USDA United States Department of Agriculture
Natural Resources Conservation Service

Colorado
Water Supply Outlook Report
January 1, 2017

Looking into the Current Creek basin, a headwater tributary of the Fraser River, after a substantial mid-December storm. The Berthoud Summit SNOTEL site recorded 7 inches of liquid precipitation during the month of December, turning the tables after a dry fall. Thanks to this steady December snowfall the Upper Colorado River basin snowpack is currently at 117 percent of median.

Date: 12/18/2016 Photo By: Lexi Landers

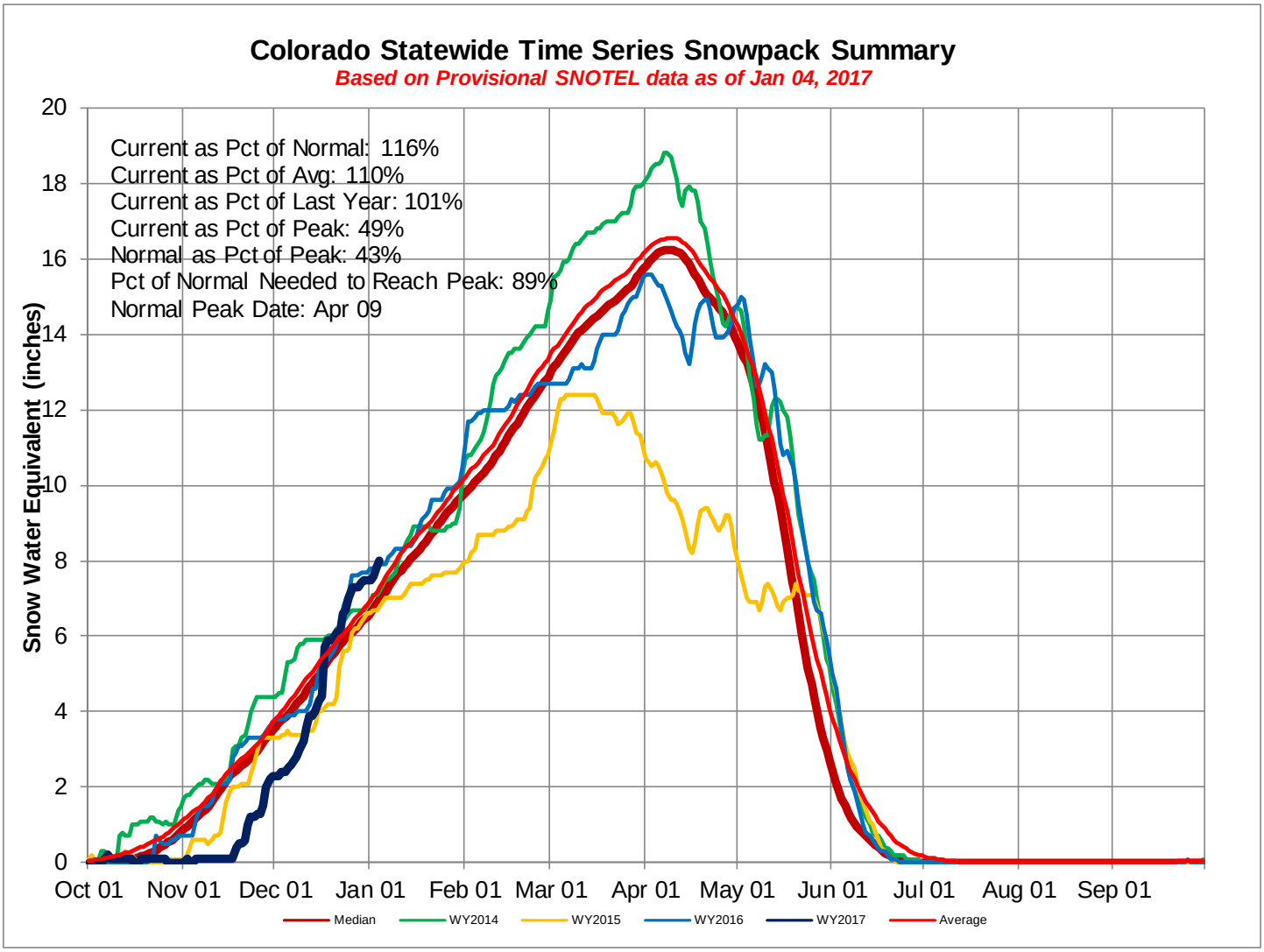
REMINDER: We are soliciting field work photos from our snow surveyors again this year. Each month we will pick one to grace the cover of this report! Please include information on where, when and of who/what the photo was taken.

Contents

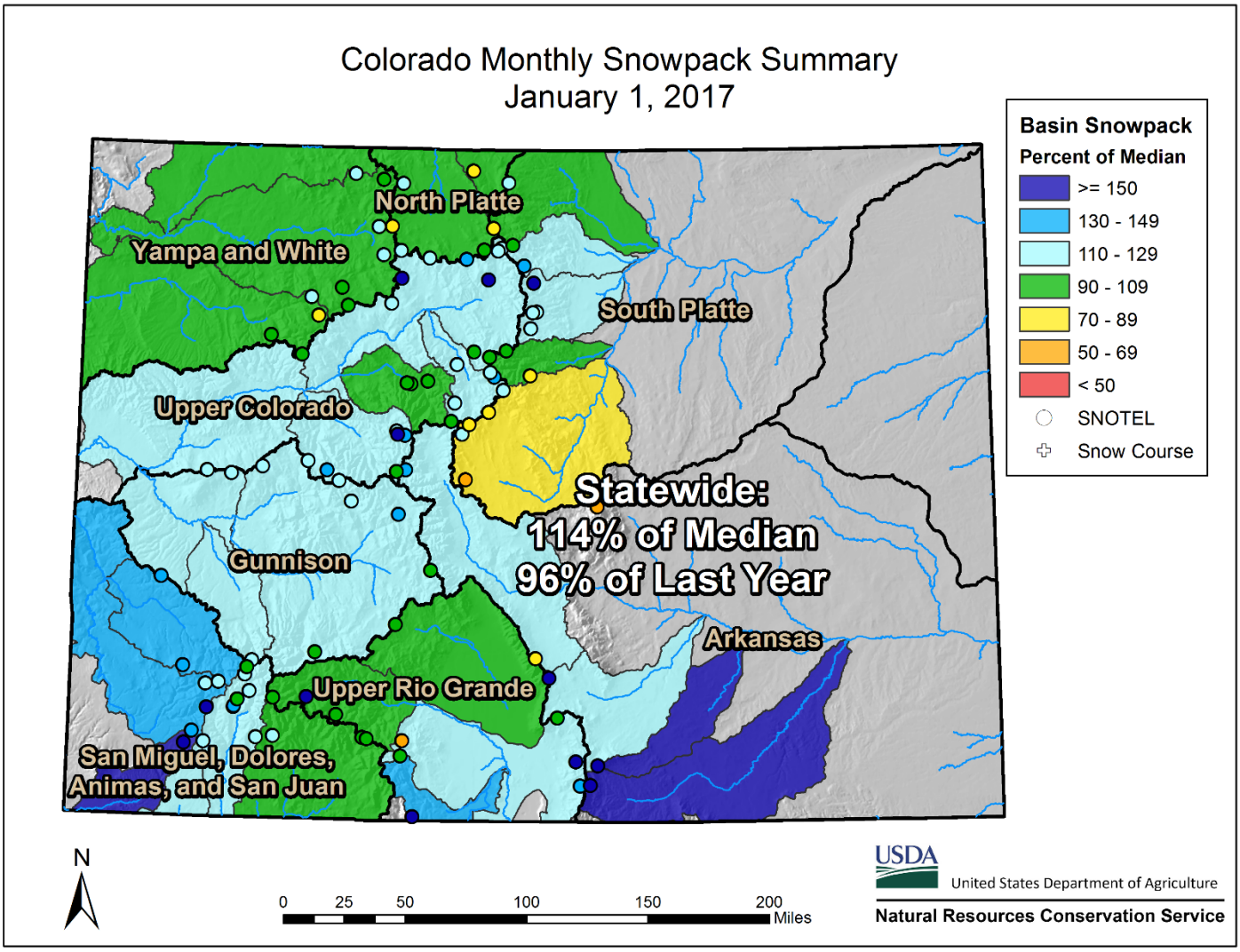
Statewide Water Supply Conditions

Summary

On the morning of November 17th, 2016, Colorado's statewide snowpack was off to the worst start in over 32 years. Mountain temperatures were well above normal, preventing snow from accumulating in many areas. While temperatures struggled to reach freezing, precipitation also failed to fall altogether, ranking in the bottom tenth percentile of water year accumulations to date. At that point, prospects for reaching normal snowpack conditions by January 1st, 2017 were bleak, and chances of achieving a normal peak snowpack by late April, looked doubtful. However, on November 17th, 2016 a change was in store; late summer seemed to give way to winter as if Mother Nature decided to skip right over fall. From that point through January 1st, 2017, snow water equivalent measurements from statewide automated Snow Telemetry (SNOTEL) stations have accumulated at the greatest rate in over 32 years. This first publication of 2017 snowpack numbers, based on January 1st SNOTEL data, boasts a healthy 114 percent of normal snow water equivalent across Colorado. Statewide year-to-date mountain precipitation is currently 98 percent of normal on the heels of bountiful December precipitation at 171 percent of normal. Reservoir storage rounds out 2016 at 105 percent of normal. The start of water year 2017 has been on both ends of the extremes, ending up on the favorable side for now.

