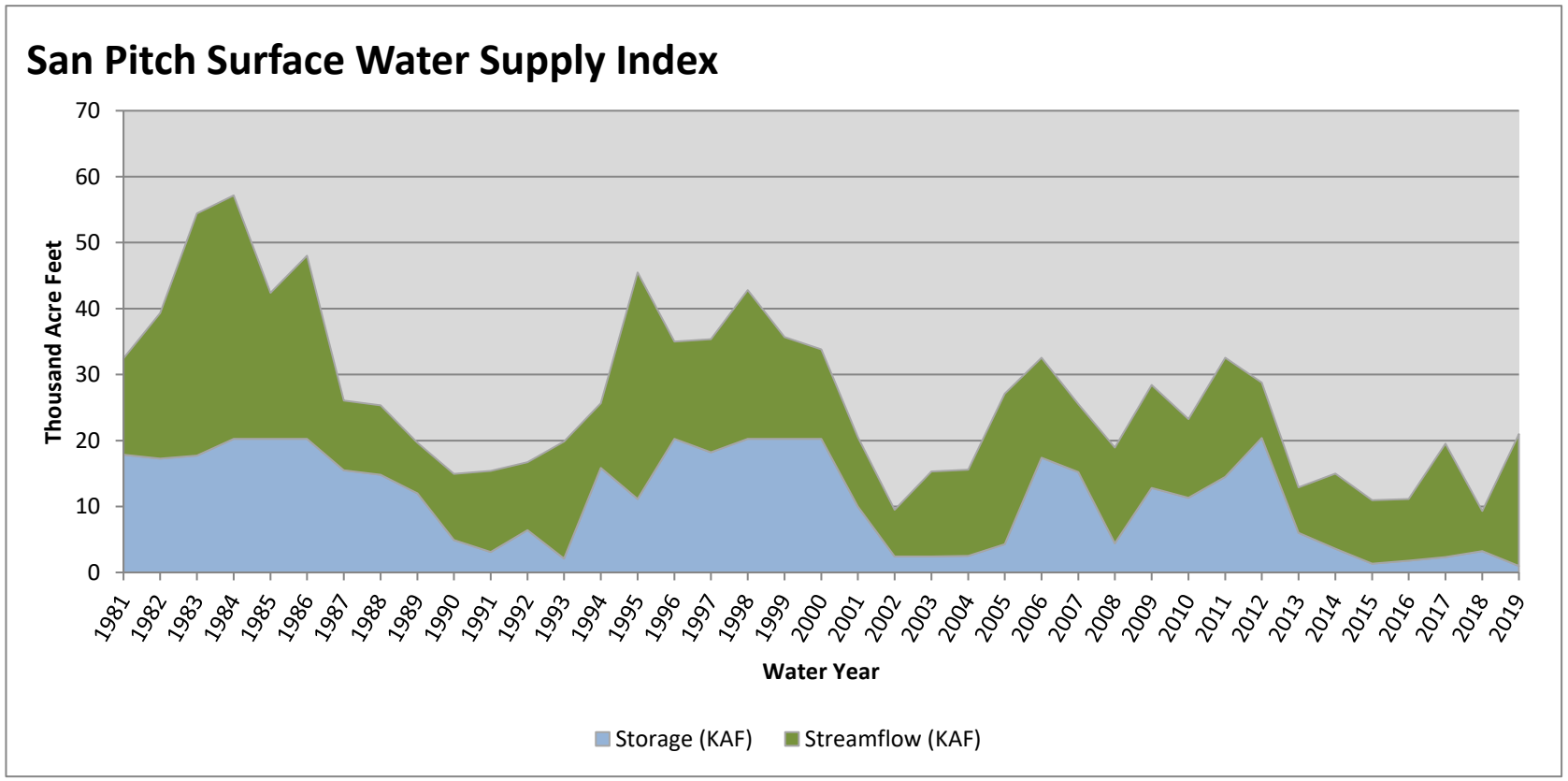
Watershed Snowpack Analysis March 1, 2019	# of Sites	% Median	Last Year % Median
Upper San Pitch	3	123%	45%
Lower San Pitch	7	121%	58%

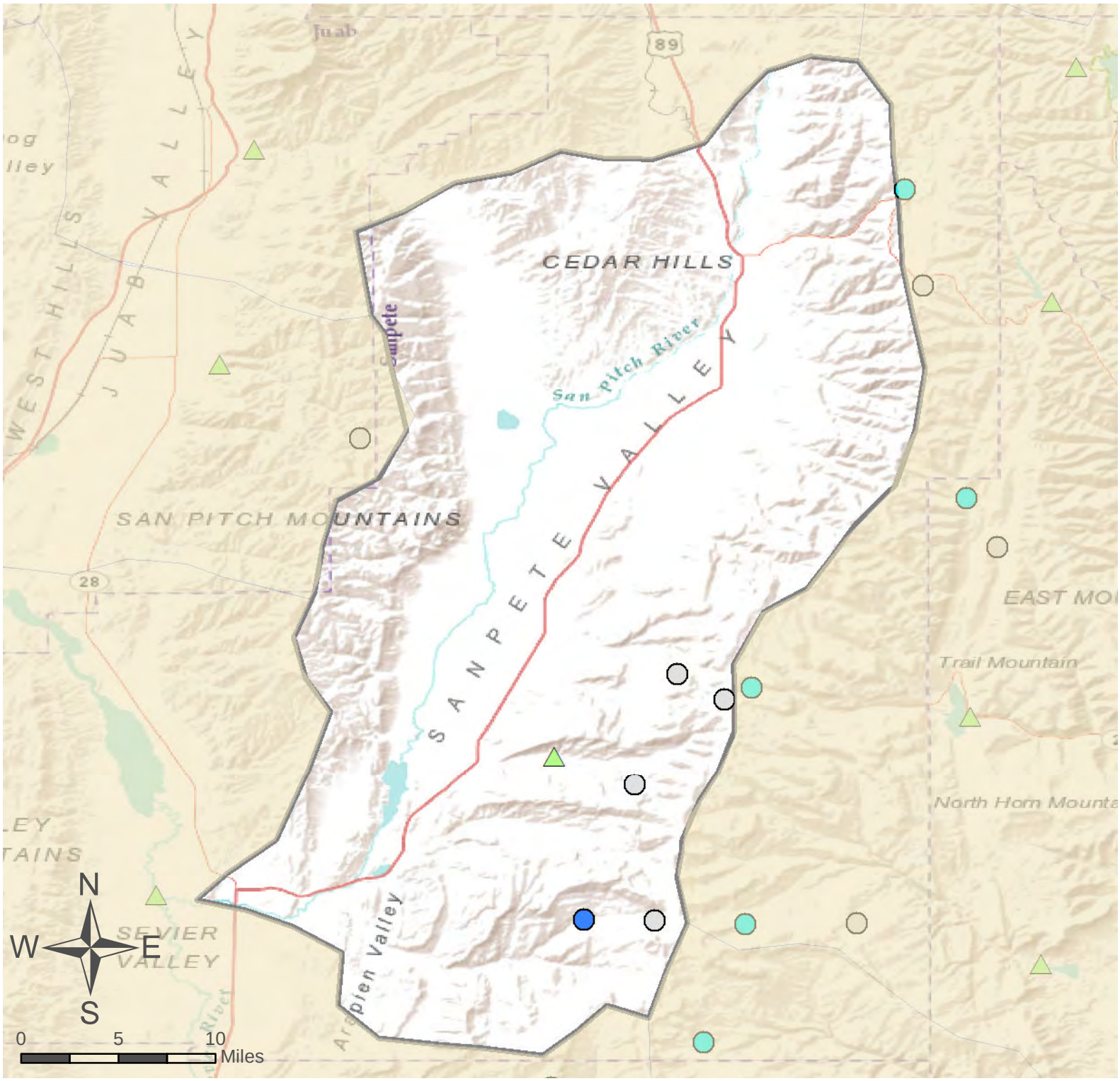
March 1, 2019

Surface Water Supply Index

Basin or Region	Feb EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
San Pitch	**0.98**	**20.00**	**20.98**	**43**	**-0.63**	**93, 01, 10, 88**

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





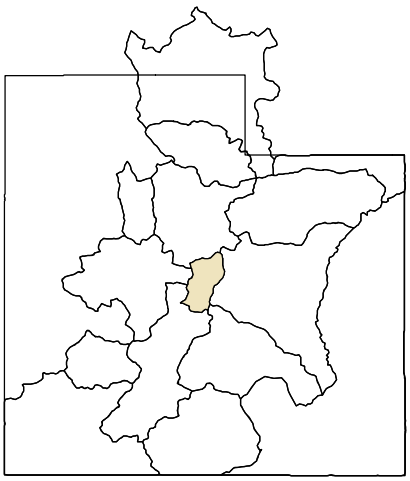
San Pitch River Basin

SNOTEL Site

Forecast Point

% of Normal

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



As of March 1, 2019:

127% of Normal SWE

128% of Normal Precipitation

159% of Normal Precipitation Last Month

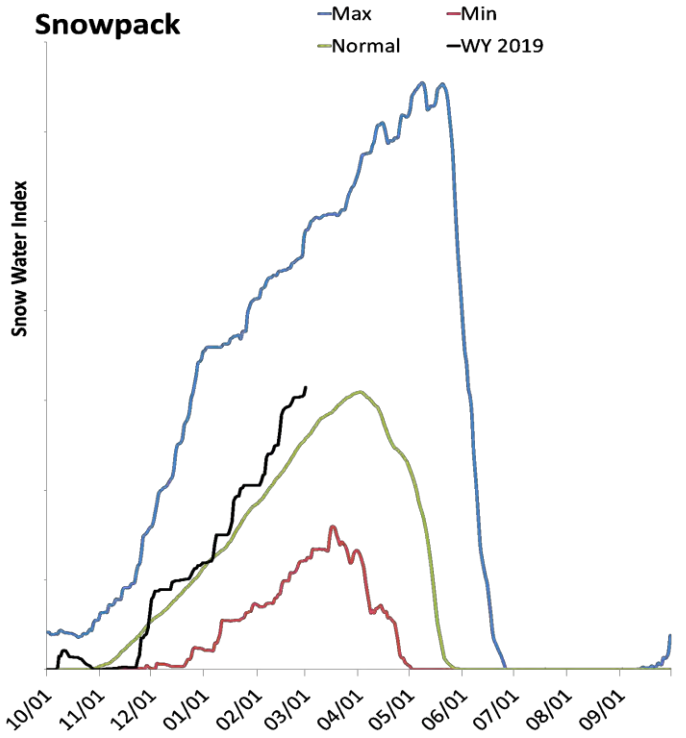
68% Saturation Soil Moisture

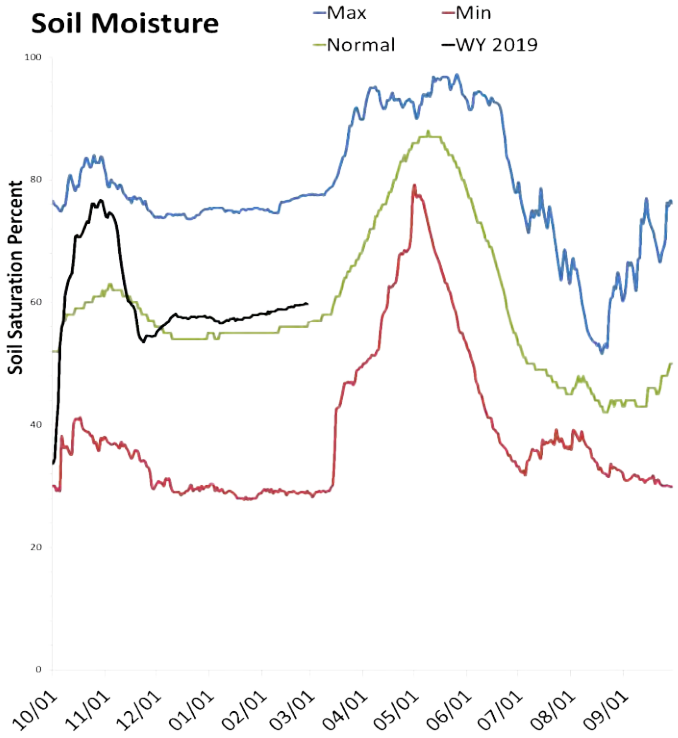
San Pitch River Basin

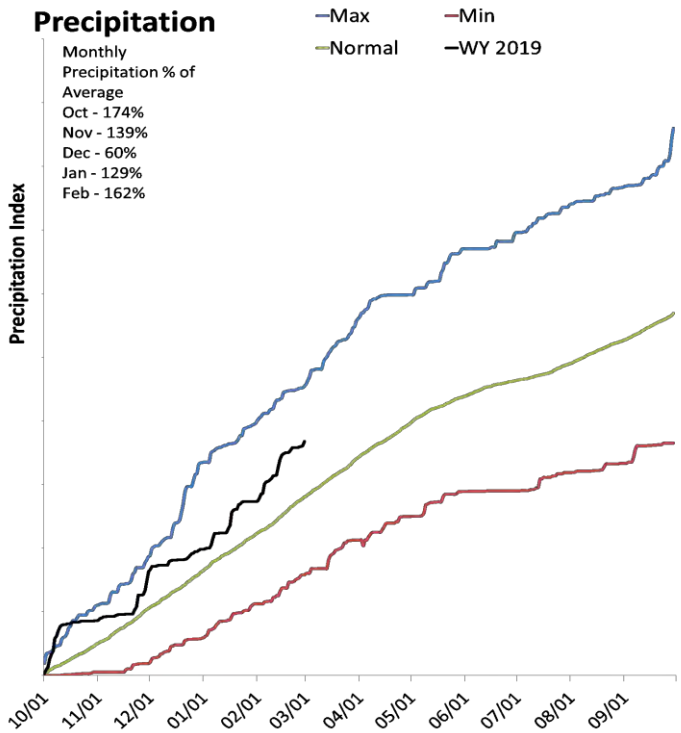
Price & San Rafael Basins

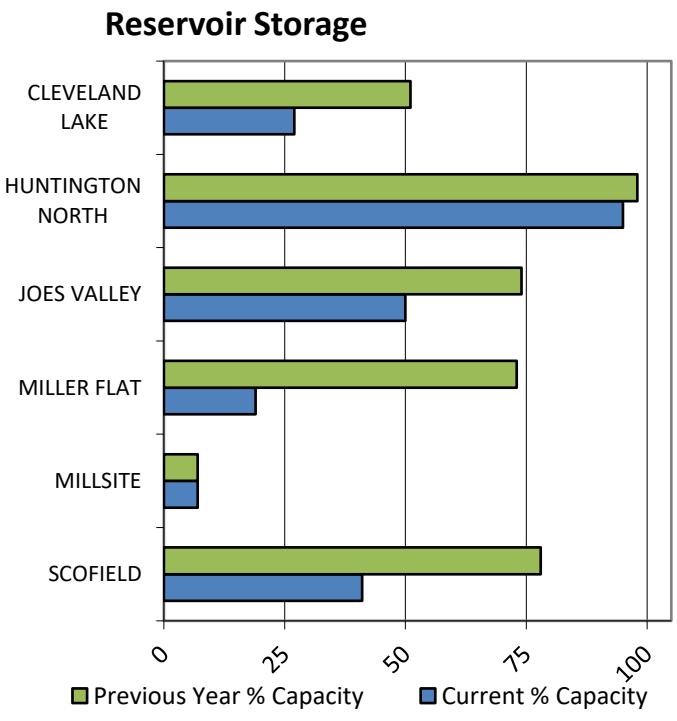
March 1, 2019

Snowpack in the Price & San Rafael Basins is above normal at 122% of normal, compared to 47% last year. Precipitation in February was much above average at 162%, which brings the seasonal accumulation (Oct-Feb) to 131% of average. Soil moisture is at 60% compared to 43% last year. Reservoir storage is at 43% of capacity, compared to 69% last year. Forecast streamflow volumes range from 106% to 142% of average. The surface water supply index is 75% for the Price River, 65% for Joe's Valley, 63% for Ferron Creek.









SNOTEL Data

Data Current as of: 3/6/2019 9:55:45 AM

Price San Rafael Rivers
Streamflow Forecasts - March 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	26	34	40	133%	47	58	30
Price R nr Scofield Reservoir[2]	APR-JUL	35	48	58	141%	69	87	41
White R bl Tabbyune Creek	APR-JUL	13.9	18.5	22	142%	26	32	15.5
Green R at Green River, UT [2]	APR-JUL	2030	2660	3150	106%	3670	4510	2960
Electric Lake Inflow [2]	APR-JUL	11.6	15.2	18	135%	21	26	13.3
Huntington Ck nr Huntington [2]	APR-JUL	38	48	55	138%	63	75	40
Joes Valley Reservoir Inflow[2]	APR-JUL	48	61	70	125%	80	96	56
Ferron Ck (Upper Station) nr Ferron	APR-JUL	36	43	48	126%	54	62	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 February, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Joes Valley Reservoir	30.9	45.6	40.0	61.6
Millsite	1.2	1.2	10.2	16.7
Huntington North Reservoir	4.0	4.1	3.3	4.2
Cleveland Lake	1.5	2.8		5.4
Miller Flat Reservoir	1.0	3.8		5.2
Scofield Reservoir	27.2	51.4	30.7	65.8
Basin-wide Total	63.2	102.2	84.2	148.3
# of reservoirs	4	4	4	4

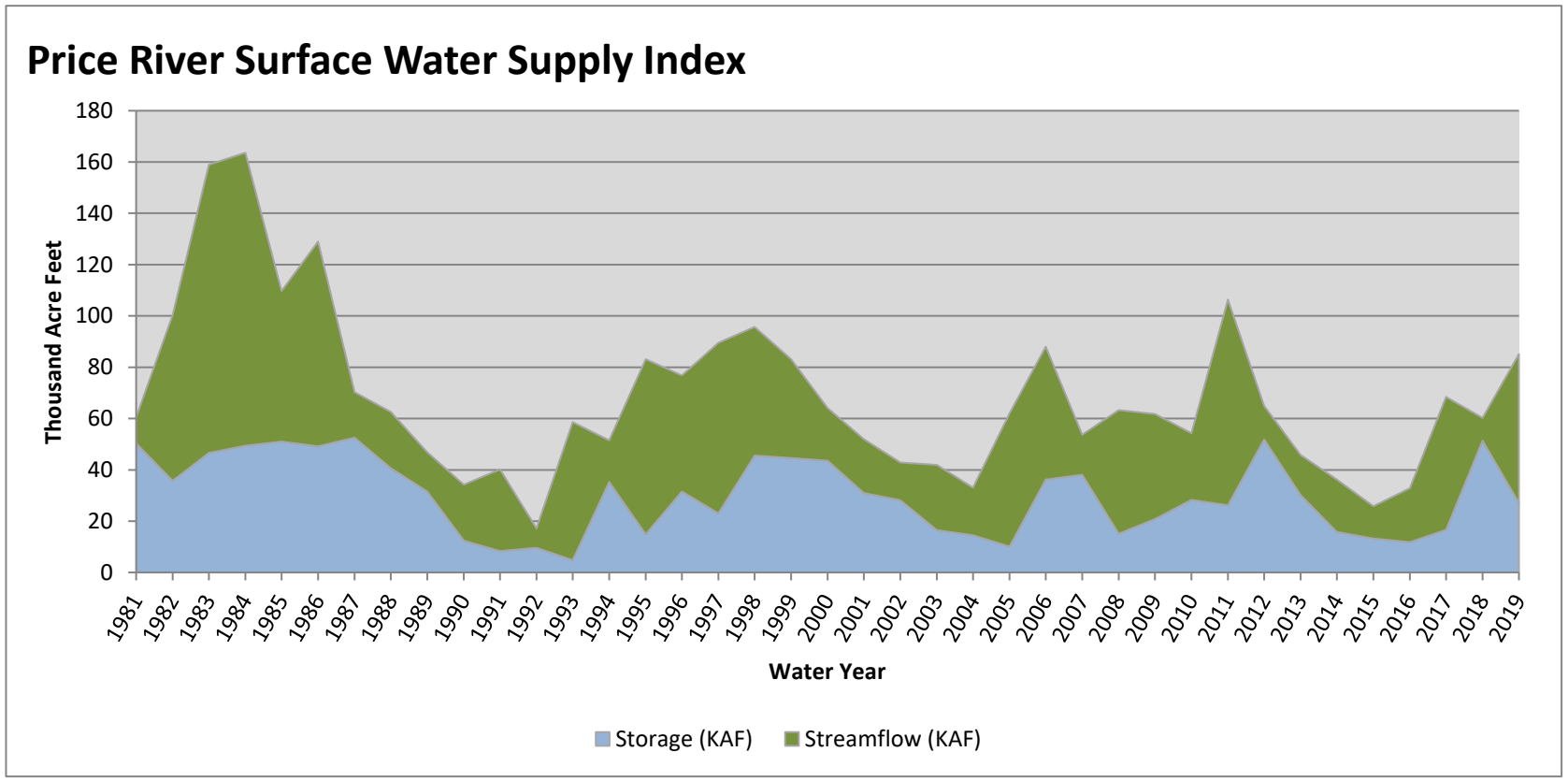
Watershed Snowpack Analysis March 1, 2019	# of Sites	% Median	Last Year % Median
Price River	4	128%	47%
San Rafael	7	121%	50%

March 1, 2019

Surface Water Supply Index

Basin or Region	Feb EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Price River	**27.15**	**58.00**	**85.15**	**75**	**2.08**	**99, 95, 06, 97**

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

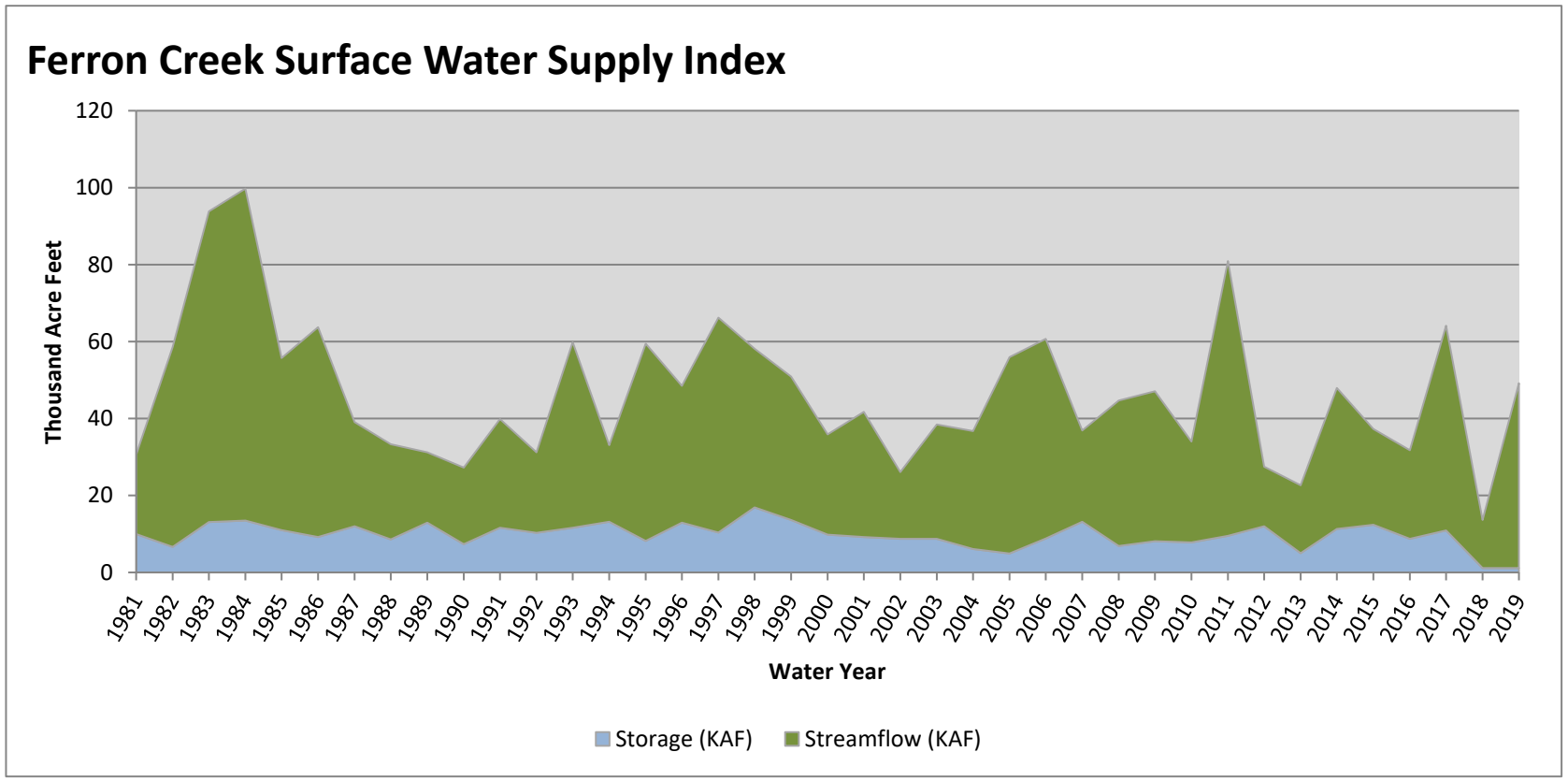


March 1, 2019

Surface Water Supply Index

Basin or Region	Feb EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Ferron Creek	**1.15**	**48.00**	**49.15**	**63**	**1.04**	**14, 96, 99, 85**

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

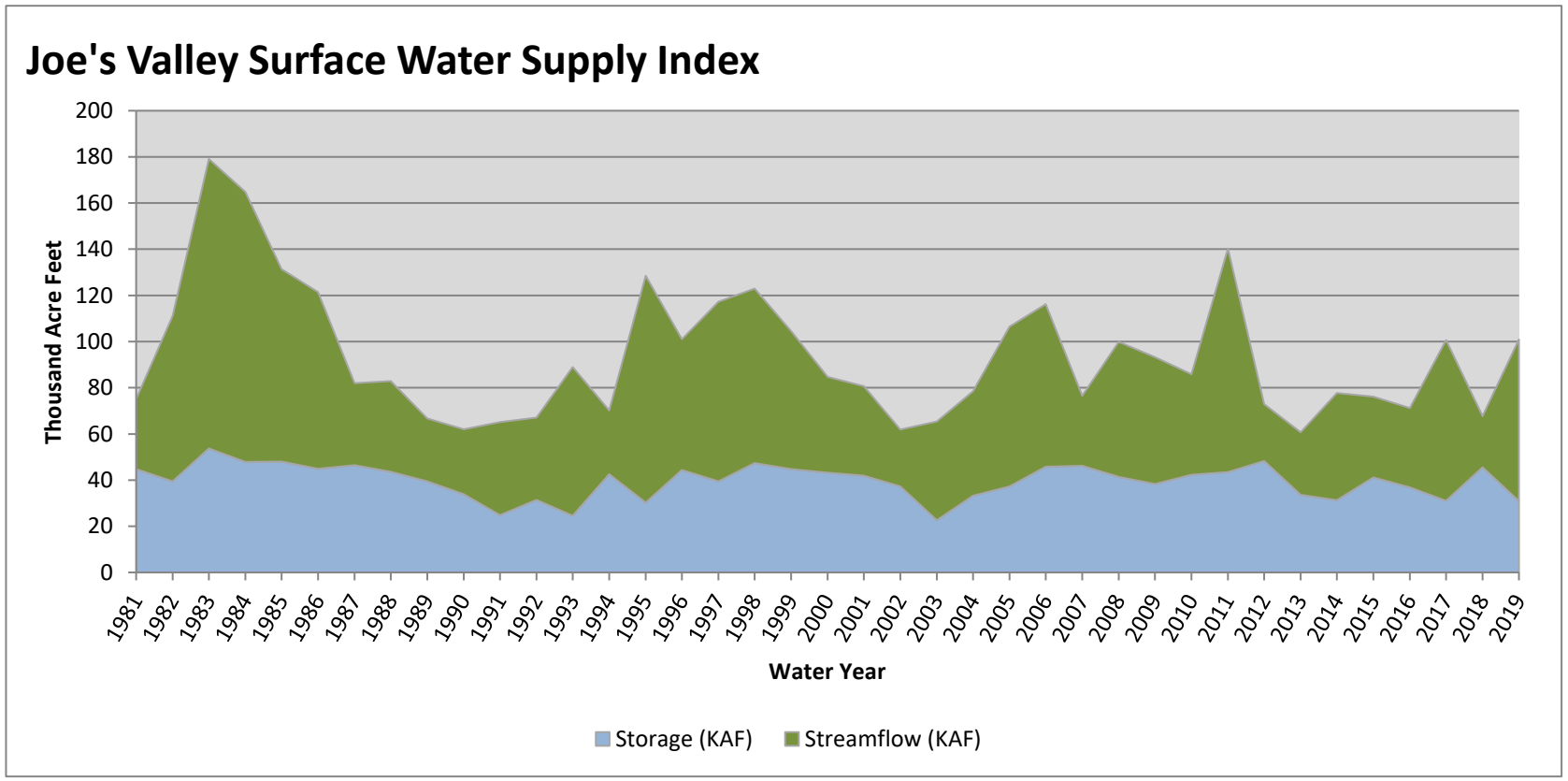


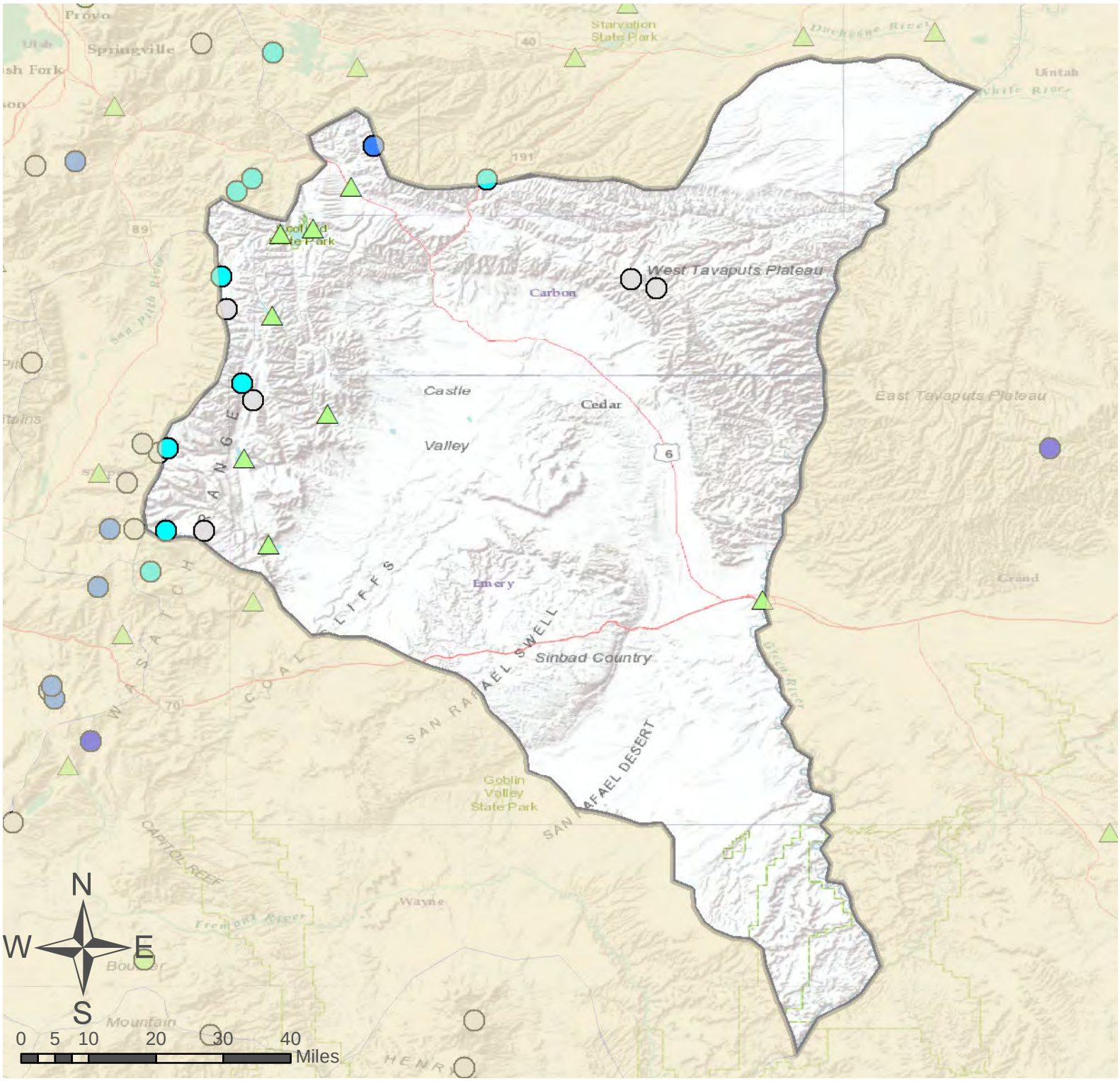
March 1, 2019

Surface Water Supply Index

Basin or Region	Feb EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Joe's Valley	**30.88**	**70.00**	**100.88**	**65**	**1.25**	**08, 17, 96, 99**

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





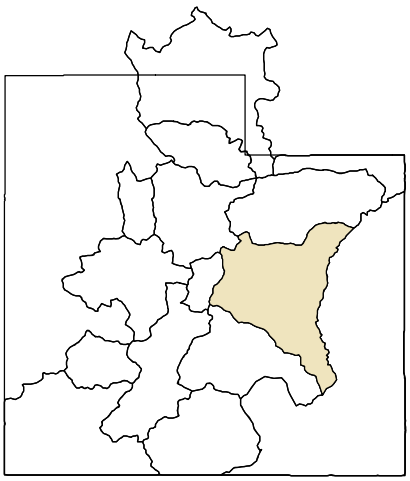
Price & San Rafael Basins

SNOTEL Site

Forecast Point

% of Normal

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



As of March 1, 2019:

122% of Normal SWE

131% of Normal Precipitation

162% of Normal Precipitation Last Month

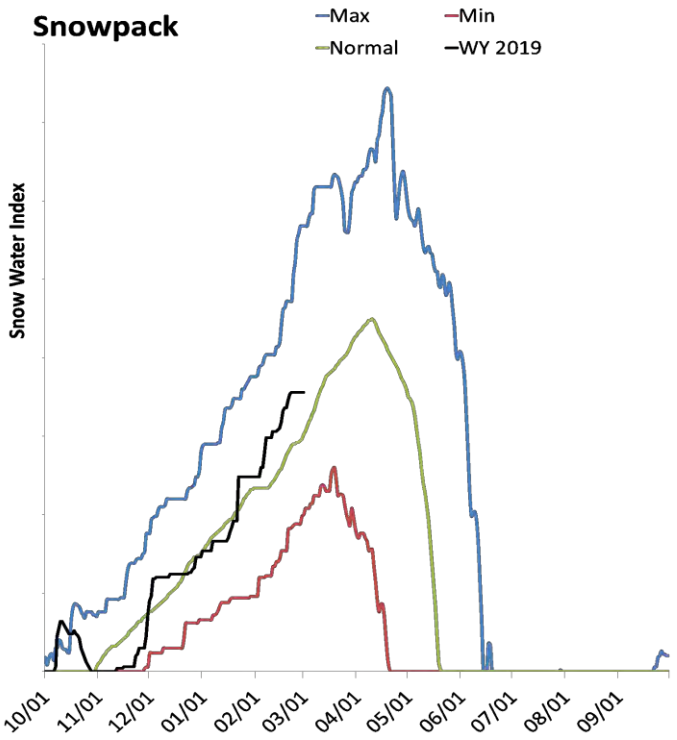
60% Saturation Soil Moisture

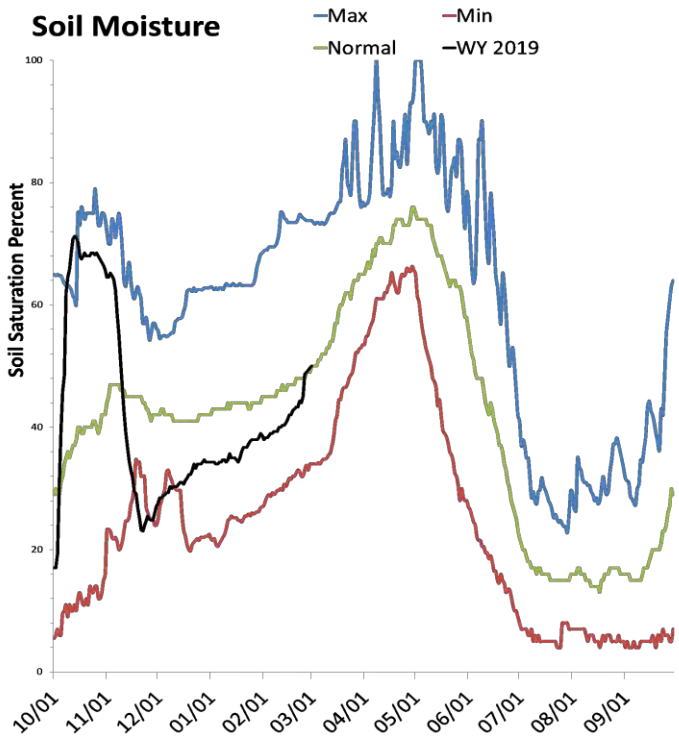
Price & San Rafael Basins

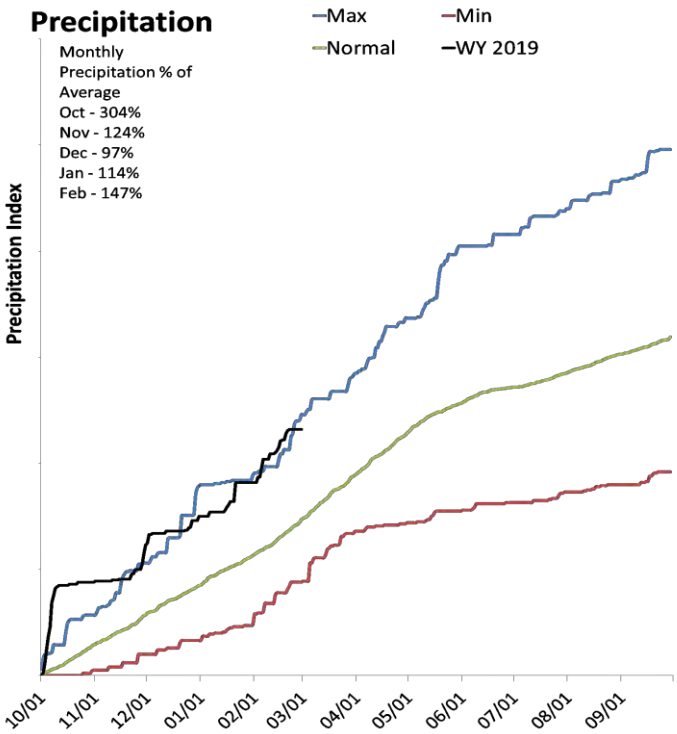
Lower Sevier Basin

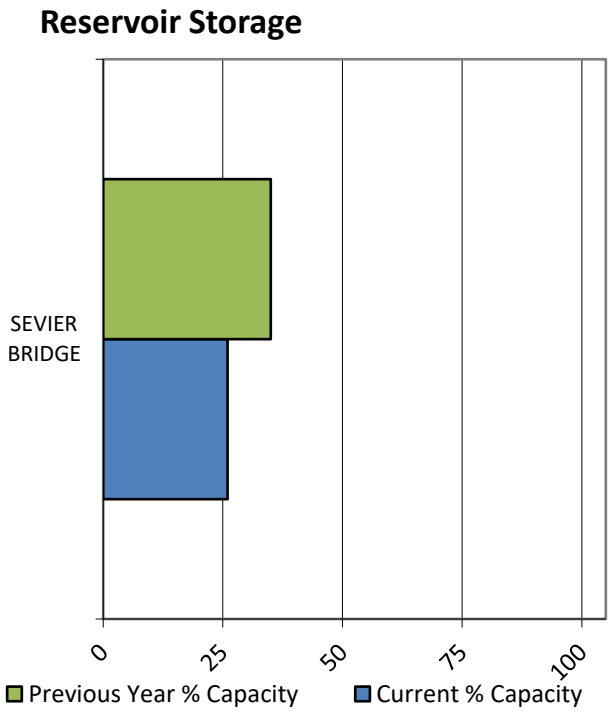
March 1, 2019

Snowpack in the Lower Sevier Basin is above normal at 118% of normal, compared to 72% last year. Precipitation in February was much above average at 147%, which brings the seasonal accumulation (Oct-Feb) to 158% of average. Soil moisture is at 50% compared to 34% last year. Reservoir storage is at 26% of capacity, compared to 35% last year. The forecast streamflow volume for the Sevier River nr Gunnison is 123% of average. The surface water supply index is 43% for the Lower Sevier.









SNOTEL Data

Data Current as of: 3/6/2019 9:56:24 AM

Lower Sevier
Streamflow Forecasts - March 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	*NO FORECAST AVAILABLE*							
Sevier R nr Gunnison	APR-JUL	71	101	122	123%	143	173	99
Oak Ck nr Oak City	*NO FORECAST AVAILABLE*							

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 February, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Sevier Bridge Reservoir	62.4	82.5	169.0	236.0
Basin-wide Total	62.4	82.5	169.0	236.0
# of reservoirs	1	1	1	1

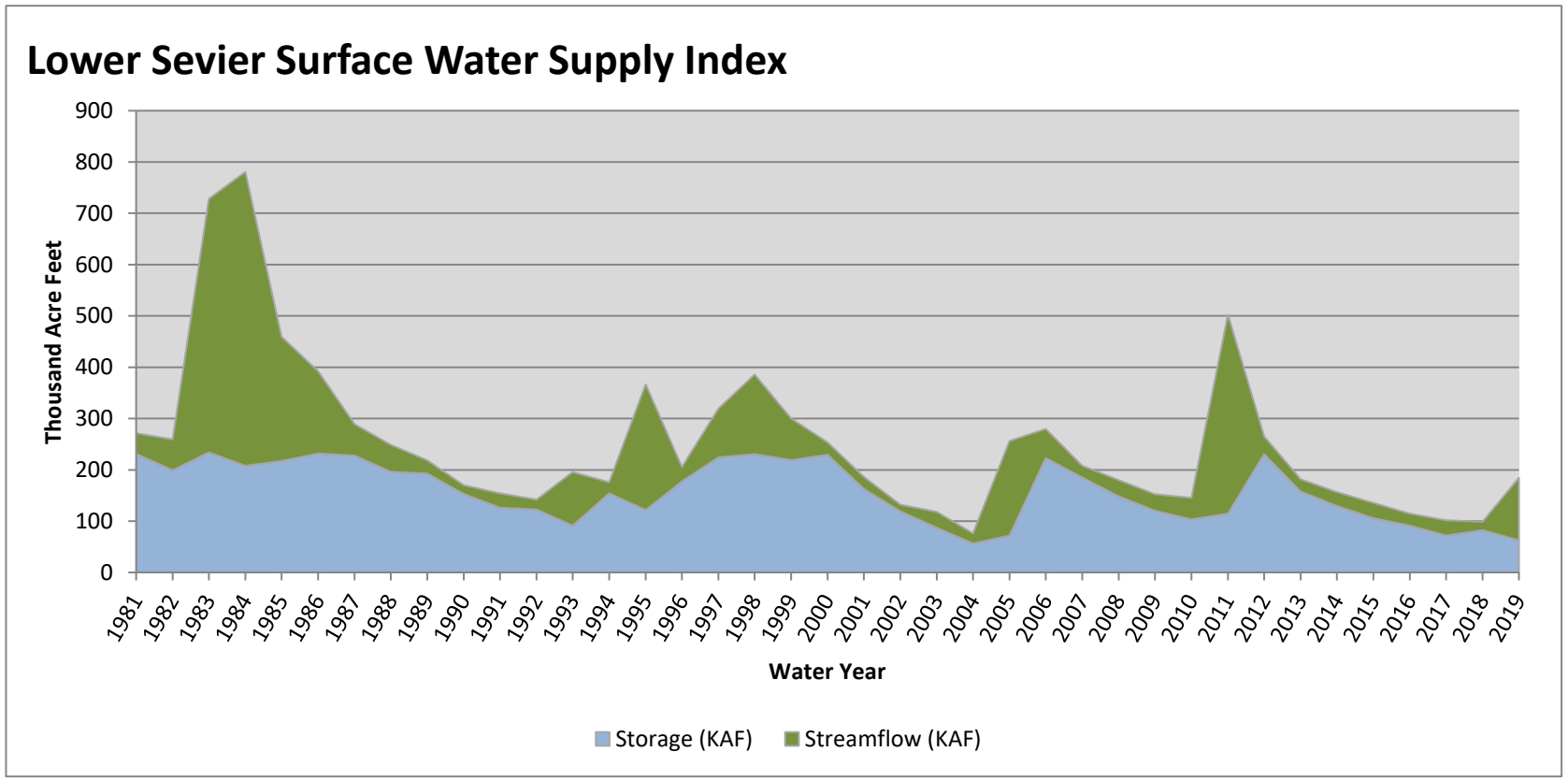
Watershed Snowpack Analysis March 1, 2019	# of Sites	% Median	Last Year % Median
Lower Sevier	1	118%	72%

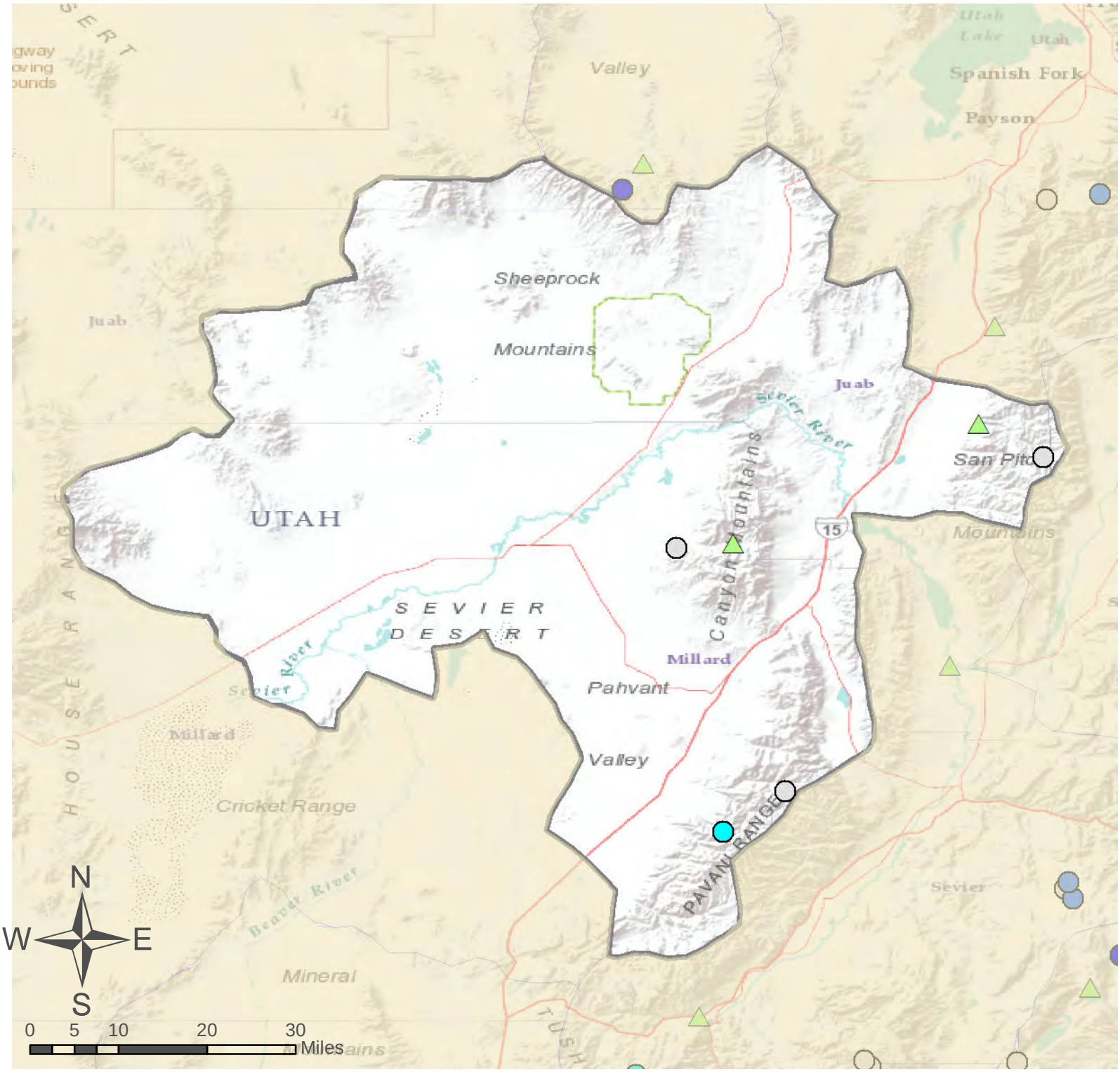
March 1, 2019

Surface Water Supply Index

Basin or Region	Feb EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Lower Sevier	**62.35**	**122.00**	**184.35**	**43**	**-0.63**	**08, 13, 01, 93**

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





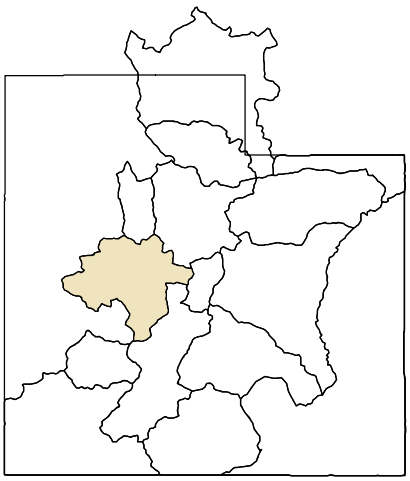
Lower Sevier Basin

SNOTEL Site

Forecast Point

% of Normal

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



As of March 1, 2019:

118% of Normal SWE

158% of Normal Precipitation

147% of Normal Precipitation Last Month

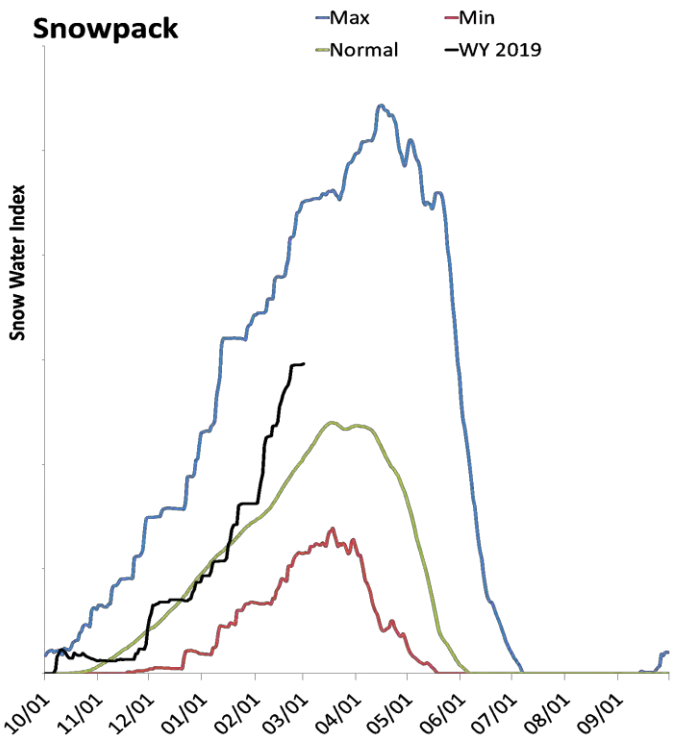
50% Saturation Soil Moisture

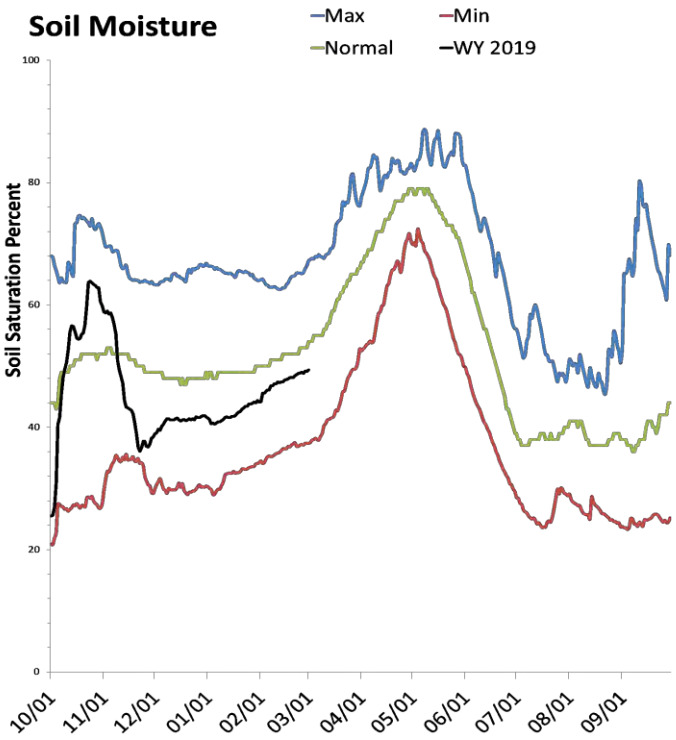
Lower Sevier Basin

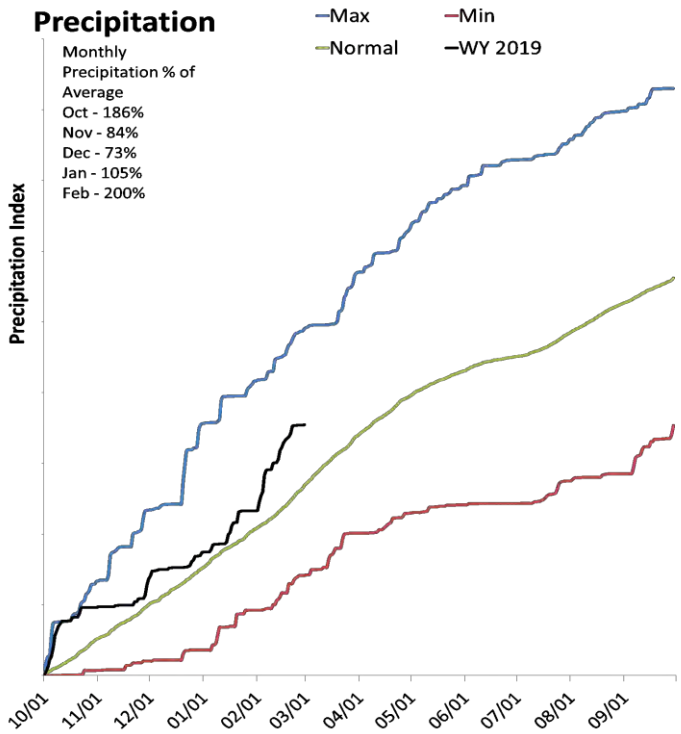
Upper Sevier Basin

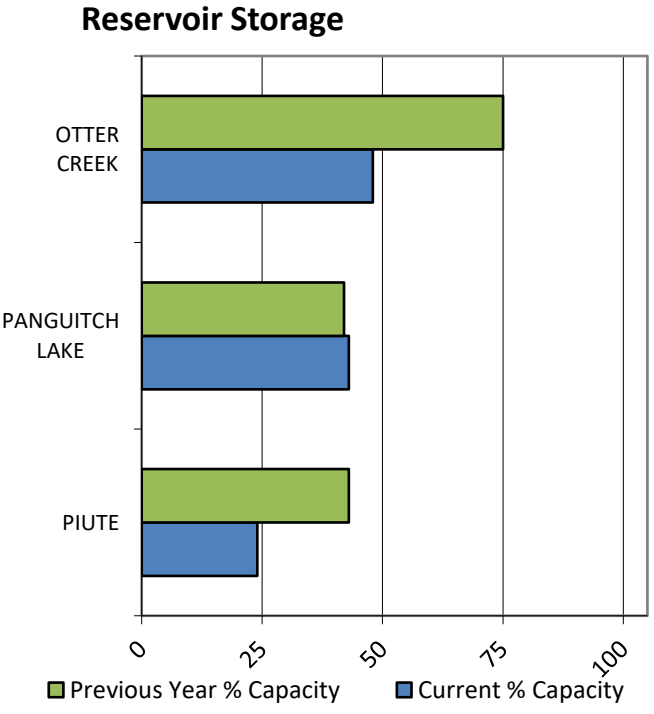
March 1, 2019

Snowpack in the Upper Sevier Basin is much above normal at 143% of normal, compared to 56% last year. Precipitation in February was much above average at 201%, which brings the seasonal accumulation (Oct-Feb) to 132% of average. Soil moisture is at 48% compared to 36% last year. Reservoir storage is at 35% of capacity, compared to 55% last year. Forecast streamflow volumes range from 119% to 124% of average. The surface water supply index is 35% for the Upper Sevier.









SNOTEL Data

Data Current as of: 3/6/2019 9:56:09 AM

Upper Sevier
Streamflow Forecasts - March 1, 2019

		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Upper Sevier	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Mammoth Ck nr Hatch	APR-JUL	19.1	26	32	119%	39	50	27
Sevier R at Hatch	APR-JUL	35	48	57	119%	66	79	48
EF Sevier R nr Kingston	APR-JUL	18.9	33	42	120%	51	65	35
Sevier R nr Kingston	APR-JUL	2.7	25	40	121%	55	77	33
Sevier R bl Piute Dam	APR-JUL	25	57	78	118%	99	131	66
Clear Ck ab Diversions nr Sevier	APR-JUL	13.5	20	25	119%	30	36	21
Salina Ck nr Emery	APR-JUL	3.5	7.3	9.8	124%	12.3	16.1	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 February, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Piute Reservoir	17.3	31.1	53.6	71.8
Otter Creek Reservoir	25.0	39.5	38.6	52.5
Panguitch Lake	9.7	9.4	13.7	22.3
Basin-wide Total	52.0	80.1	105.9	146.6
# of reservoirs	3	3	3	3

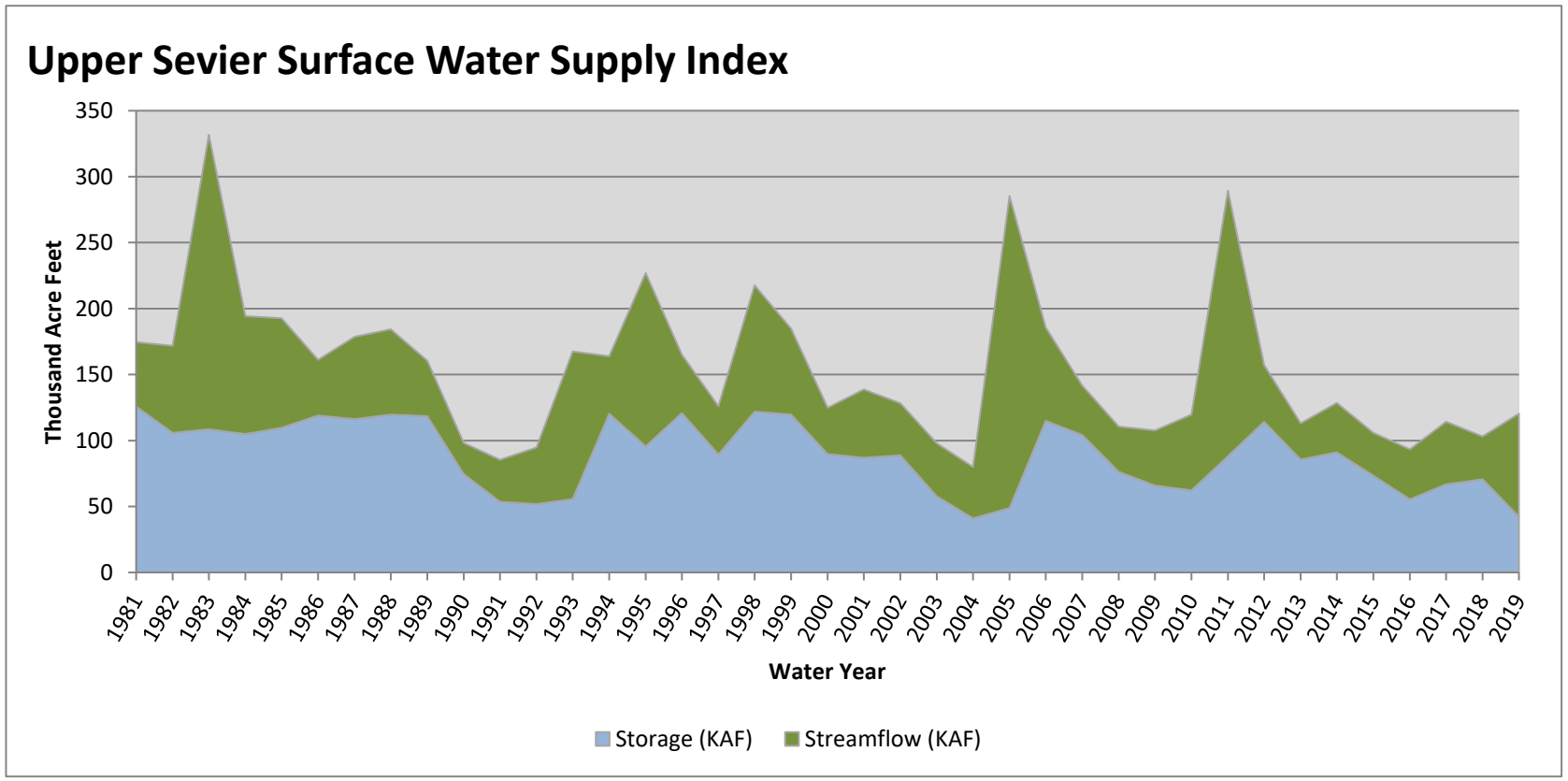
Watershed Snowpack Analysis March 1, 2019	# of Sites	% Median	Last Year % Median
Upper Sevier	12	143%	56%
Middle Sevier	8	131%	67%
East Fork Sevier River	5	151%	35%

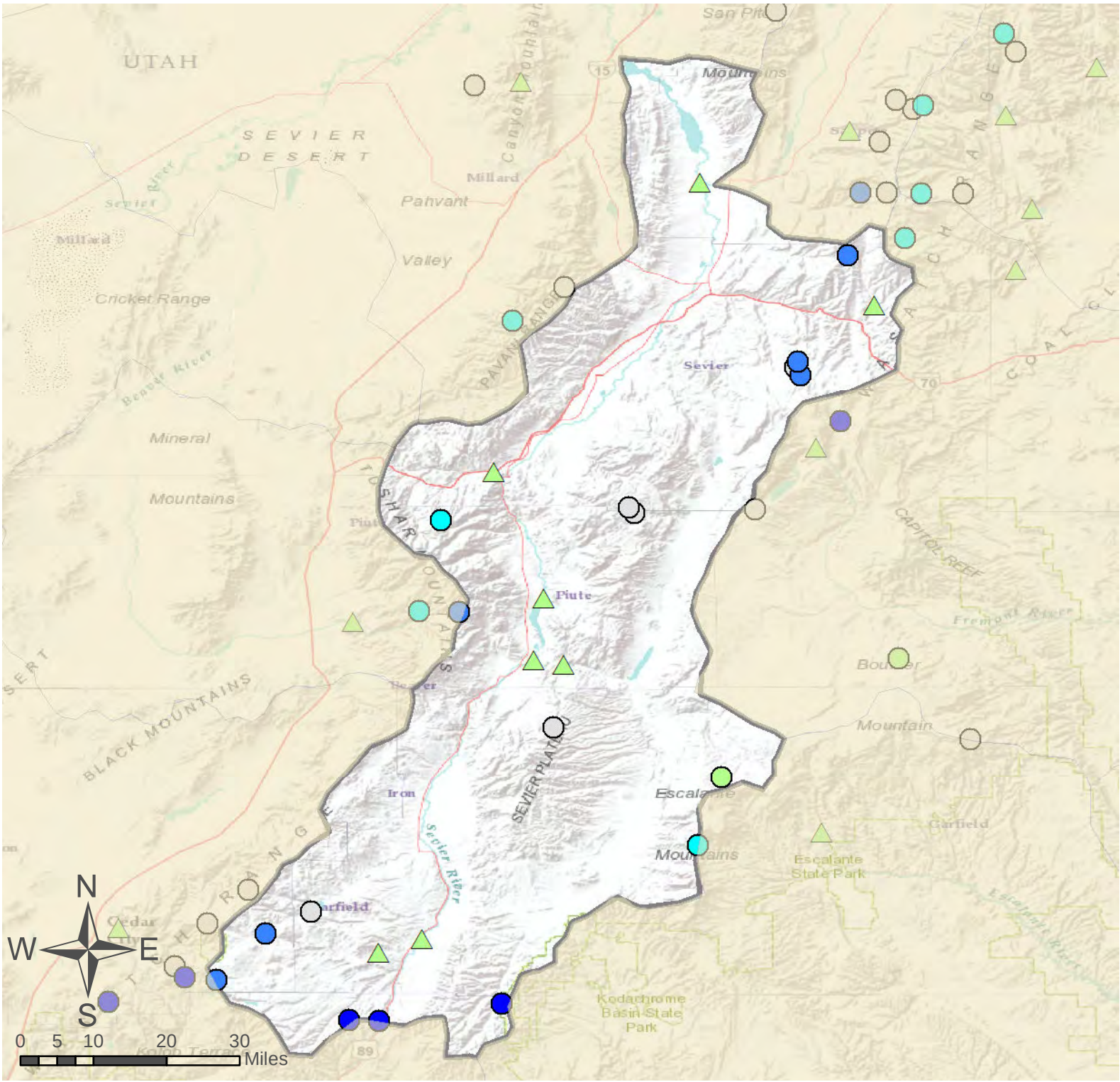
March 1, 2019

Surface Water Supply Index

Basin or Region	Feb EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Upper Sevier	**42.29**	**78.00**	**120.29**	**35**	**-1.25**	**17, 10, 00, 97**