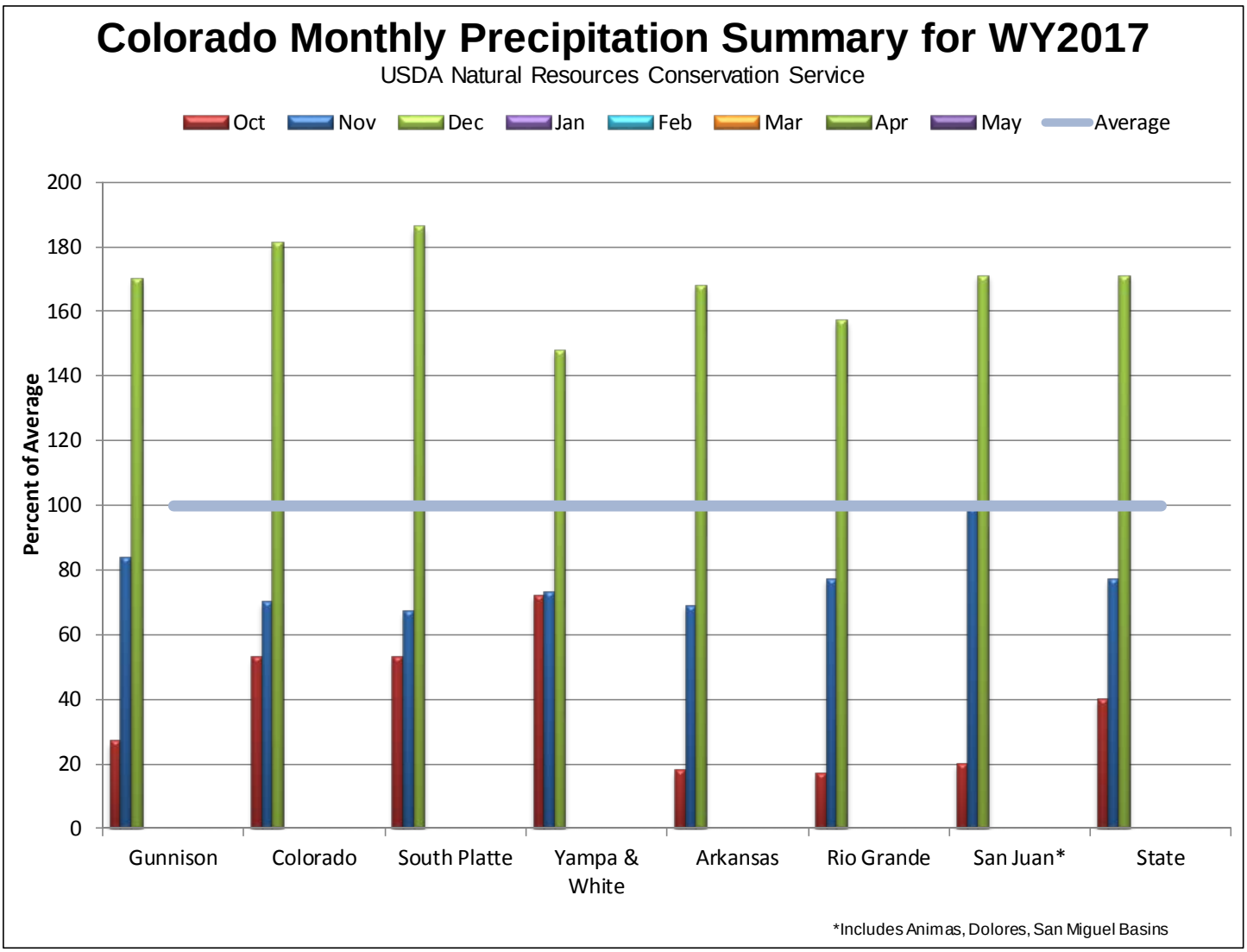


Snowpack



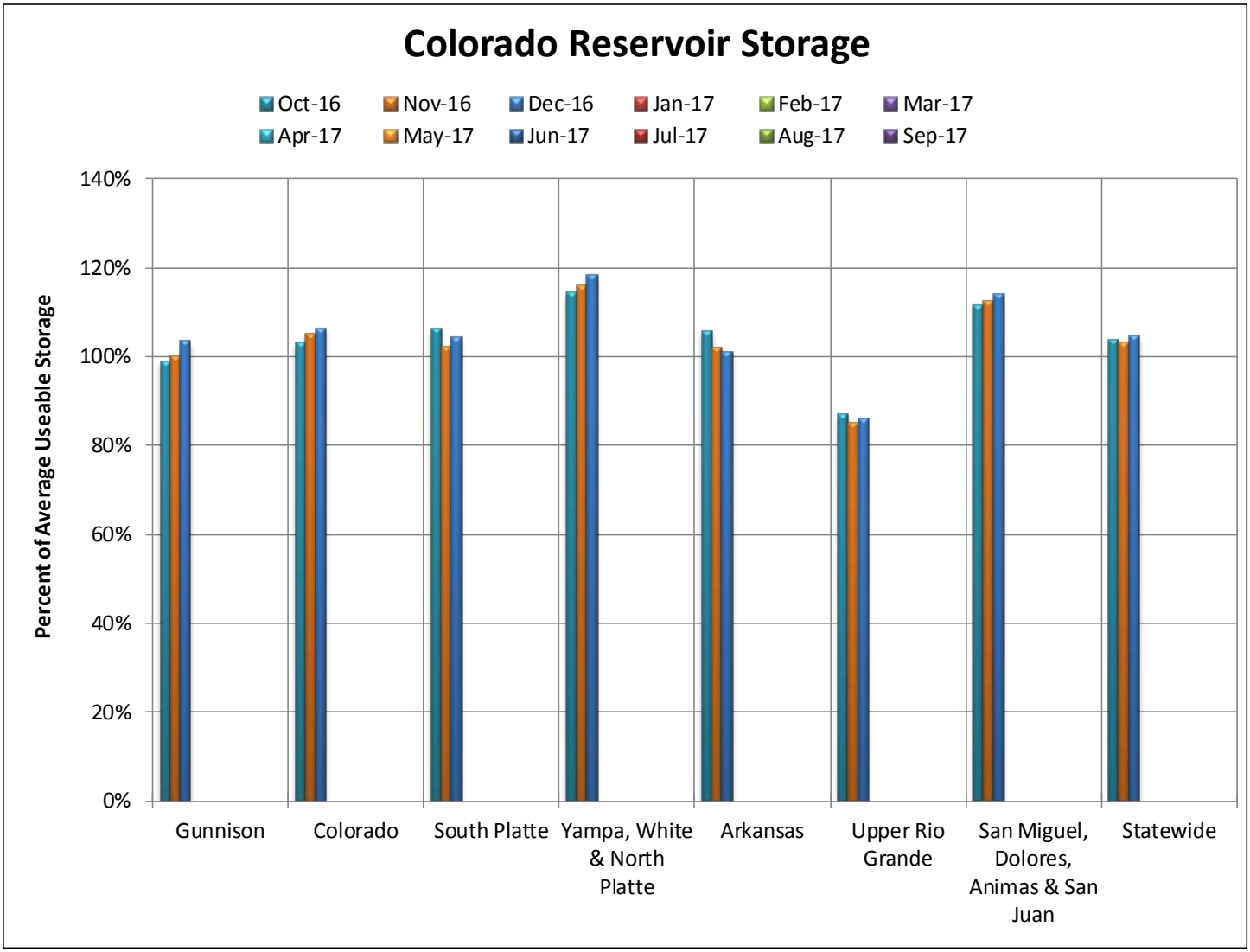
Many of Colorado's SNOTEL stations began accumulating their seasonal snowpack much later than normal this water year. However, most mountain locations have more than made up for this slow start with multiple generous storms providing plentiful snowfall. The snowpack across the state is starting off 2017 above normal at 114 percent of the median. While not quite as high as last year at this time, this puts Colorado in a good position has we head into the heart of winter. All of the major river basins also have above normal snowpacks, with basins west of the Continental Divide generally faring better than basins east of the divide. The combined San Miguel, Dolores, Animas, and San Juan River basins have the most ample snowpack, currently at 120 percent of the median. The Gunnison, Upper Colorado, and Arkansas River basins are also off to a healthy start at 118, 117, and 116 percent of median respectively. The Upper Rio Grande and combined Yampa, White, and North Platte River basins are at 109 and 106 percent of median respectively, while the South Platte Basin currently has the lowest snowpack in the state with respect to normal at 105 percent of the median. This is in part due to the relatively low snowpack levels in the Upper South Platte sub-basin, which at 89 percent is currently the only sub-basin in Colorado with a snowpack below 90 percent of the median. With the majority of the snow accumulation season remaining, this is still an optimistic start to the 2017 water year.