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





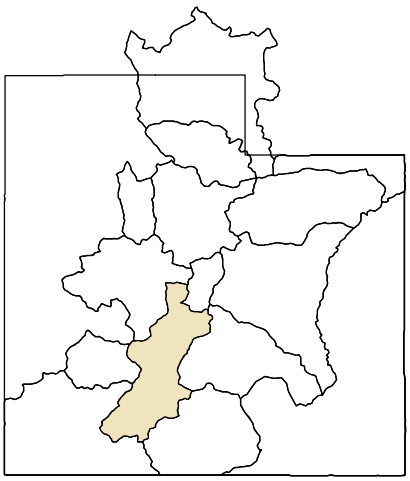
Upper Sevier Basin

SNOTEL Site

Forecast Point

% of Normal

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



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

143% of Normal SWE

132% of Normal Precipitation

201% of Normal Precipitation Last Month

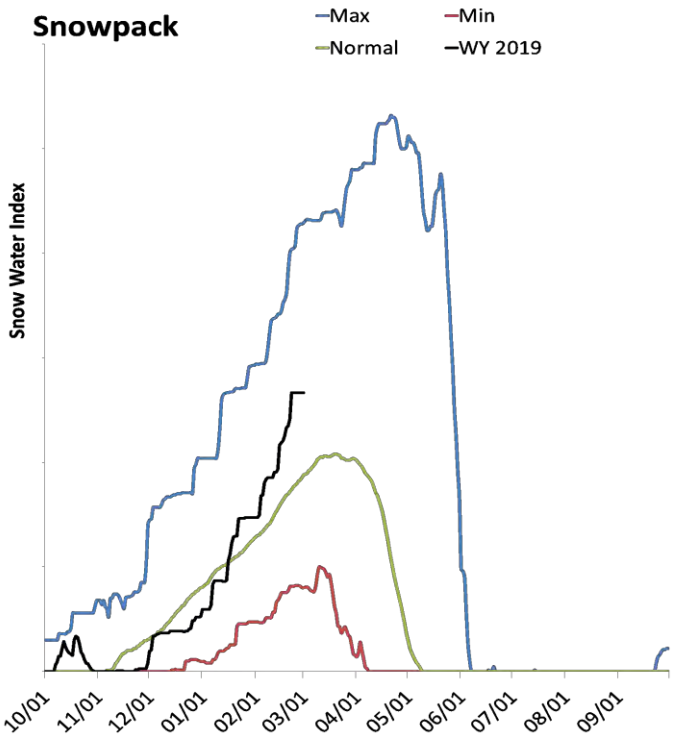
48% Saturation Soil Moisture

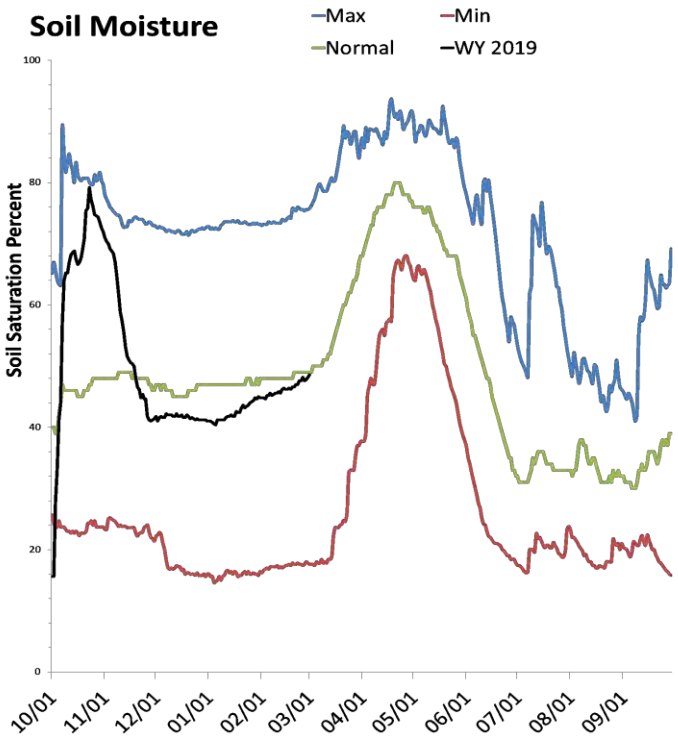
Upper Sevier Basin

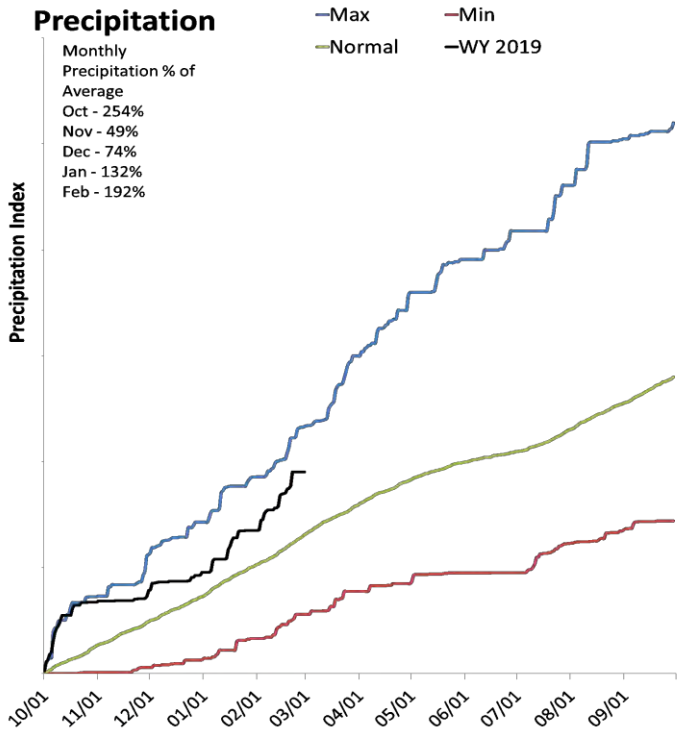
Southeastern Utah

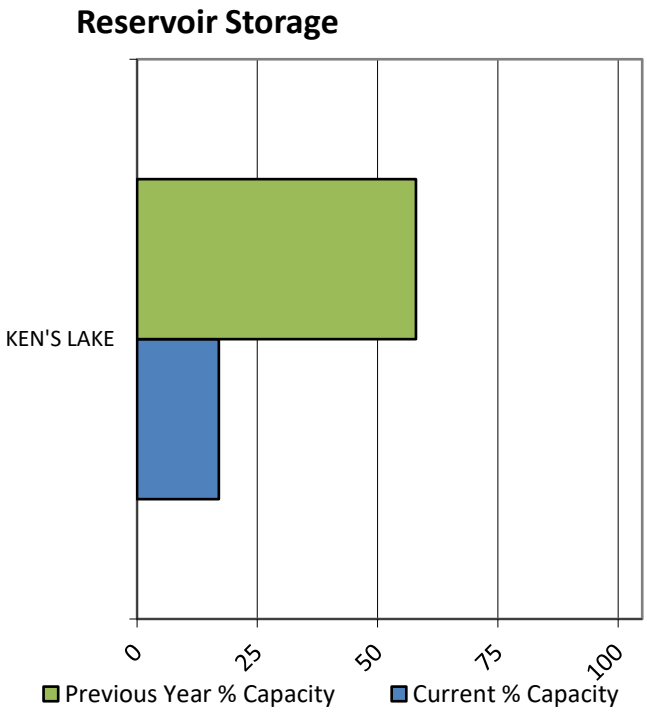
March 1, 2019

Snowpack in the Southeastern Utah is much above normal at 142% of normal, compared to 51% last year. Precipitation in February was much above average at 191%, which brings the seasonal accumulation (Oct-Feb) to 145% of average. Soil moisture is at 48% compared to 18% last year. Reservoir storage is at 17% of capacity, compared to 58% last year. Forecast streamflow volumes range from 105% to 155% of average. The surface water supply index is 67% for Moab.









SNOTEL Data

Data Current as of: 3/6/2019 9:56:01 AM

Southeastern Utah
Streamflow Forecasts - March 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	3.4	4.6	5.5	128%	6.5	8.1	4.3
South Ck ab Resv nr Monticello	MAR-JUL	0.73	1.23	1.69	155%	2.2	3.3	1.09
Colorado R nr Cisco [2]	APR-JUL	3170	3930	4490	105%	5090	6040	4280
San Juan R near Bluff [2]	APR-JUL	815	1050	1230	112%	1420	1730	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 February, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Ken's Lake	0.4	1.3	1.3	2.3
Basin-wide Total	0.4	1.3	1.3	2.3
# of reservoirs	1	1	1	1

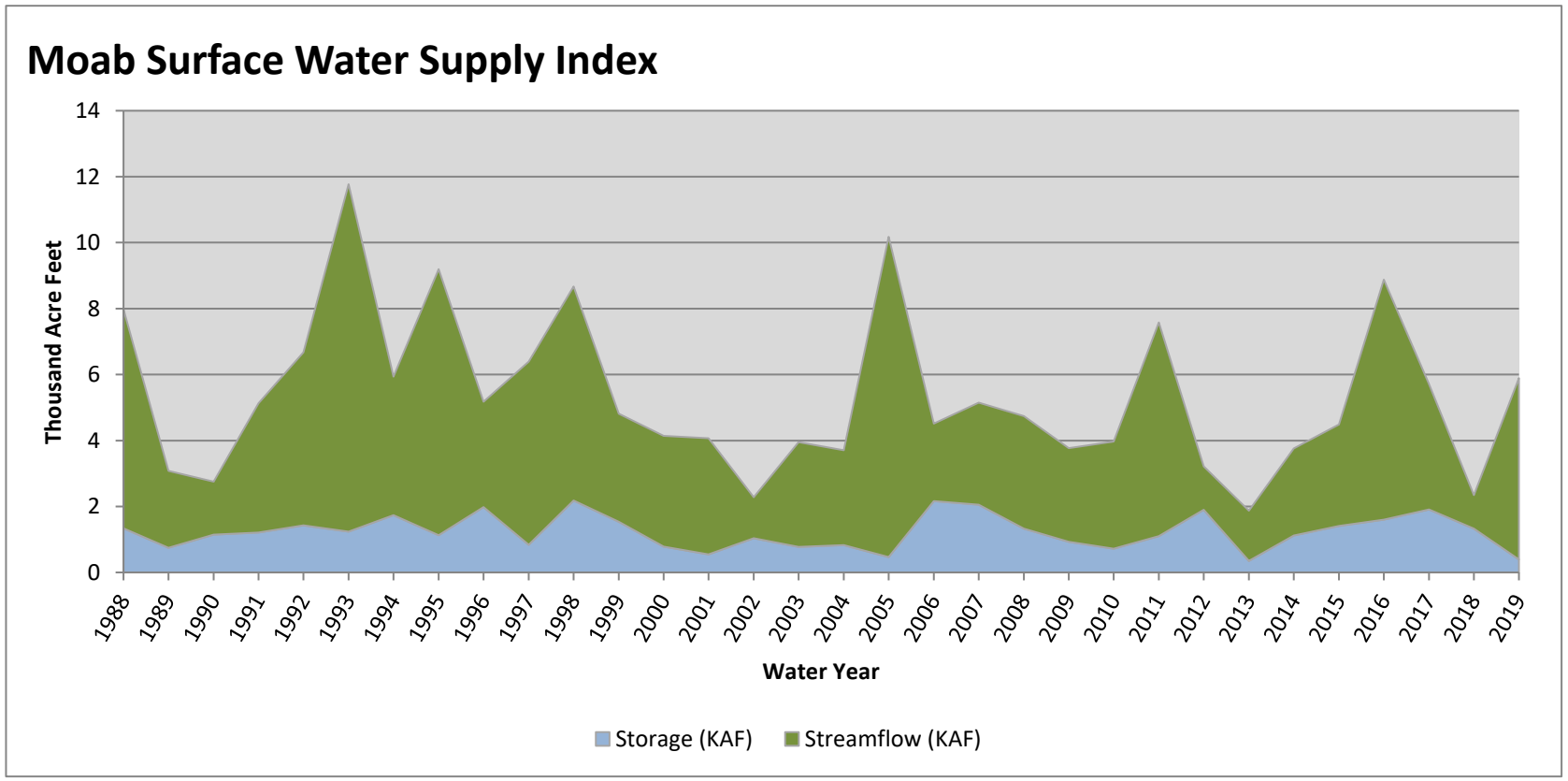
Watershed Snowpack Analysis March 1, 2019	# of Sites	% Median	Last Year % Median
Lasal Mountains	2	130%	61%
Lower San Juan	2	155%	47%
Lower Green	2	137%	58%
Henry Mountains	0		

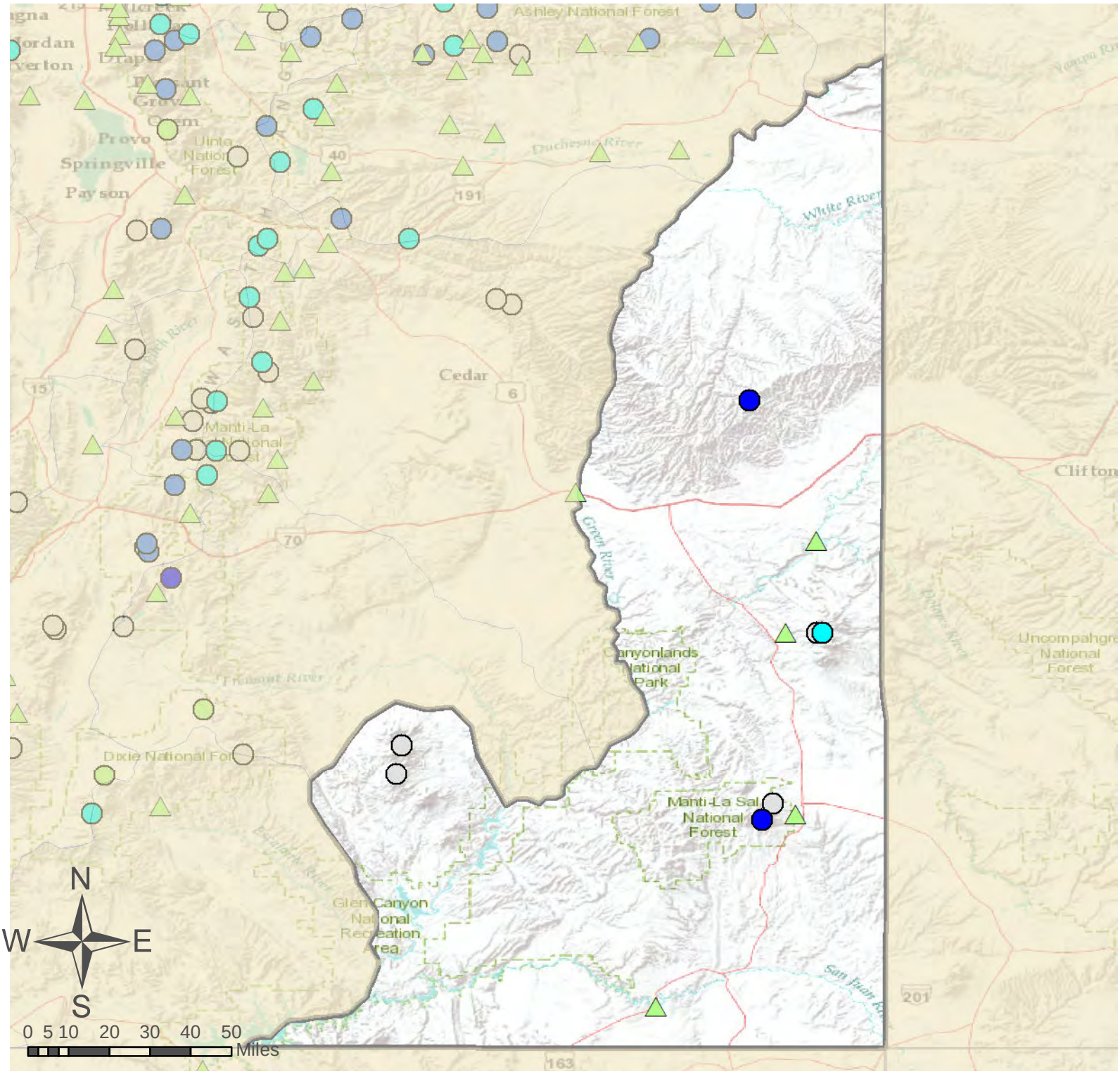
March 1, 2019

Surface Water Supply Index

Basin or Region	Feb EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Moab	**0.39**	**5.50**	**5.89**	**67**	**1.39**	**96, 17, 94, 97**

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





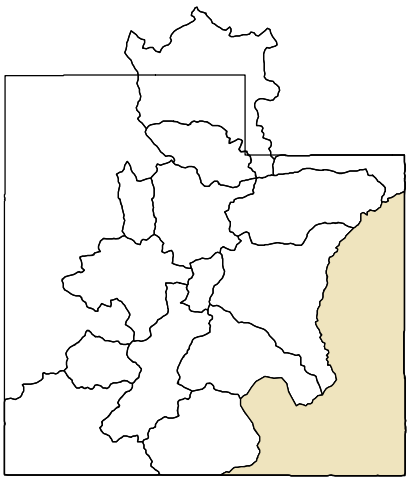
Southeastern Utah

SNOTEL Site

Forecast Point

% of Normal

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



As of March 1, 2019:

142% of Normal SWE

145% of Normal Precipitation

191% of Normal Precipitation Last Month

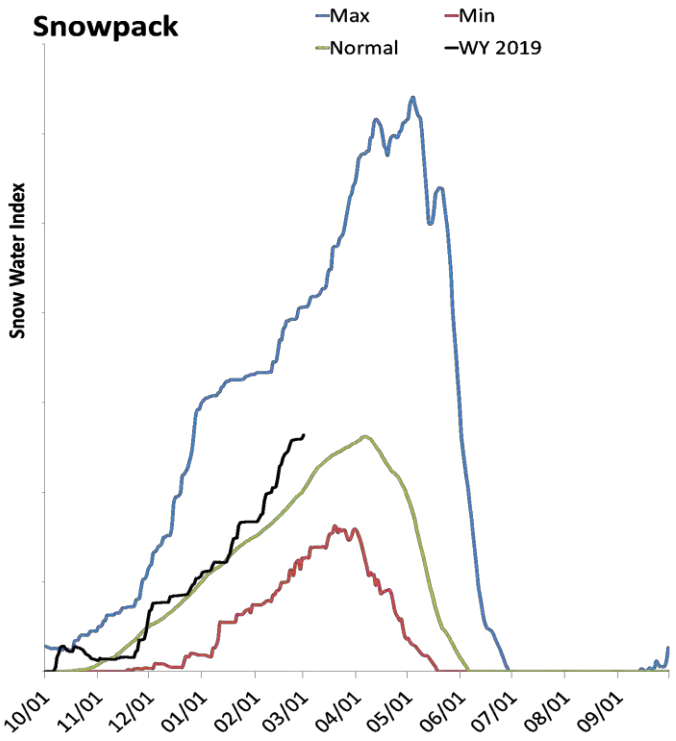
48% Saturation Soil Moisture

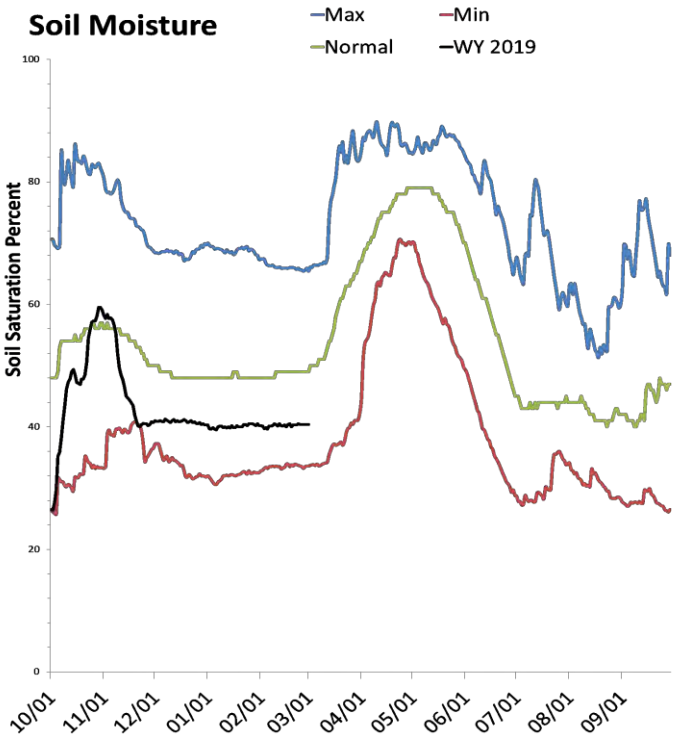
Southeastern Utah

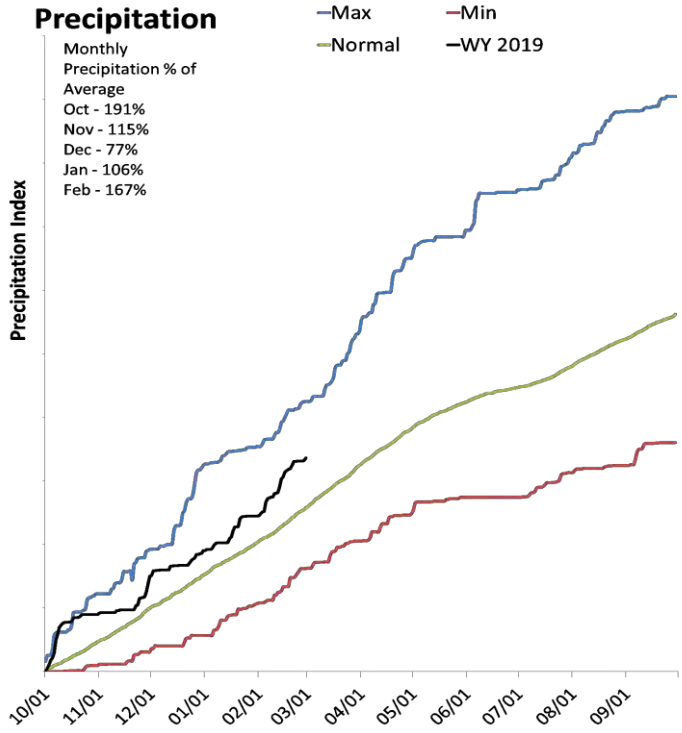
Dirty Devil Basin

March 1, 2019

Snowpack in the Dirty Devil Basin is above normal at 130% of normal, compared to 62% last year. Precipitation in February was much above average at 167%, which brings the seasonal accumulation (Oct-Feb) to 130% of average. Soil moisture is at 41% compared to 33% last year. Forecast streamflow volumes range from 121% to 137% of average.