Precipitation



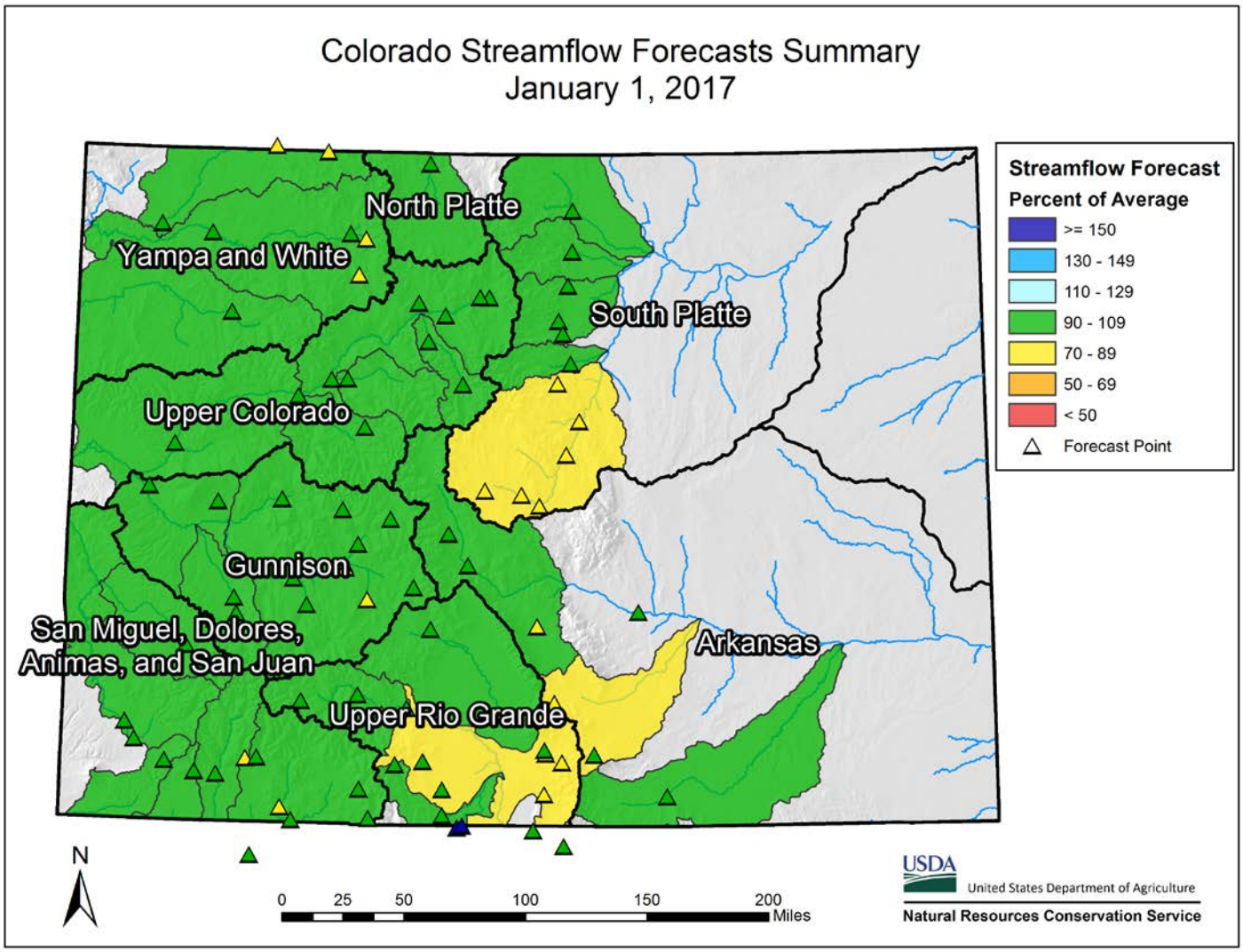
The 2017 water year started off quite dry across Colorado, with most mountain locations receiving little mountain precipitation during the first month of the water year. All of the major river basins experienced precipitation that was much below average for October, and statewide Colorado was only at 40 percent of average. The major river basins experienced improved precipitation during November, but all basins except the combined San Miguel, Dolores, Animas, San Juan continued to receive below normal precipitation amounts. Conditions shifted drastically during the latter half of November into December. All major basins received precipitation that was much above normal for the December, bringing most areas to near normal water year-to-date precipitation levels. The Upper Rio Grande and Arkansas River basins had the largest deficits to make up after an extremely dry October and subpar November. Despite December precipitation amounts that were 157 and 168 percent of average respectively, both basins remain at only 85 percent of average for the water year. After December precipitation levels near 170 percent of average, the Gunnison and combined San Juan, Dolores, Animas, and San Juan River basins are now only slightly below normal at 96 and 97 percent of average respectively. The combined Yampa, White, and North Platte River basins are currently right at 100 percent of average, while the Colorado and South Platte and are both above normal at 104 percent of average. Thanks to abundant December precipitation that contributed much needed mountain snowfall, Colorado's statewide water year precipitation is close to normal at 98 percent of average.

Reservoir Storage



Despite meager precipitation this fall, wise reservoir management has allowed statewide reservoir storage for Colorado to remain above normal, and most of the major river basins have remained fairly stable since the start of the water year on October 1st. Currently at 86 percent of average, the Upper Rio Grande remains the only basin with below normal reservoir storage. The Yampa, White, North Platte River basins have the highest reservoir storage with respect to normal and are currently at 118 percent of average, which is very similar to last year at this time. The combined San Miguel, Dolores, Animas, and San Juan basins are also well above normal at 114 percent of average, which is an improvement over January 2016. The Arkansas, Gunnison, South Platte, and Upper Colorado basins all have near normal storage levels at 101, 103, 104, and 106 percent of average respectively. As of January 1st, Colorado's statewide reservoir storage is at 105 percent of average. Given current reservoir capacity, the collective storage in the majority of Colorado's river basins will be well poised to provide adequate water supply if the above normal precipitation and snowpack trends experienced during December do not continue for the remainder of the water year.

Streamflow



Generally speaking, streamflow forecasts for stations in Colorado agree with current snowpack and precipitation levels. However, there is a wide range of potential outcomes for spring and summer runoff for any given station, expressing the low-skill in streamflow forecasts issued this early in the water year. Additionally, although most of Colorado's river basins have near normal year to date precipitation, most of this precipitation fell as snow during December, doing little to contribute to soils that received little moisture earlier in the fall. Therefore, the first surge of snowmelt will be used to fill this deficit rather than contribute directly to runoff. Streamflow forecasts are highest with respect to normal for stations in the Upper Colorado River basin where most locations are predicted to have April through July streamflow volumes near or above normal, with the highest forecast occurring for the inflow to Willow Creek Reservoir, currently predicted to be 109 percent of average. Currently the lowest predicted streamflow volumes occur for the Upper South Platte River sub-basin, where streamflow forecasts range from 77 to 85 percent of average. With the majority of winter still ahead, these forecasts can change drastically based on the snowpack that will accumulate in Colorado's mountains during the coming months.

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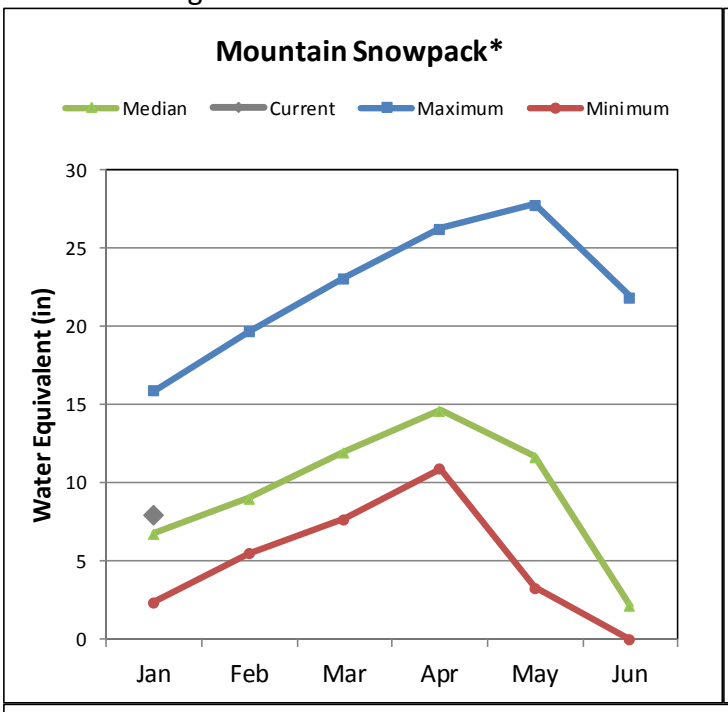
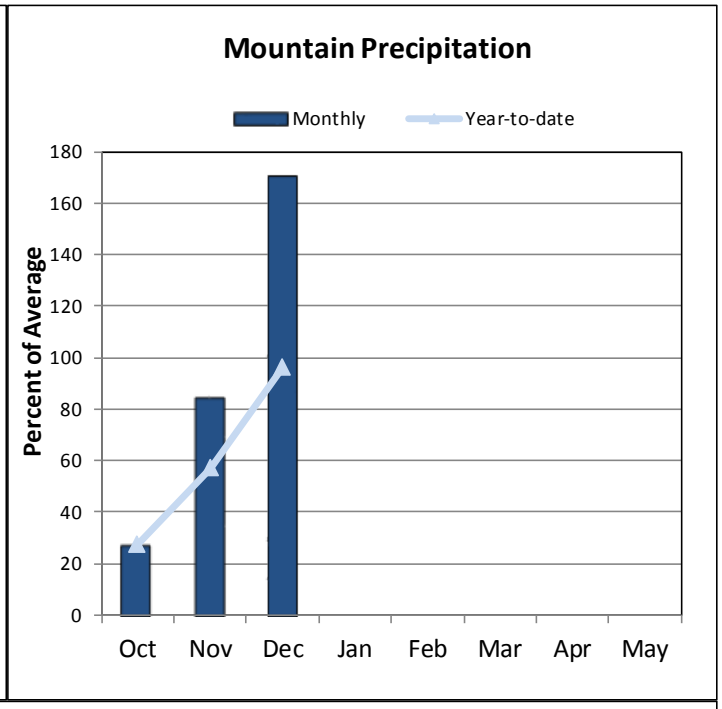
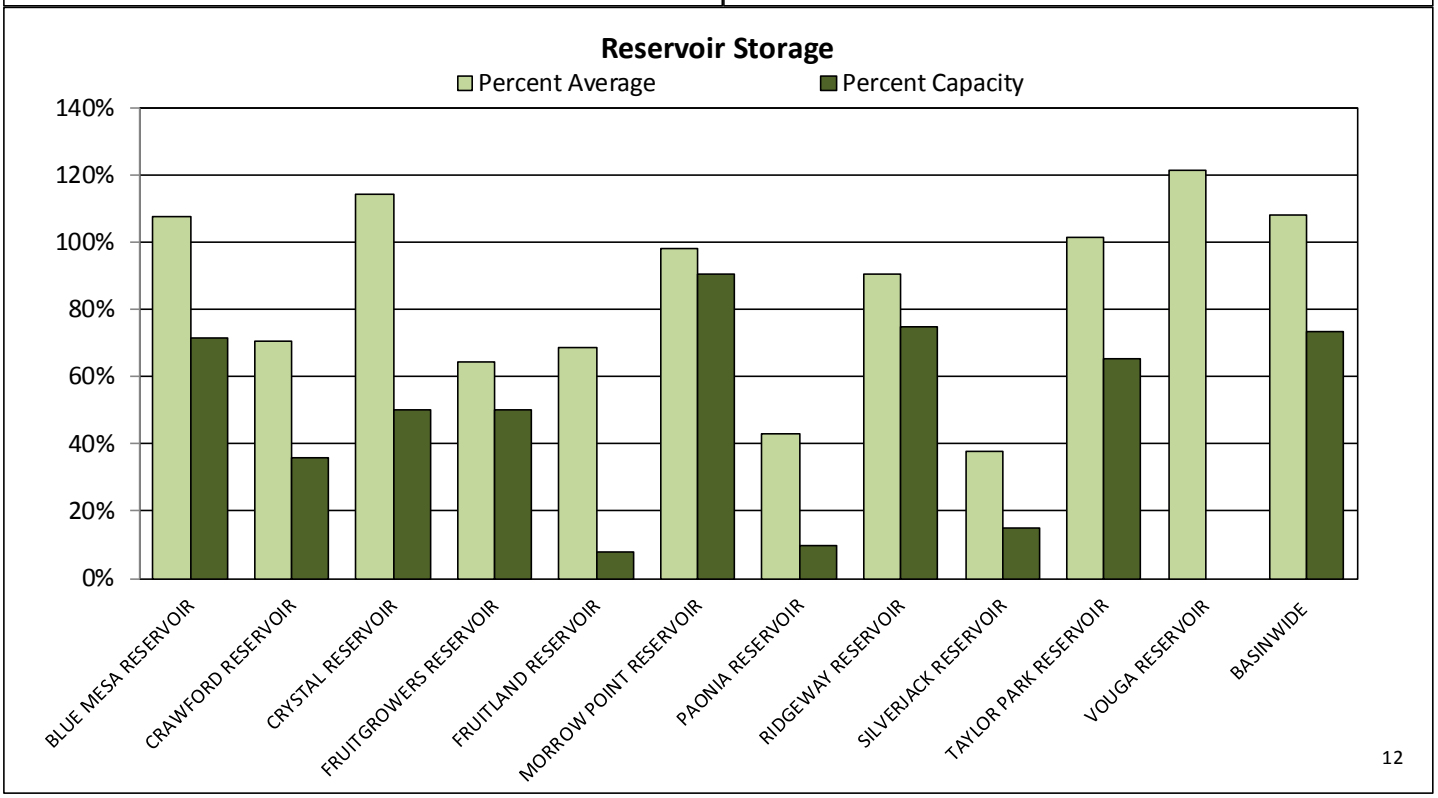
GUNNISON RIVER BASIN

January 1, 2017

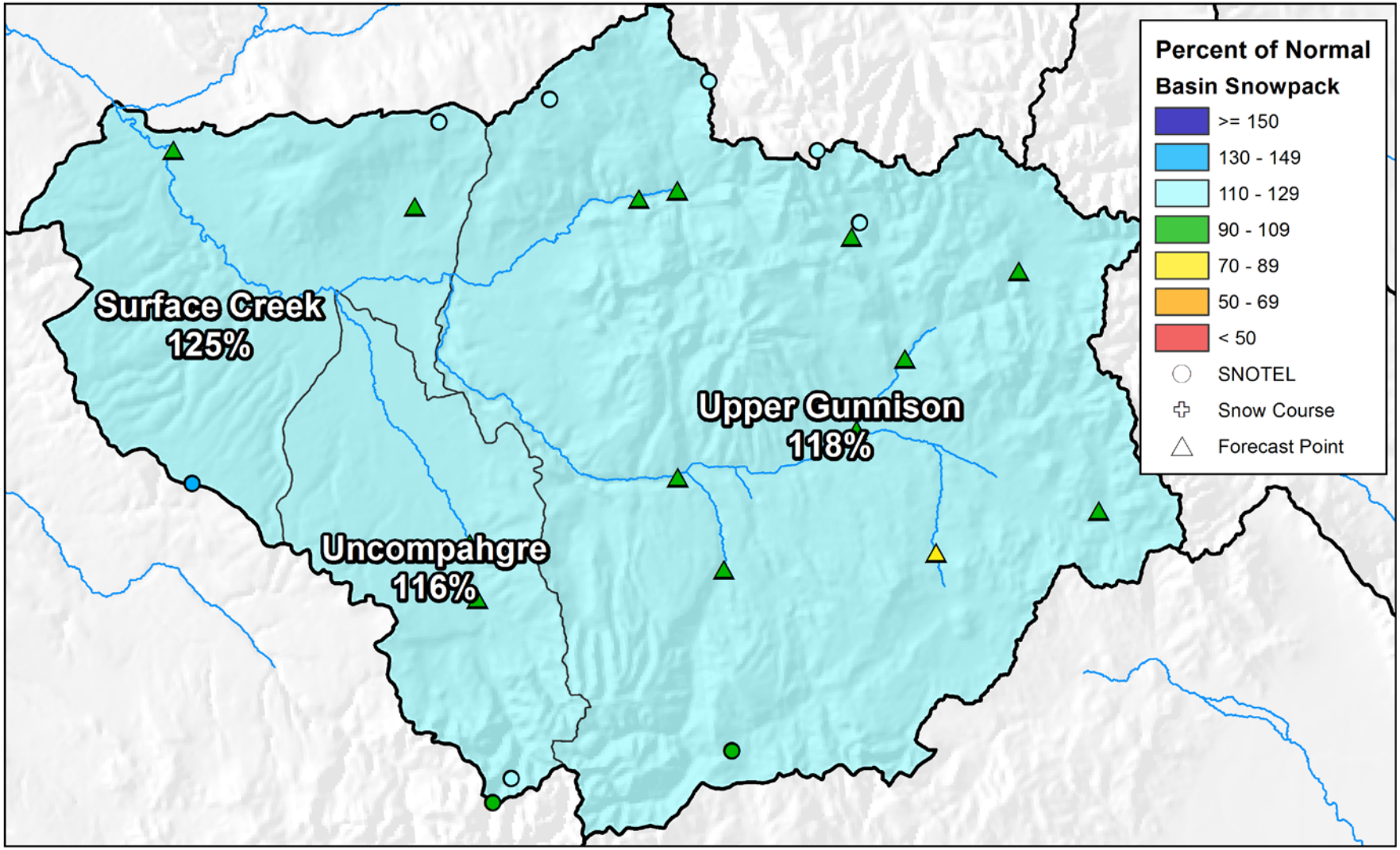
Snowpack in the Gunnison River basin is above normal at 118% of the median. Precipitation for December was 170% of average which brings water year-to-date precipitation to 96% of average. Reservoir storage at the end of December was 103% of average compared to 108% last year. Current streamflow forecasts range from 104% of average for the Slate River near Crested Butte to 86% for Tomichi Creek at Gunnison.