SNOTEL Data

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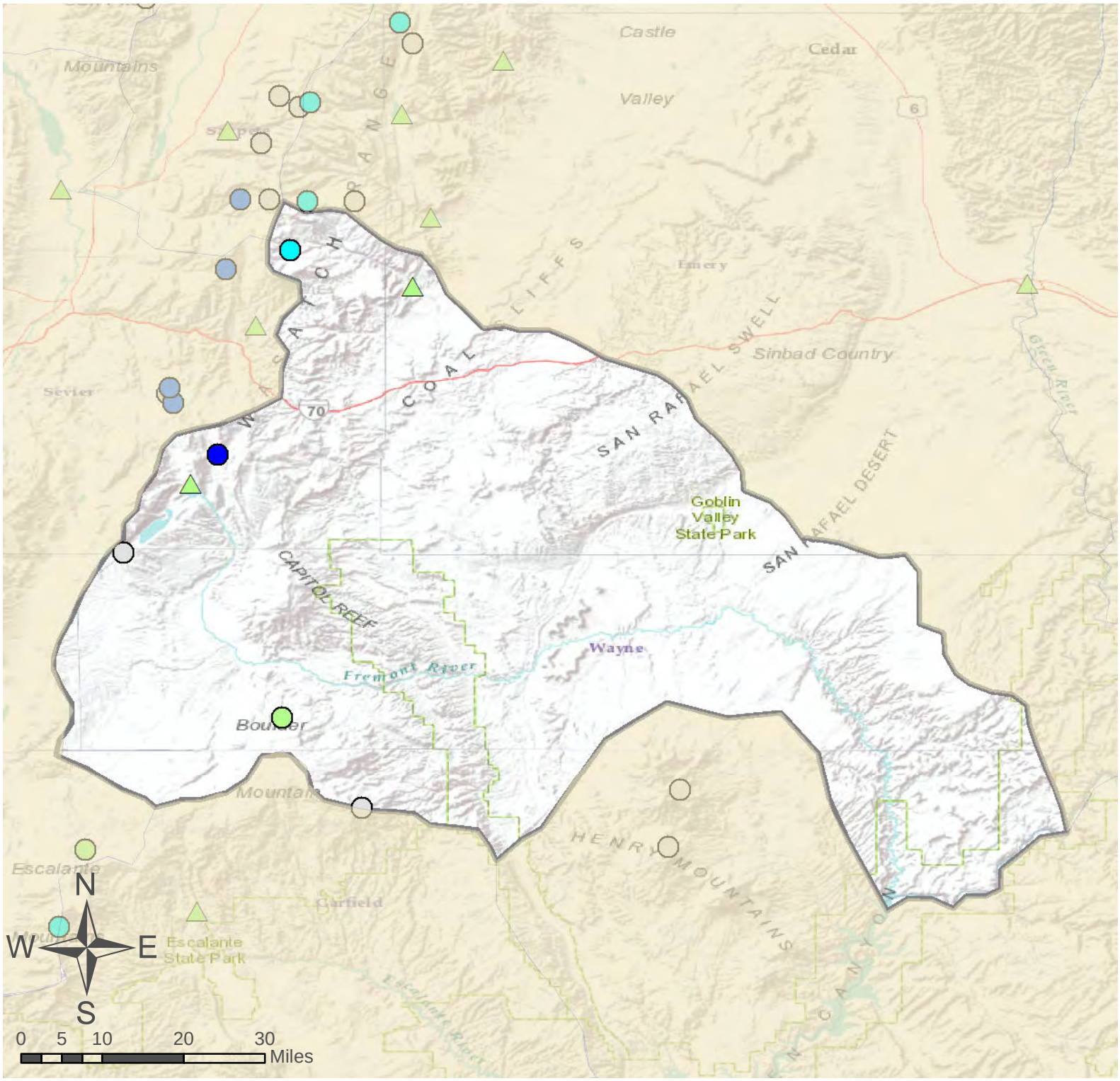
Dirty Devil
Streamflow Forecasts - March 1, 2019

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	15.3	20	24	121%	28	35	19.9
Seven Mile Ck nr Fish Lake								
	APR-JUL	6	8.3	10	137%	11.9	15	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 March 1, 2019	# of Sites	% Median	Last Year % Median
Muddy Creek	3	127%	55%
Fremont River	4	140%	65%
Henry Mountains	0		



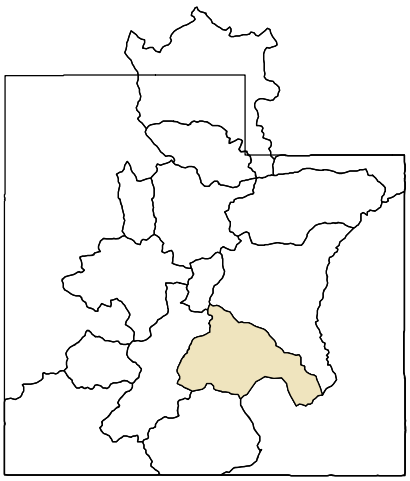
Dirty Devil Basin

SNOTEL Site

Forecast Point

% of Normal

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



As of March 1, 2019:

130% of Normal SWE

130% of Normal Precipitation

167% of Normal Precipitation Last Month

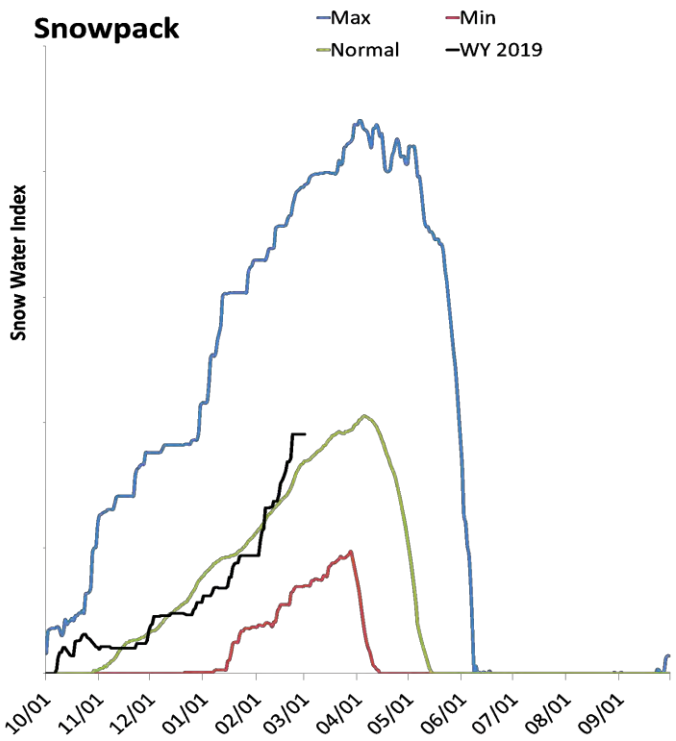
41% Saturation Soil Moisture

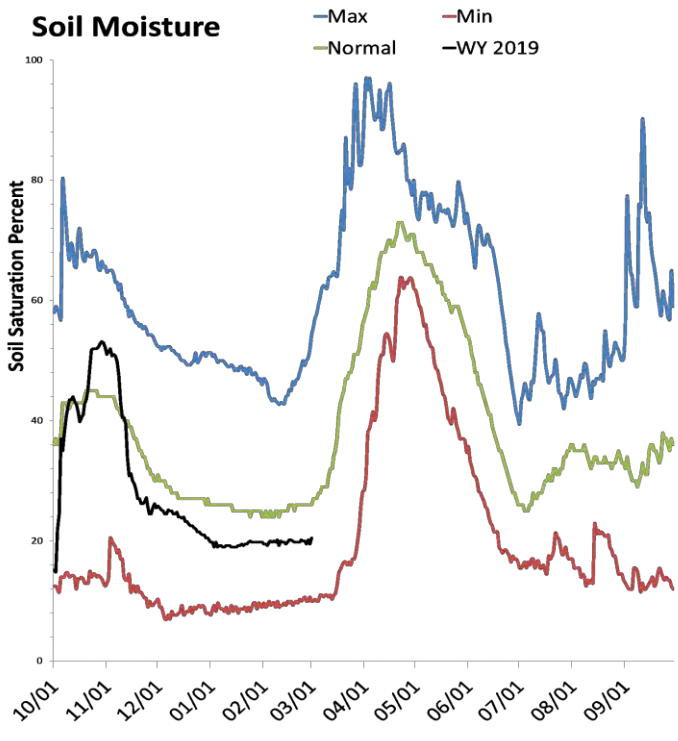
Dirty Devil Basin

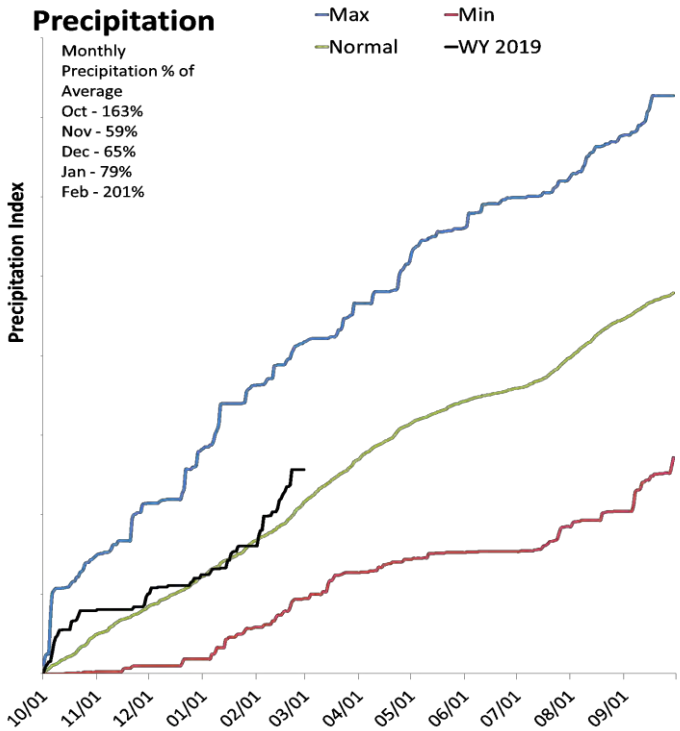
Escalante River Basin

March 1, 2019

Snowpack in the Escalante River Basin is above normal at 113% of normal, compared to 41% last year. Precipitation in February was much above average at 203%, which brings the seasonal accumulation (Oct-Feb) to 119% of average. Soil moisture is at 20% compared to 12% last year. The forecast streamflow volume for Pine Creek is 104% of average.







SNOTEL Data

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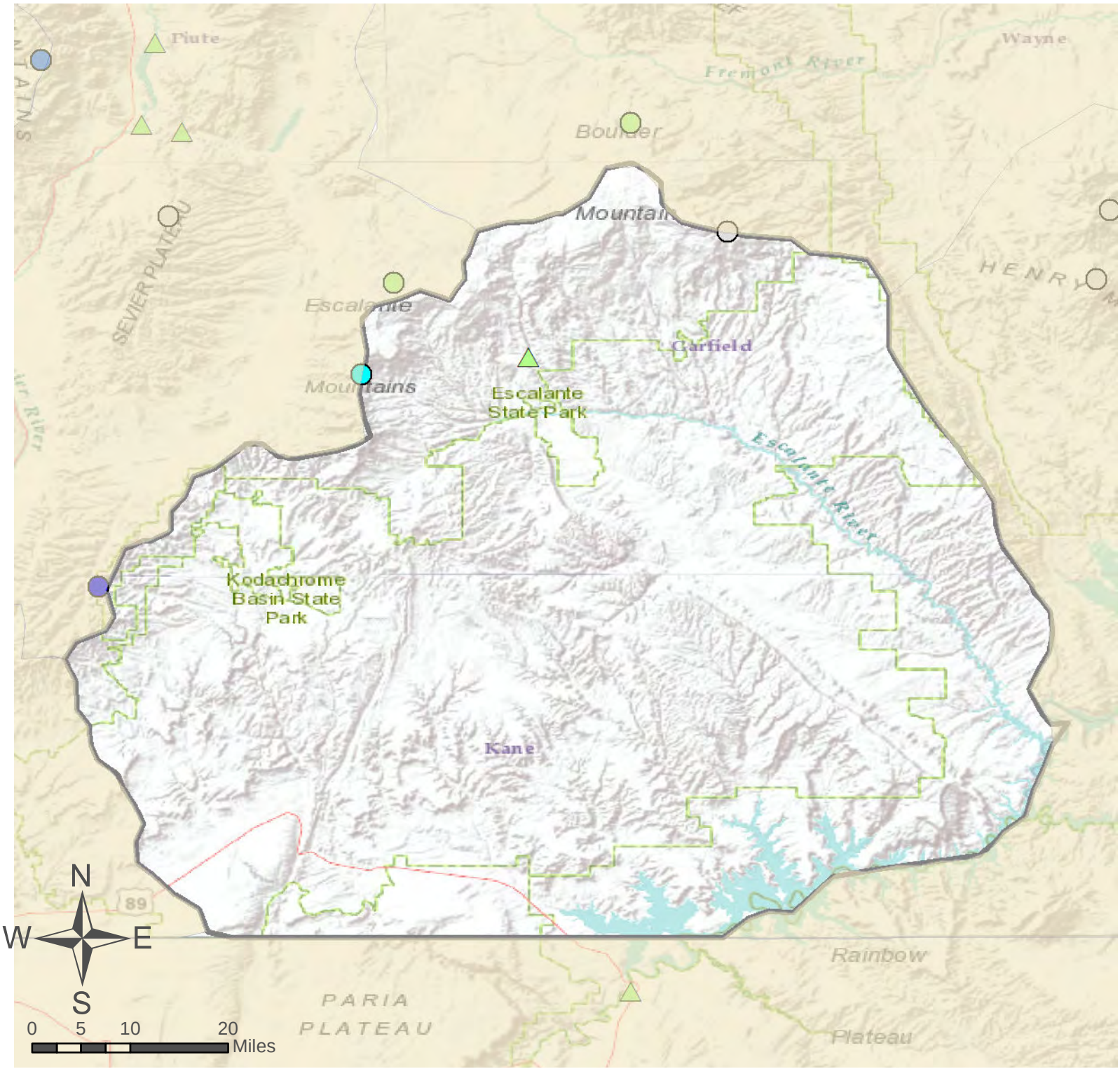
Escalante River
Streamflow Forecasts - March 1, 2019

		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	1.02	1.84	2.5	104%	3.3	4.7	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 March 1, 2019	# of Sites	% Median	Last Year % Median
Escalante River	3	113%	41%
Paria River	3	171%	29%



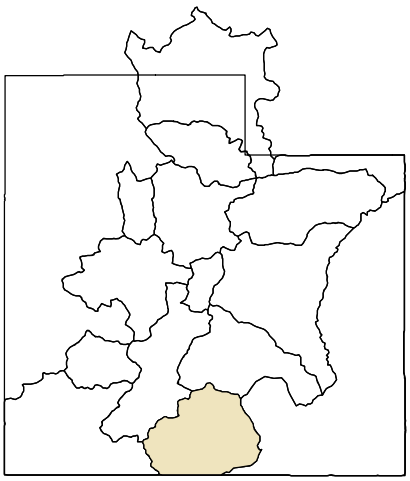
Escalante River Basin

SNOTEL Site

Forecast Point

% of Normal

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



As of March 1, 2019:

113% of Normal SWE

119% of Normal Precipitation

203% of Normal Precipitation Last Month

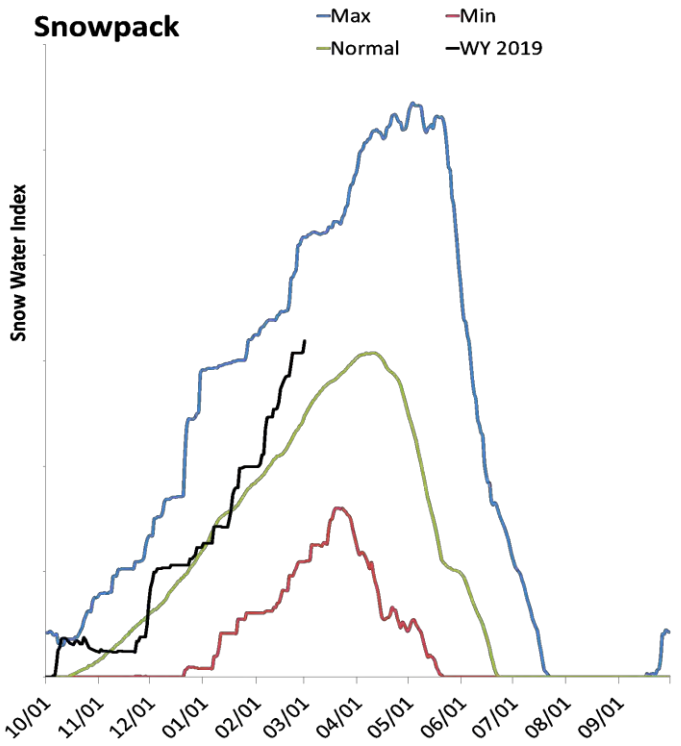
20% Saturation Soil Moisture

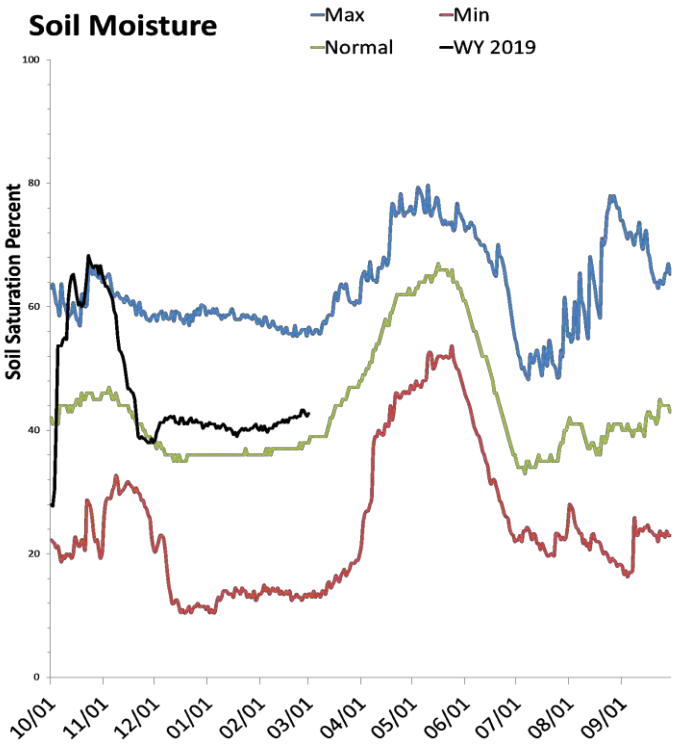
Escalante River Basin

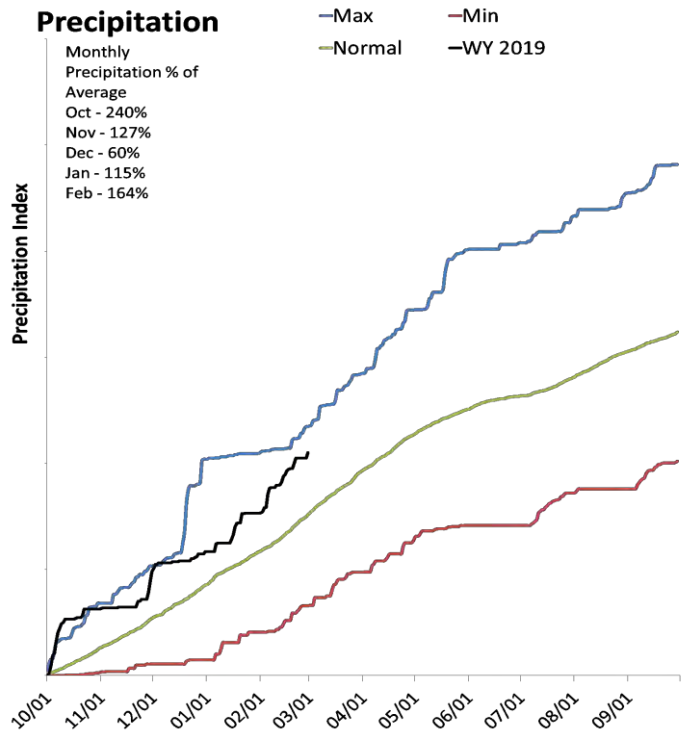
Beaver River Basin

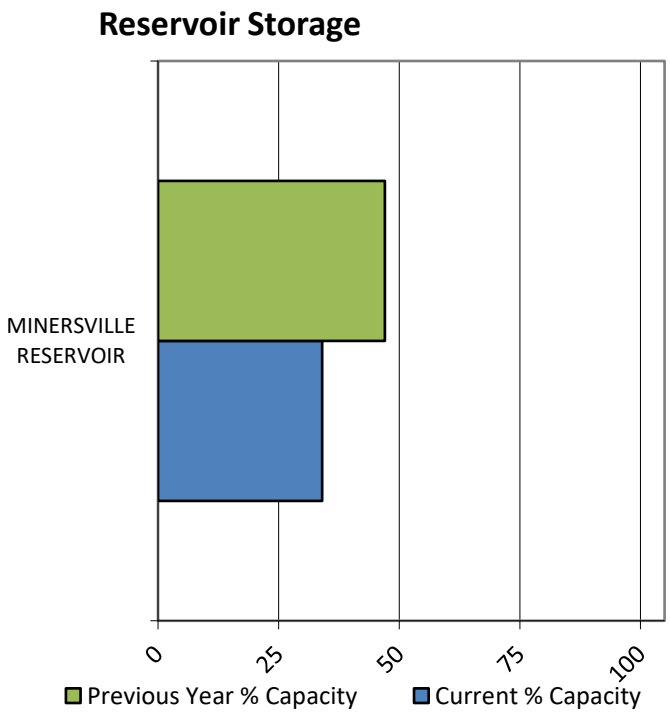
March 1, 2019

Snowpack in the Beaver River Basin is above normal at 128% of normal, compared to 44% last year. Precipitation in February was much above average at 164%, which brings the seasonal accumulation (Oct-Feb) to 138% of average. Soil moisture is at 43% compared to 23% last year. Reservoir storage is at 34% of capacity, compared to 47% last year. The forecast streamflow volume for the Beaver River is 123% of average. The surface water supply index is 58% for the Beaver River.









SNOTEL Data

Data Current as of: 3/6/2019 9:56:33 AM

Beaver River
Streamflow Forecasts - March 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	17.5	26	32	123%	38	46	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 February, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Minersville Reservoir	8.0	10.9	15.1	23.3
Basin-wide Total	8.0	10.9	15.1	23.3
# of reservoirs	1	1	1	1

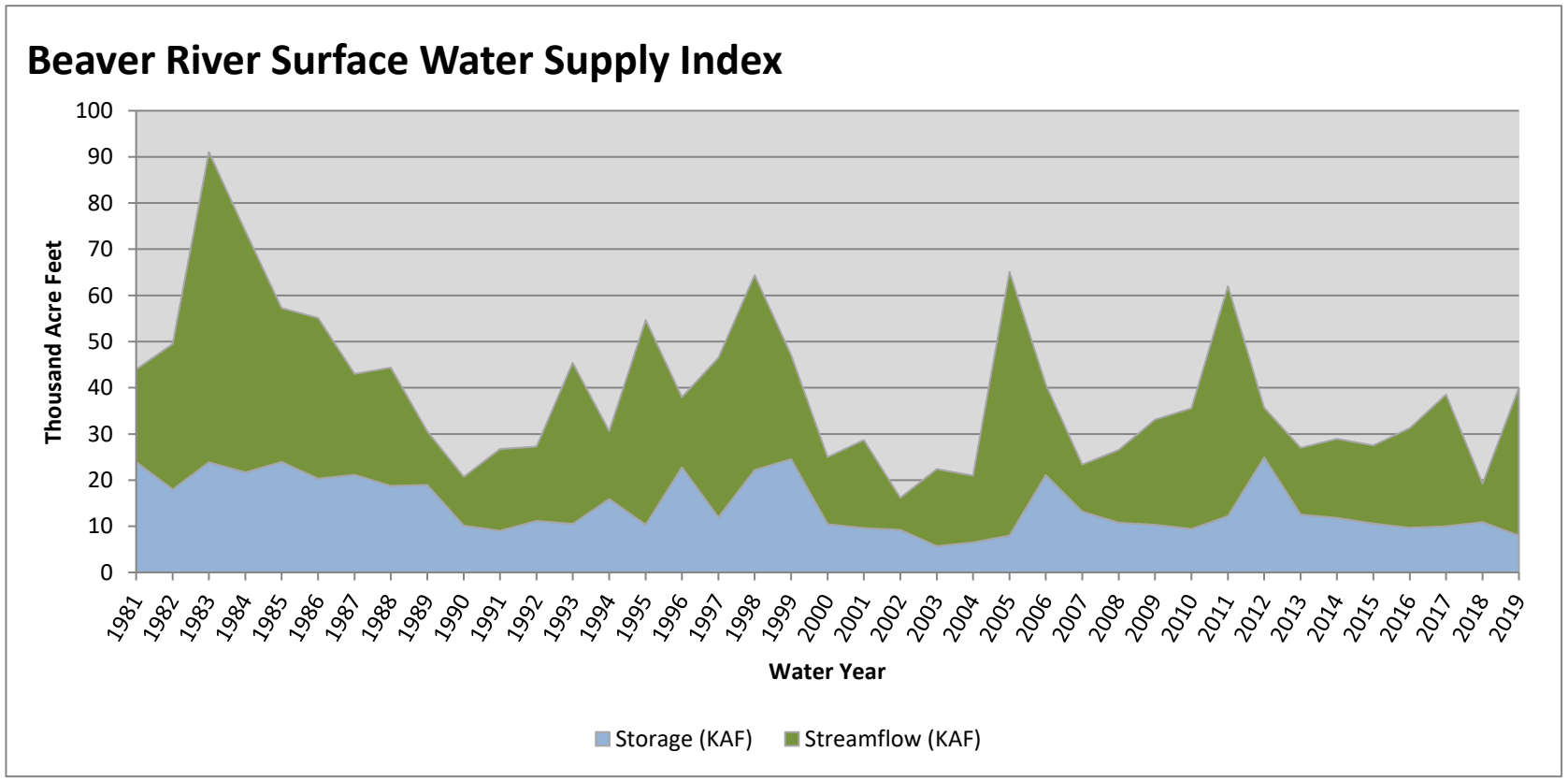
Watershed Snowpack Analysis March 1, 2019	# of Sites	% Median	Last Year % Median
Beaver River	3	128%	44%

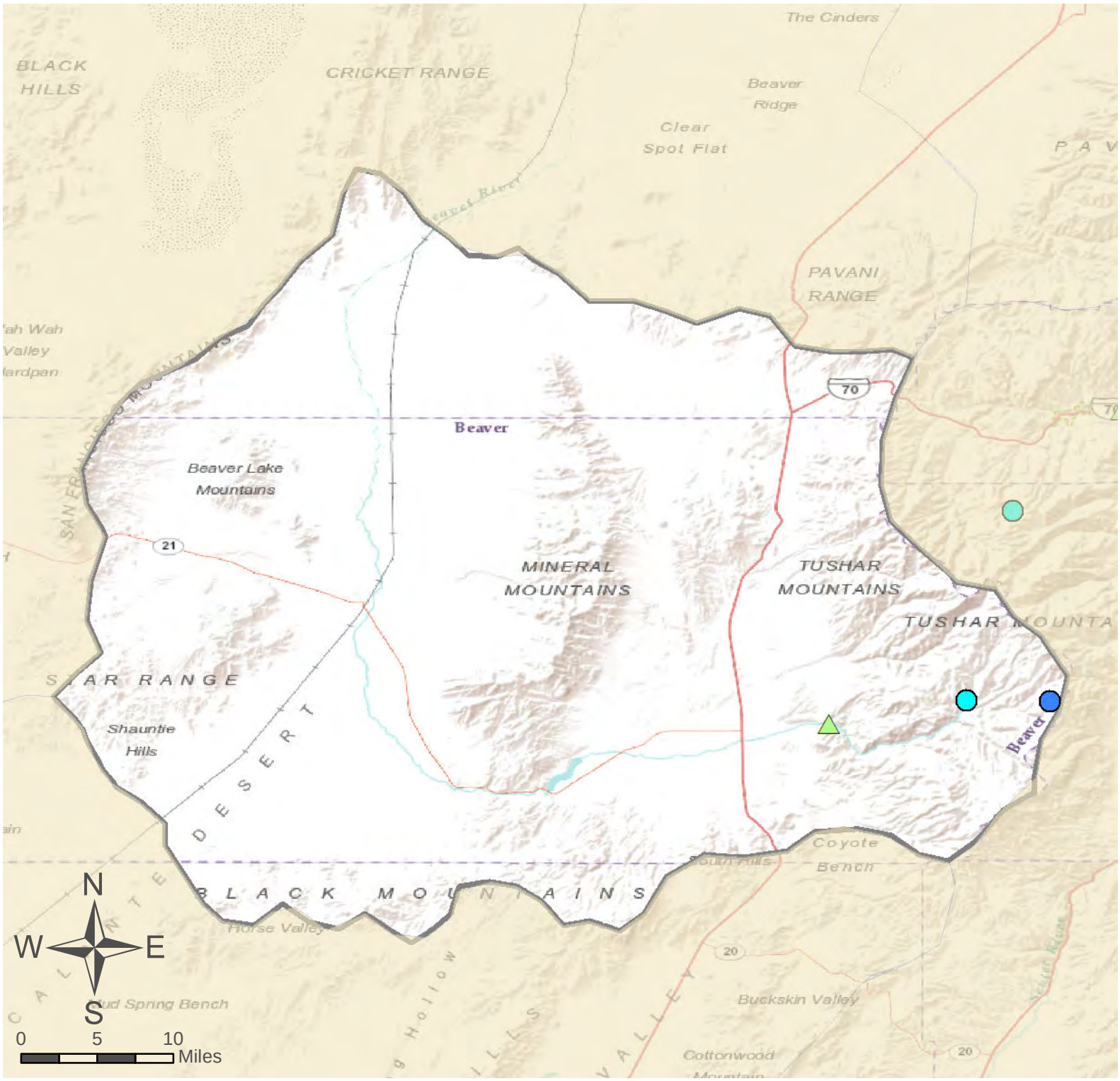
March 1, 2019

Surface Water Supply Index

Basin or Region	Feb EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Beaver River	**8.02**	**32.00**	**40.02**	**58**	**0.62**	**96, 17, 06, 87**

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





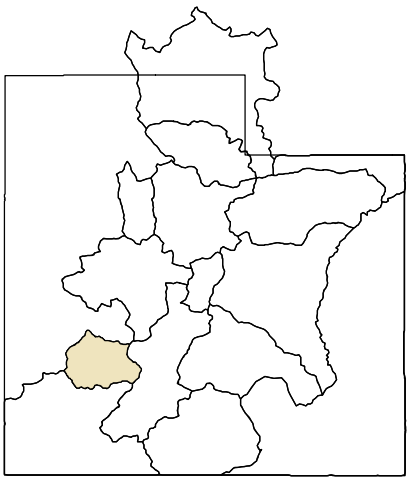
Beaver River Basin

SNOTEL Site

Forecast Point

% of Normal

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



As of March 1, 2019:

128% of Normal SWE

138% of Normal Precipitation

164% of Normal Precipitation Last Month

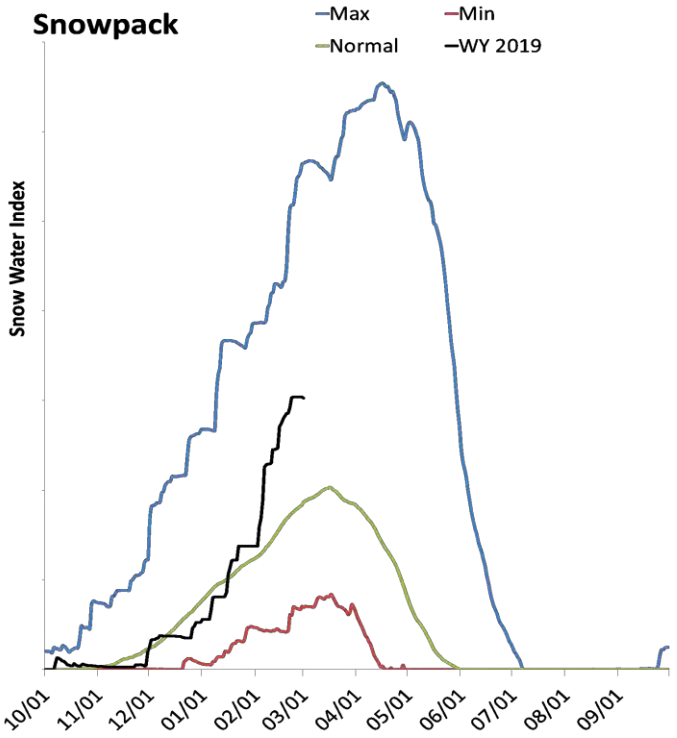
43% Saturation Soil Moisture

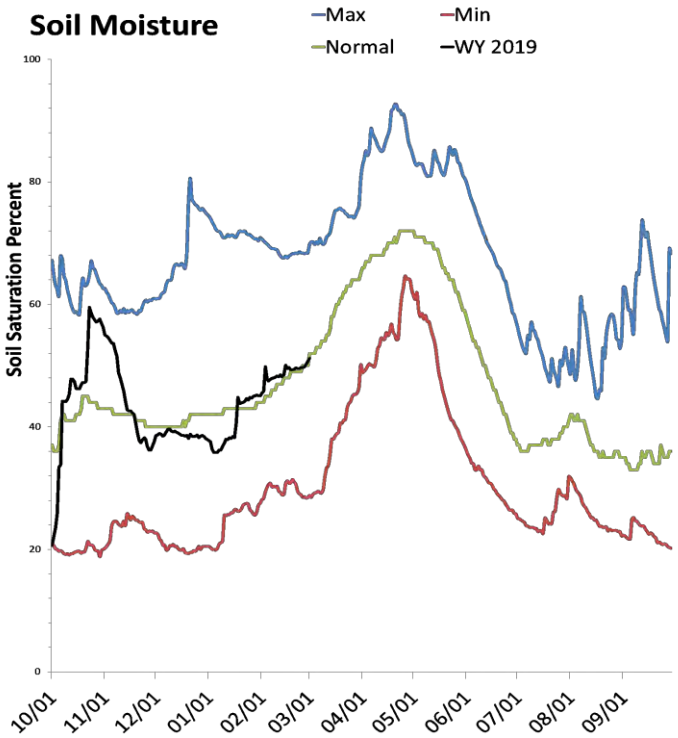
Beaver River Basin

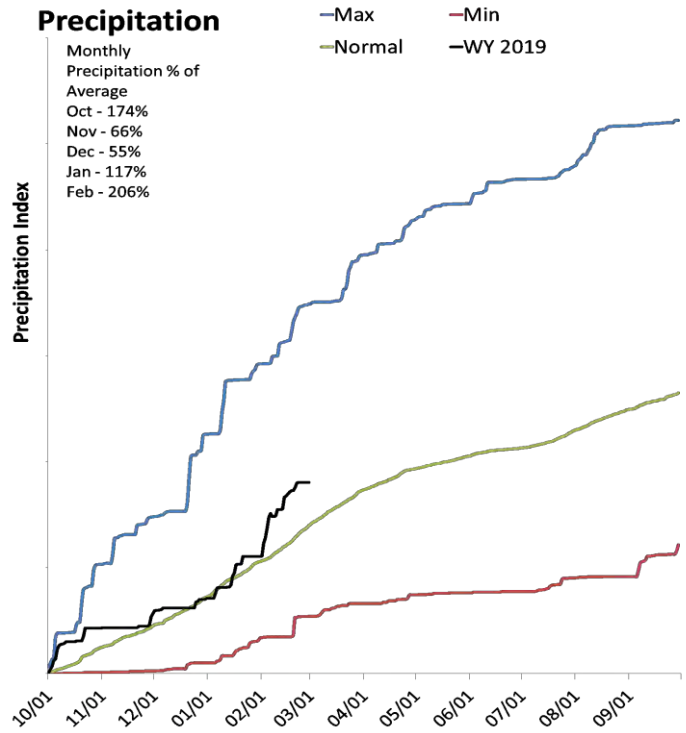
Southwestern Utah

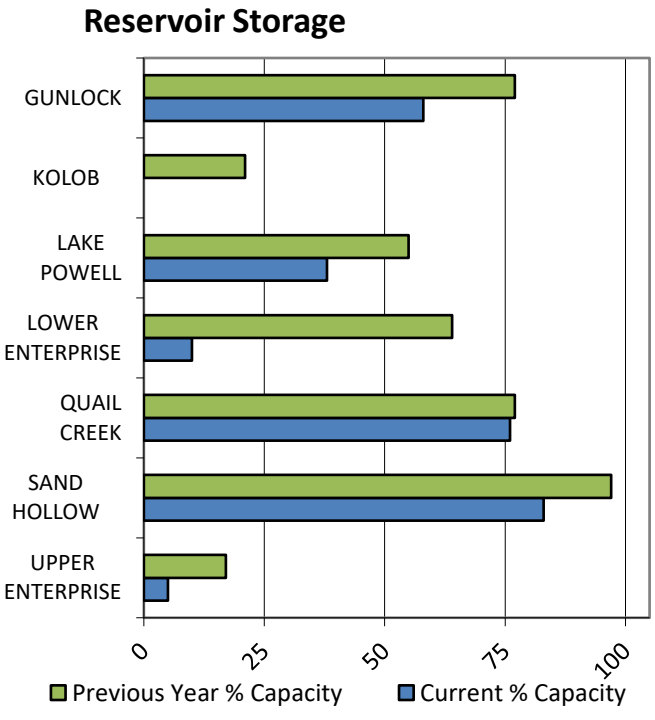
March 1, 2019

Snowpack in the Southwestern Utah is much above normal at 162% of normal, compared to 43% last year. Precipitation in February was much above average at 207%, which brings the seasonal accumulation (Oct-Feb) to 129% of average. Soil moisture is at 51% compared to 29% last year. Reservoir storage is at 38% of capacity, compared to 55% last year. Forecast streamflow volumes range from 108% to 143% of average. The surface water supply index is 79% for the Virgin River.









SNOTEL Data

Data Current as of: 3/6/2019 9:56:48 AM

Southwestern Utah
Streamflow Forecasts - March 1, 2019

Southwestern Utah	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						
Lake Powell Inflow [2]	APR-JUL	4930	6510	7700	108%	8990	11100	7160
Virgin R nr Hurricane	APR-JUL	44	72	90	143%	109	136	63
Virgin R at Virgin	APR-JUL	40	57	77	133%	86	111	58
Santa Clara R nr Pine Valley	APR-JUL	2.5	4.2	5.6	112%	7.2	9.9	5
Coal Ck nr Cedar City	APR-JUL	16	21	25	129%	29	36	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 February, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Powell	9260.7	13345.8	17055.0	24322.0
Lower Enterprise	0.3	1.7	1.0	2.6
Upper Enterprise	0.5	1.7	3.9	10.0
Kolob Reservoir	0.0	1.2		5.6
Gunlock	6.0	8.0	6.7	10.4
Sand Hollow Reservoir	41.5	48.5		50.0
Quail Creek	30.4	30.8	30.0	40.0
Basin-wide Total	9297.9	13387.9	17096.6	24385.0
# of reservoirs	5	5	5	5

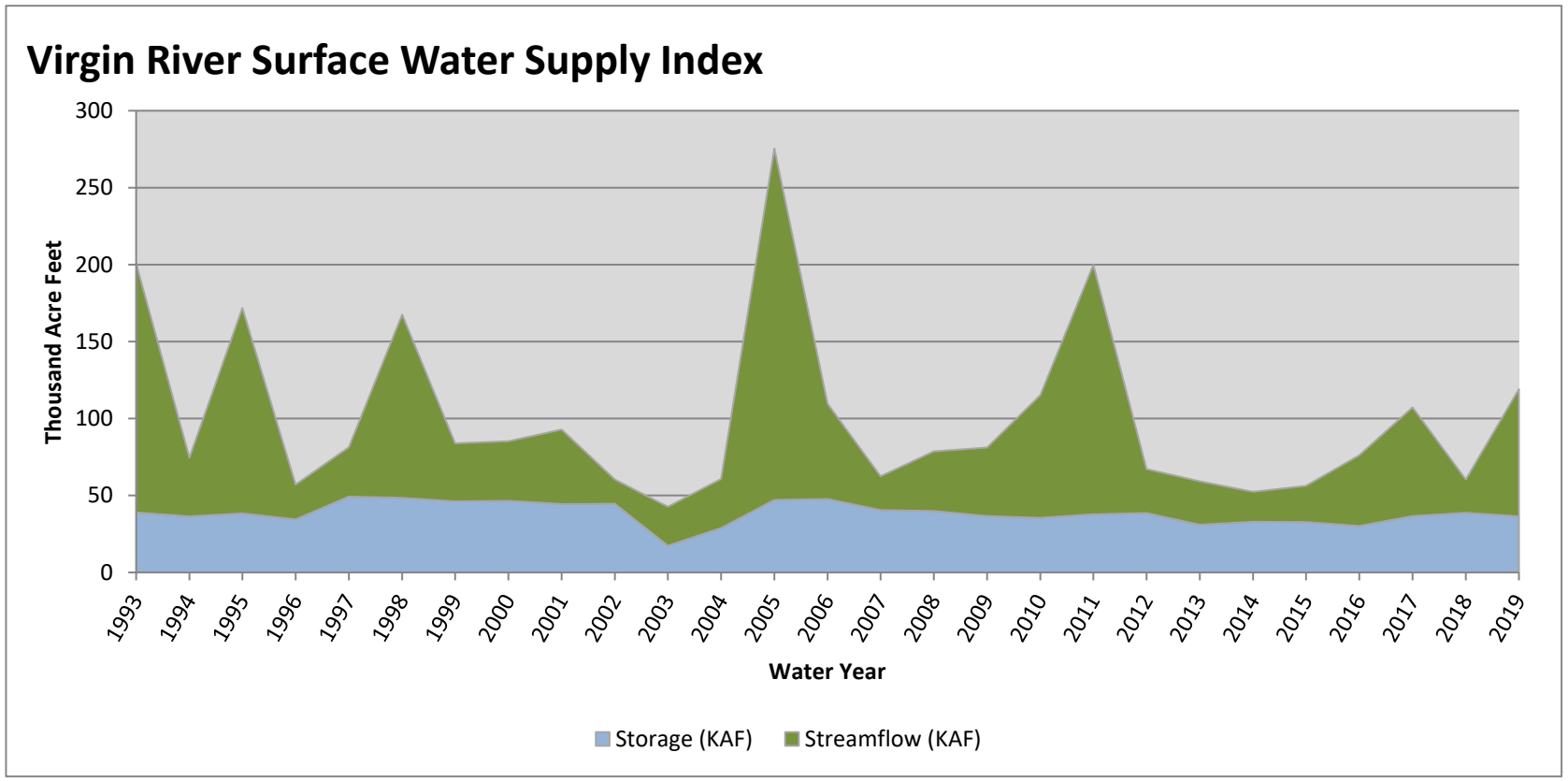
Watershed Snowpack Analysis March 1, 2019	# of Sites	% Median	Last Year % Median
Upper Virgin	8	164%	39%
Lower Virgin	2	165%	21%
Coal Parowan Creeks	4	148%	55%

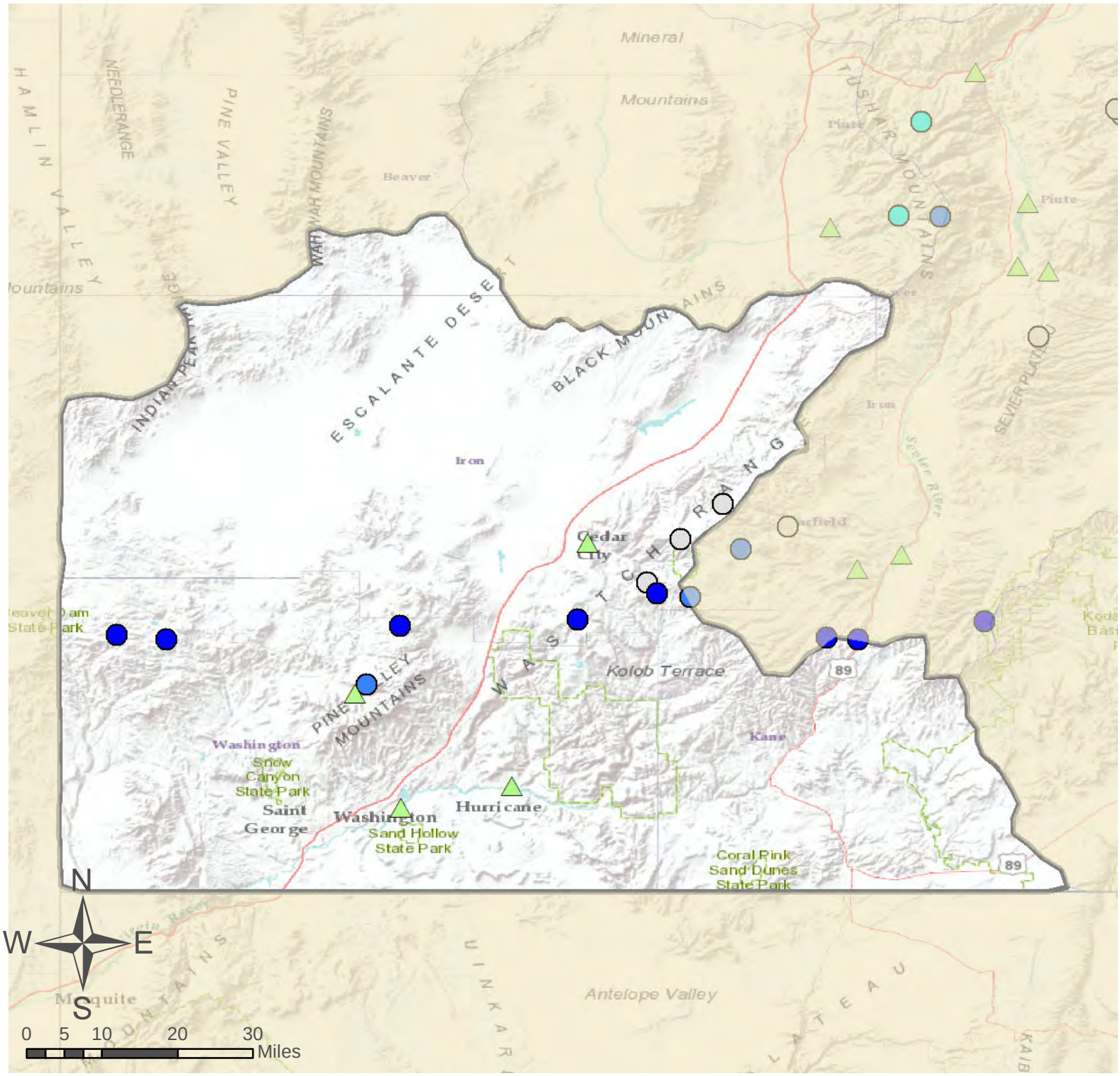
March 1, 2019

Surface Water Supply Index

Basin or Region	Feb EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF^	KAF^	KAF^	%		
Virgin River	**36.43**	**82.60**	**119.03**	**79**	**2.38**	**06, 10, 98, 95**

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





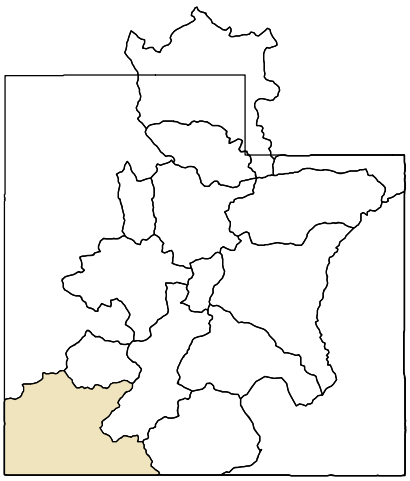
Southwestern Utah

SNOTEL Site

Forecast Point

% of Normal

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



As of March 1, 2019:

162% of Normal SWE

129% of Normal Precipitation

207% of Normal Precipitation Last Month

51% Saturation Soil Moisture

Southwestern Utah

March 1, 2019

Surface Water Supply Index

Basin or Region	Feb EOM* Storage	APR-JUL Forecast	Storage + Forecast	Percentile	SWSI#	Years with similiar SWSI
	KAF ^	*KAF ^*	*KAF ^*	*%*		
Bear River	**833.8**	**150.0**	**983.8**	**63**	**1.04**	**88, 81, 87, 12**
Woodruff Narrows	**22.0**	**105.0**	**127.0**	**45**	**-0.42**	**00, 07, 18, 08**
Little Bear	**9.8**	**43.0**	**52.8**	**57**	**0.6**	**16, 08, 93, 09**
Ogden River	**61.2**	**114.0**	**175.2**	**58**	**0.62**	**94, 16, 96, 09**
Weber River	**243.0**	**300.0**	**543.0**	**55**	**0.42**	**94, 81, 10, 09**
Provo River	**846.0**	**106.0**	**952.0**	**23**	**-2.24**	**05, 17, 15, 95**
Western Uinta	**153.2**	**105.0**	**258.2**	**65**	**1.25**	**16, 09, 06, 98**
Eastern Uinta	**12.4**	**77.0**	**89.4**	**28**	**-1.88**	**03, 81, 12, 15**
Blacks Fork	**5.9**	**95.0**	**100.9**	**46**	**-0.34**	**06, 18, 87, 08**
Smiths Fork	**3.9**	**27.0**	**30.9**	**54**	**0.34**	**13, 97, 91, 14**
Price River	**27.2**	**58.0**	**85.2**	**75**	**2.08**	**99, 95, 06, 97**
Joe's Valley	**30.9**	**70.0**	**100.9**	**65**	**1.25**	**08, 17, 96, 99**
Ferron Creek	**1.2**	**48.0**	**49.2**	**63**	**1.04**	**14, 96, 99, 85**
Moab	**0.4**	**5.5**	**5.9**	**67**	**1.39**	**96, 17, 94, 97**
Upper Sevier	**42.3**	**78.0**	**120.3**	**35**	**-1.25**	**17, 10, 00, 97**
San Pitch	**1.0**	**20.0**	**21.0**	**43**	**-0.63**	**93, 01, 10, 88**
Lower Sevier	**62.4**	**122.0**	**184.4**	**43**	**-0.63**	**08, 13, 01, 93**
Beaver River	**8.0**	**32.0**	**40.0**	**58**	**0.62**	**96, 17, 06, 87**
Virgin River	**36.4**	**82.6**	**119.0**	**79**	**2.38**	**06, 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.

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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/

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Utah Water Supply Outlook Report

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