Gunnison River Basin Snowpack and Streamflow Forecasts
January 1, 2017



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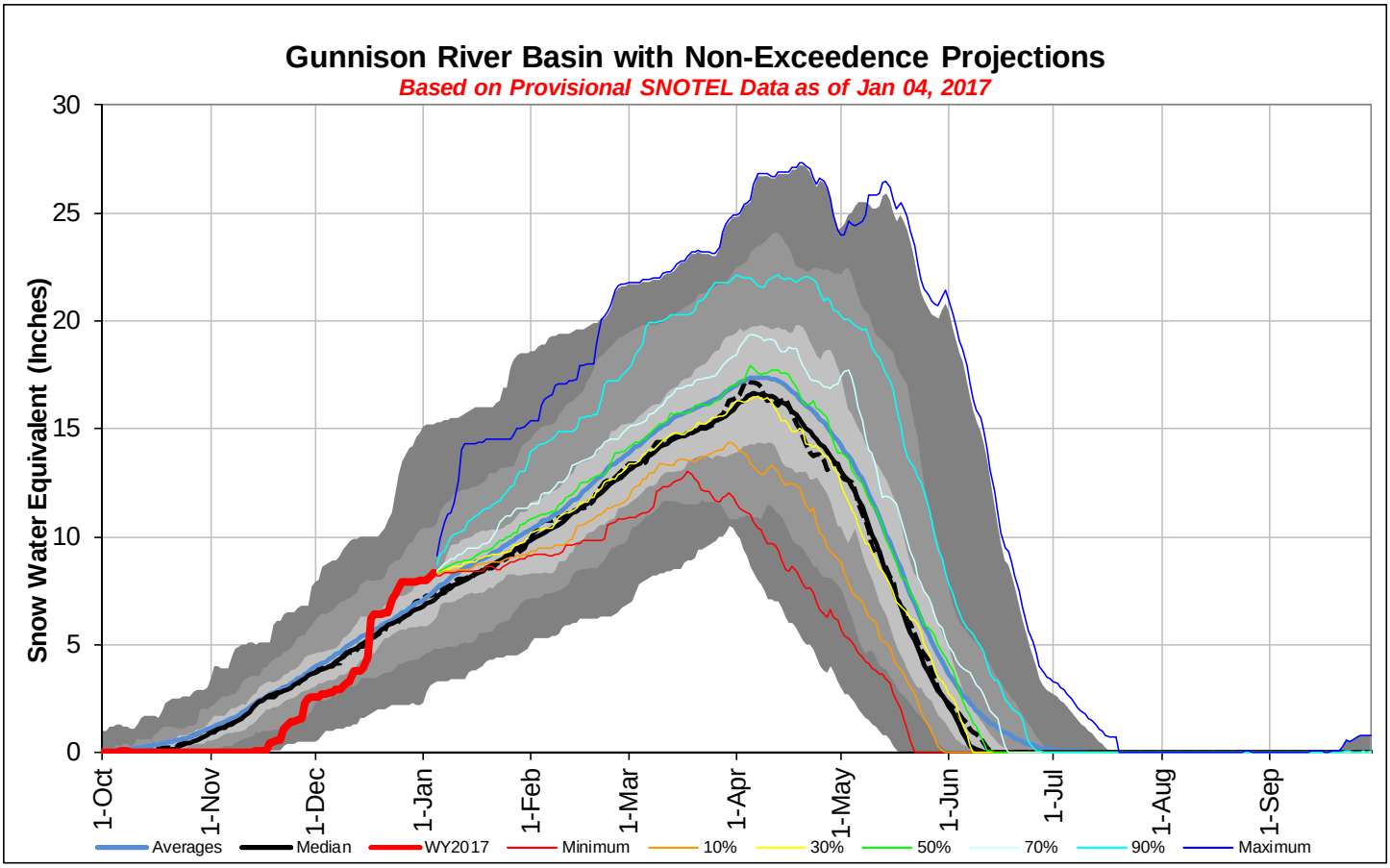
Gunnison River Basin
Streamflow Forecasts - January 1, 2017

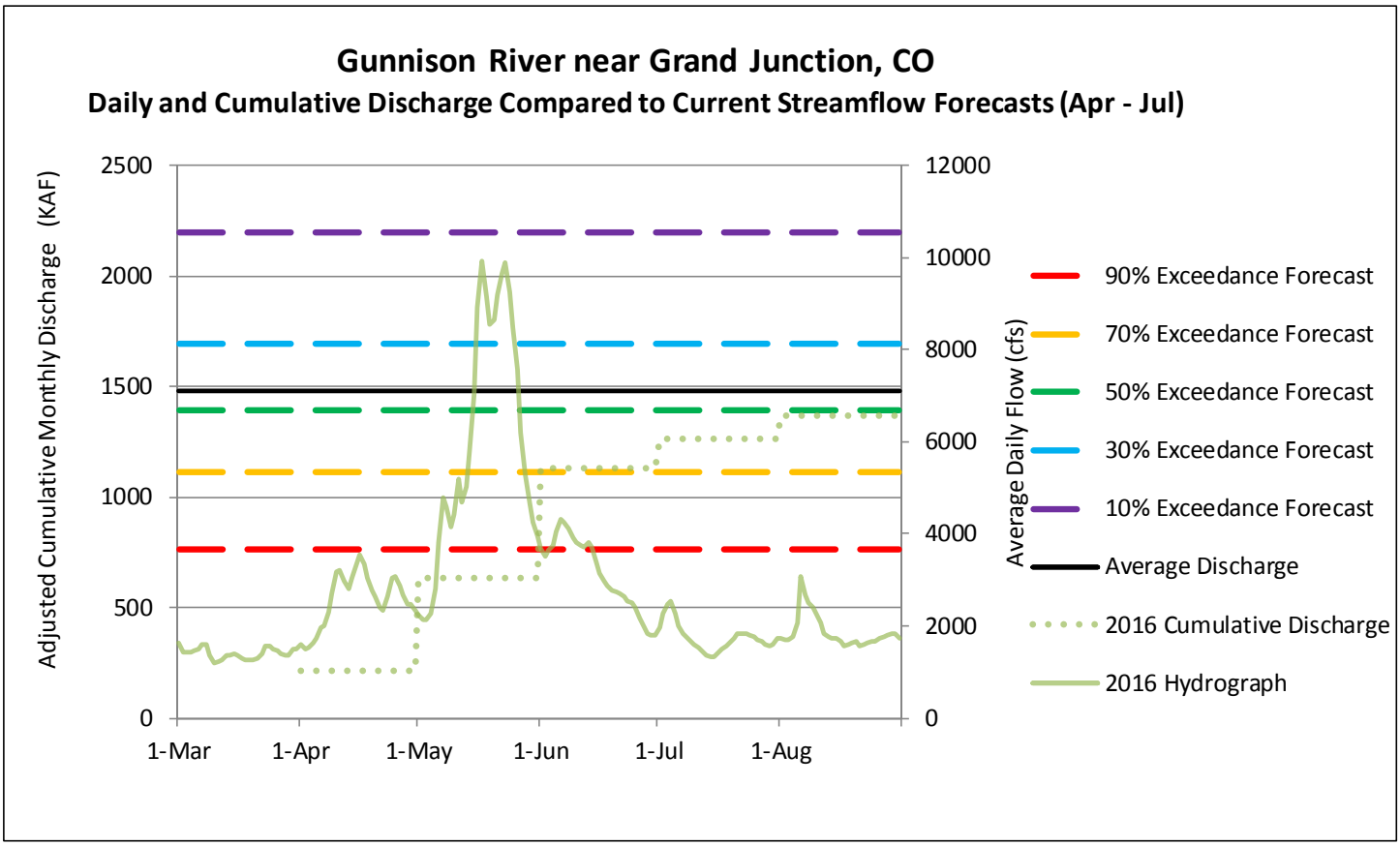
GUNNISON RIVER BASIN	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment: Chance that actual volume will exceed forecast — 90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Taylor Park Reservoir Inflow	APR-JUL	65	86	101	102%	118	145	99
Slate R nr Crested Butte	APR-JUL	60	75	86	104%	98	116	83
East R at Almont	APR-JUL	116	157	188	103%	220	275	182
Gunnison R near Gunnison [2]	APR-JUL	220	310	380	103%	455	580	370
Tomichi Ck at Sargents	APR-JUL	13.2	22	29	97%	36	50	30
Cochetopa Ck bl Rock Ck nr Parlin	APR-JUL	5.3	9.6	13.2	88%	17.4	25	15
Tomichi Ck at Gunnison	APR-JUL	25	46	64	86%	85	121	74
Lake Fk at Gateview	APR-JUL	78	100	117	95%	135	164	123
Blue Mesa Reservoir Inflow [2]	APR-JUL	370	525	645	96%	775	995	675
Paonia Reservoir Inflow	MAR-JUN	44	69	89	93%	112	150	96
	APR-JUL	40	66	88	91%	113	155	97
NF Gunnison R nr Somerset[2]	APR-JUL	171	235	285	98%	340	425	290
Surface Ck at Cedaredge	APR-JUL	8.6	12.7	15.9	95%	19.4	25	16.8
Ridgway Reservoir Inflow	APR-JUL	61	80	94	93%	110	136	101
Uncompahgre R at Colona [2]	APR-JUL	68	99	123	90%	150	195	137
Gunnison R nr Grand Junction [2]	APR-JUL	760	1110	1390	94%	1690	2200	1480

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 December, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Blue Mesa Reservoir	592.5	624.5	549.9	830.0
Crawford Reservoir	5.0	6.0	7.1	14.0
Crystal Reservoir	8.8	7.6	7.7	17.5
Fruitgrowers Reservoir	1.8	2.0	2.8	3.6
Fruitland Reservoir	0.7	0.5	1.0	9.2
Morrow Point Reservoir	109.4	112.8	111.6	121.0
Paonia Reservoir	1.5	1.1	3.5	15.4
Ridgway Reservoir	62.2	62.6	68.8	83.0
Silverjack Reservoir	1.9	4.1	5.0	12.8
Taylor Park Reservoir	69.2	69.8	68.1	106.0
Vouga Reservoir	0.8	0.9	0.7	0.9
Basin-wide Total	853.8	891.9	826.2	1213.4
# of reservoirs	11	11	11	11

Watershed Snowpack Analysis January 1, 2017	# of Sites	% Median	Last Year % Median
UPPER GUNNISON BASIN	10	118%	116%
SURFACE CREEK BASIN	2	125%	127%
UNCOMPAHGRE BASIN	3	116%	137%
GUNNISON RIVER BASIN	13	118%	121%



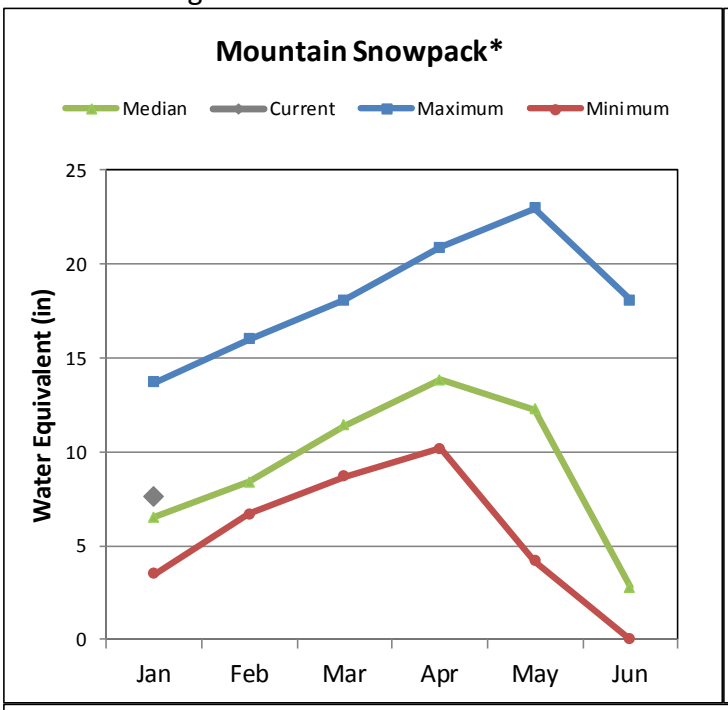


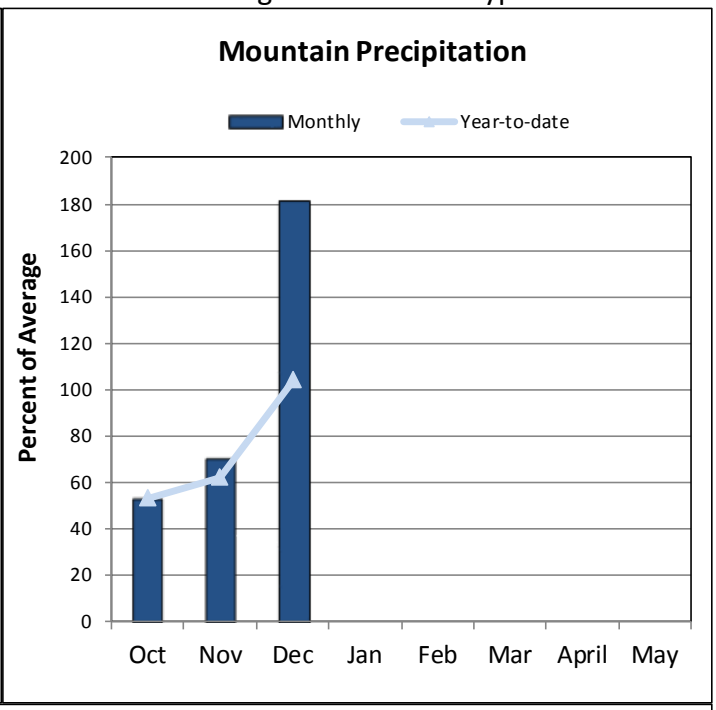
Please refer to the sections at the end of this report for further explanation concerning these graphs.

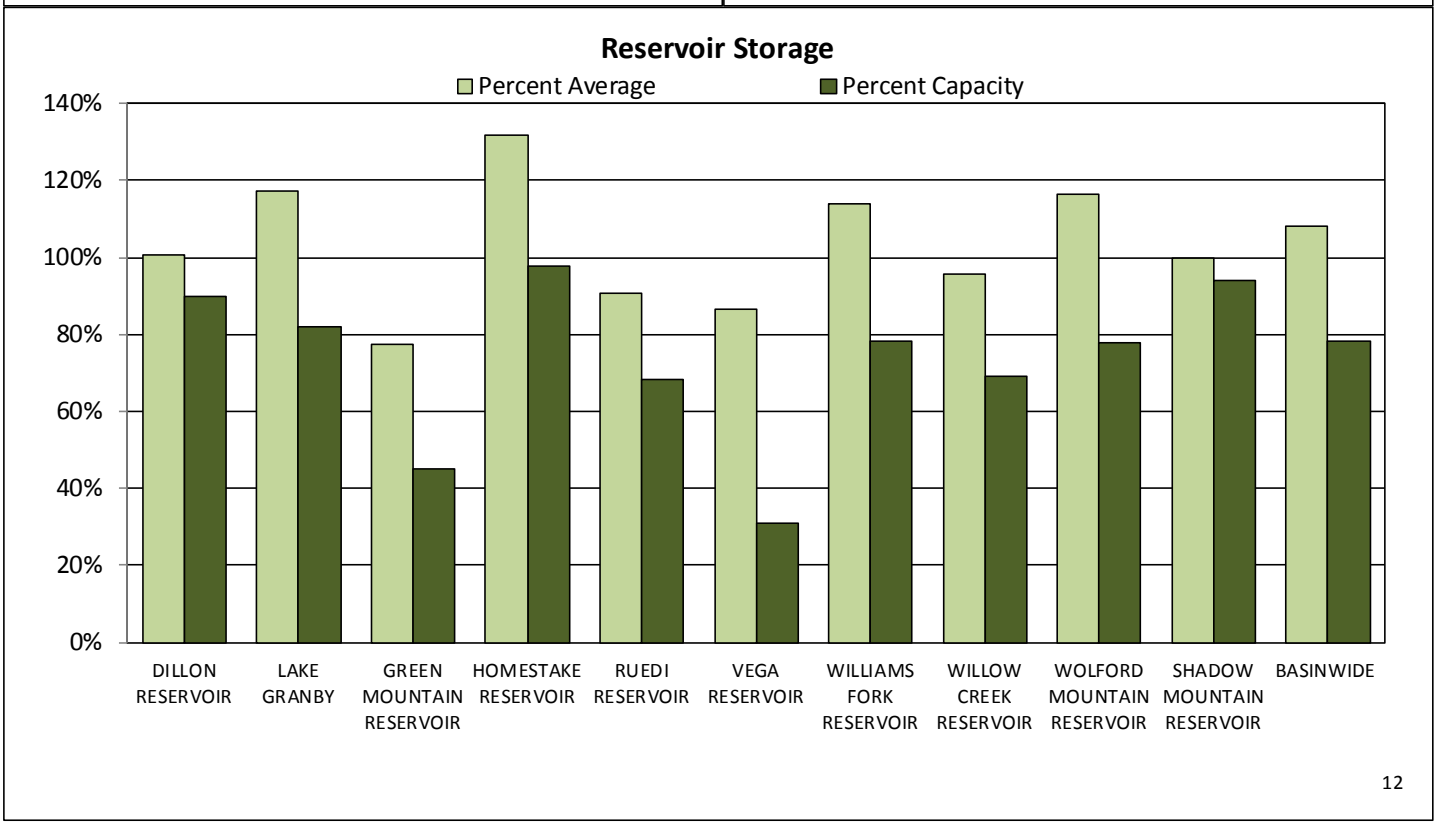
UPPER COLORADO RIVER BASIN

January 1, 2017

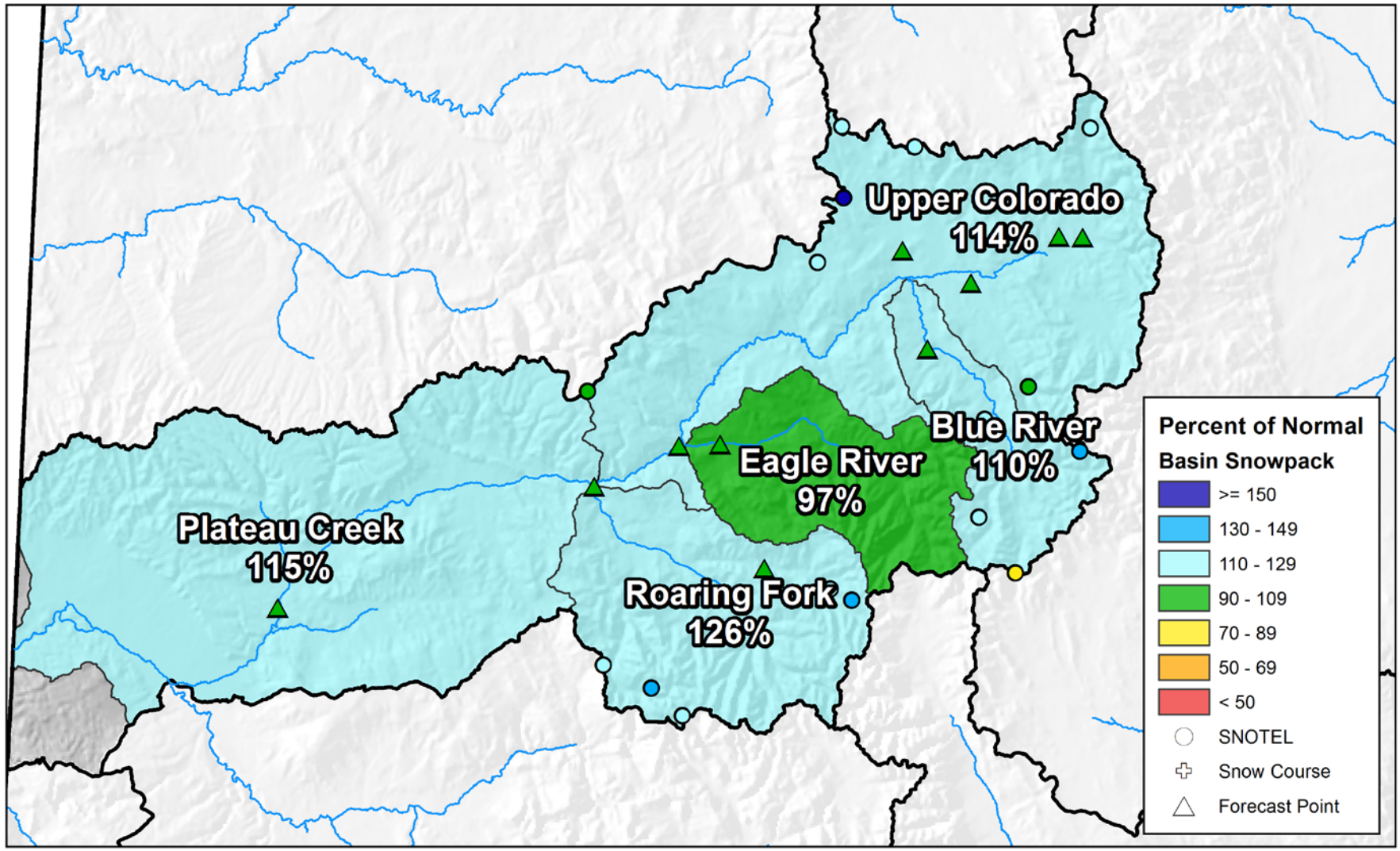
Snowpack in the Colorado River basin is above normal at 117% of the median. Precipitation for December was 181% of average which brings water year-to-date precipitation to 104% of average. Reservoir storage at the end of December was 106% of average compared to 108% last year. Current streamflow forecasts range from 109% of average for the inflow to Willow Creek Reservoir to 96% for the Eagle River below Gypsum.







Upper Colorado River Basin Snowpack and Streamflow Forecasts
January 1, 2017



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Upper Colorado River Basin
Streamflow Forecasts - January 1, 2017

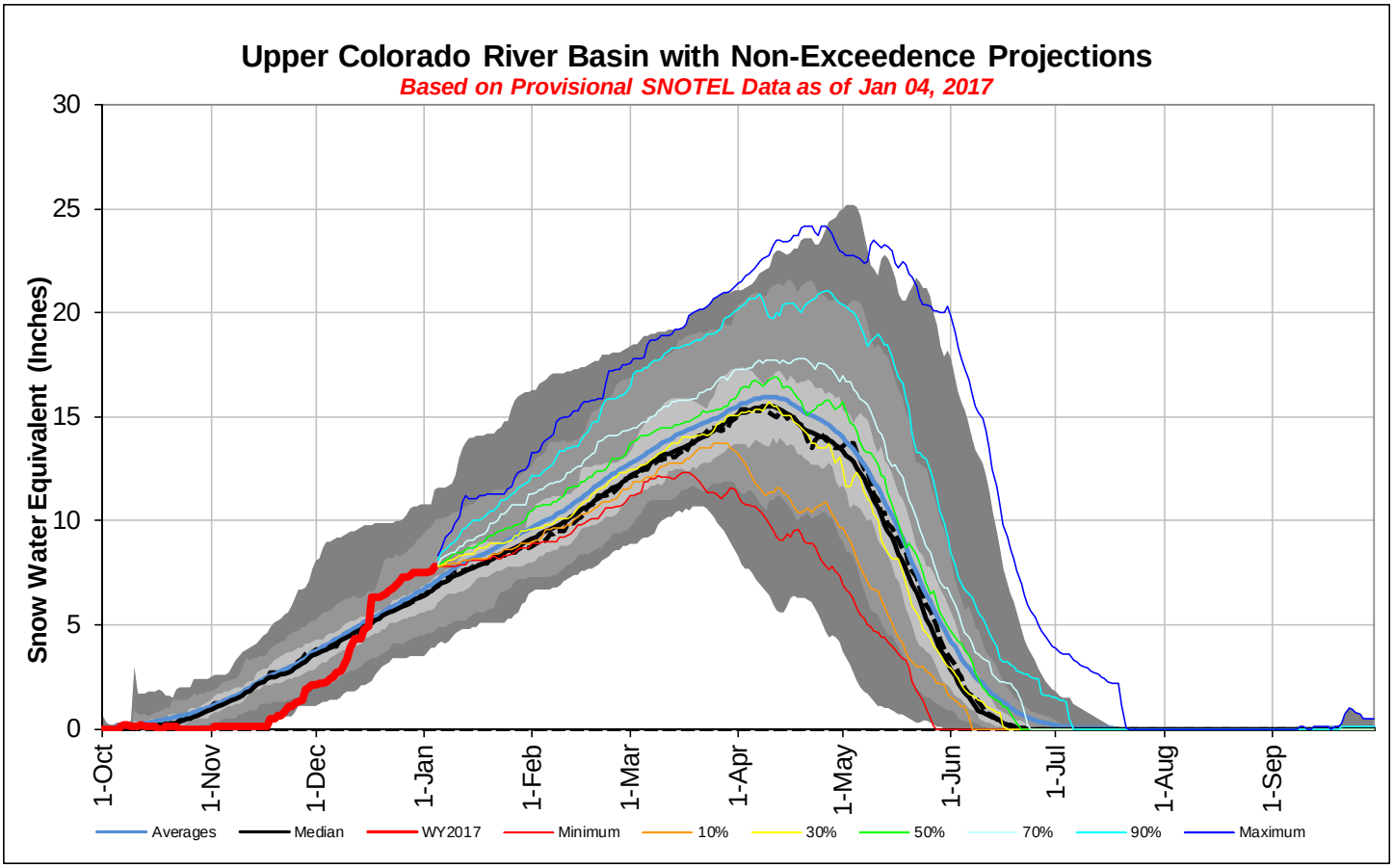
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

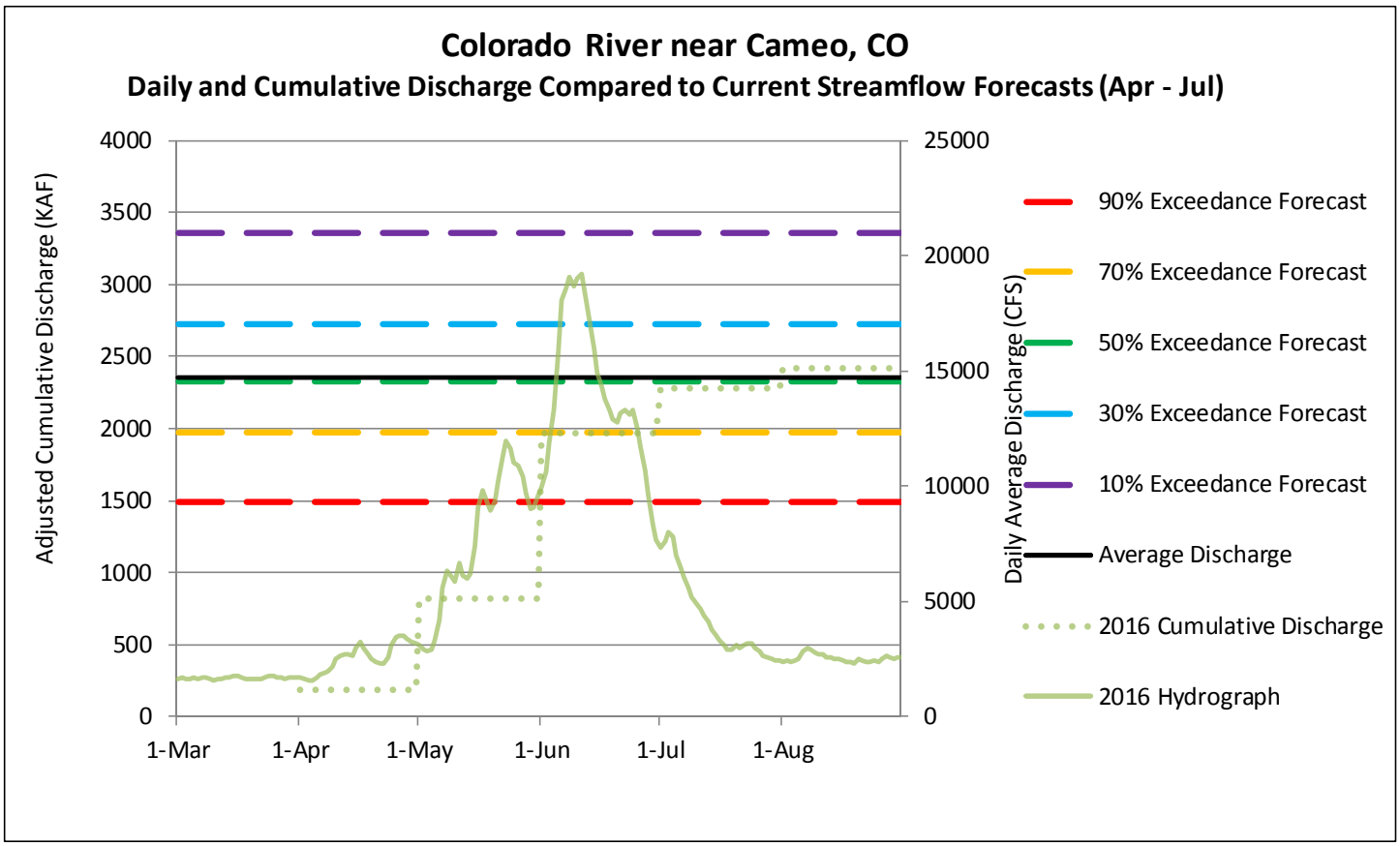
UPPER COLORADO RIVER BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Lake Granby Inflow [2]	APR-JUL	154	194	225	102%	255	305	220
Willow Ck Reservoir Inflow	APR-JUL	30	42	51	109%	61	78	47
Williams Fk bl Williams Fk Reservoir[2]	APR-JUL	66	85	100	103%	115	141	97
Wolford Mtn Reservoir Inflow	APR-JUL	30	44	54	100%	66	86	54
Dillon Reservoir Inflow[2]	APR-JUL	104	137	162	99%	190	235	163
Green Mountain Reservoir Inflow[2]	APR-JUL	179	235	275	100%	320	390	275
Eagle R bl Gypsum [2]	APR-JUL	205	270	320	96%	375	460	335
Colorado R nr Dotsero [2]	APR-JUL	895	1190	1410	101%	1650	2040	1400
Ruedi Reservoir Inflow [2]	APR-JUL	91	115	134	96%	153	184	139
Roaring Fk at Glenwood Springs[2]	APR-JUL	435	570	675	98%	785	965	690
Colorado R nr Cameo [2]	APR-JUL	1490	1970	2330	99%	2720	3360	2350

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 December, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Dillon Reservoir	223.5	231.6	222.1	249.1
Green Mountain Reservoir	65.9	63.6	85.2	146.8
Homestake Reservoir	42.0	41.3	31.9	43.0
Lake Granby	381.9	395.1	325.7	465.6
Ruedi Reservoir	69.6	71.8	76.8	102.0
Shadow Mountain Reservoir	17.3	17.4	17.3	18.4
Vega Reservoir	10.2	10.4	11.8	32.9
Williams Fork Reservoir	75.8	79.3	66.5	97.0
Willow Creek Reservoir	6.3	6.4	6.6	9.1
Wolford Mountain Reservoir	51.2	43.6	44.0	65.9
Basin-wide Total	943.7	960.5	887.9	1229.8
# of reservoirs	10	10	10	10

Watershed Snowpack Analysis January 1, 2017	# of Sites	% Median	Last Year % Median
BLUE RIVER BASIN	5	110%	116%
HEADWATERS COLORADO RIVER	19	114%	115%
MUDDY CREEK BASIN	3	127%	122%
EAGLE RIVER BASIN	4	97%	96%
PLATEAU CREEK BASIN	2	125%	127%
ROARING FORK BASIN	7	126%	108%
WILLIAMS FORK BASIN	3	97%	130%
WILLOW CREEK BASIN	2	149%	143%
UPPER COLORADO RIVER BASIN	28	117%	112%



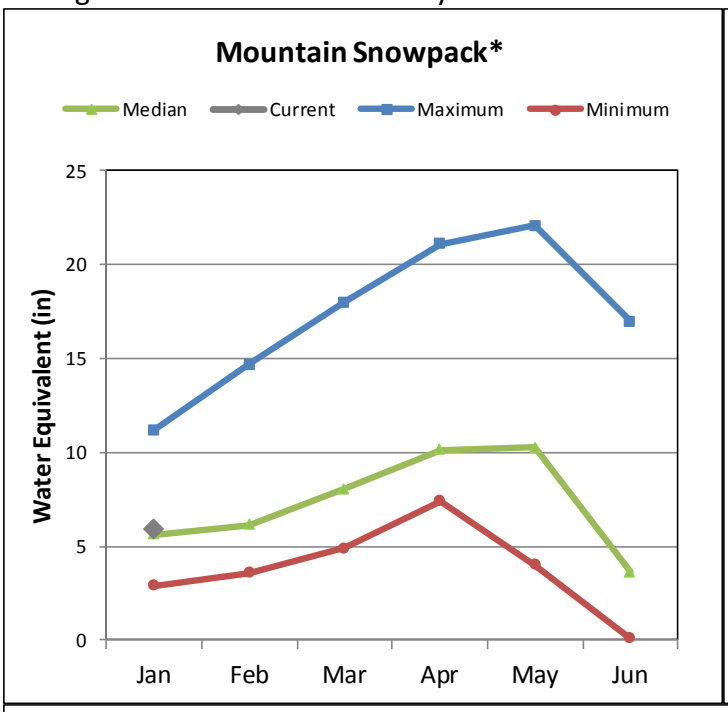


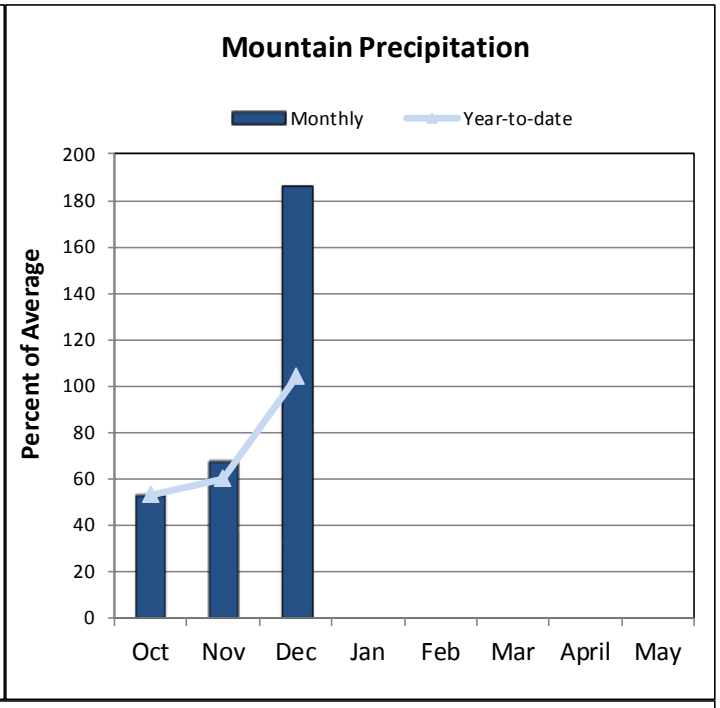
Please refer to the sections at the end of this report for further explanation concerning these graphs.

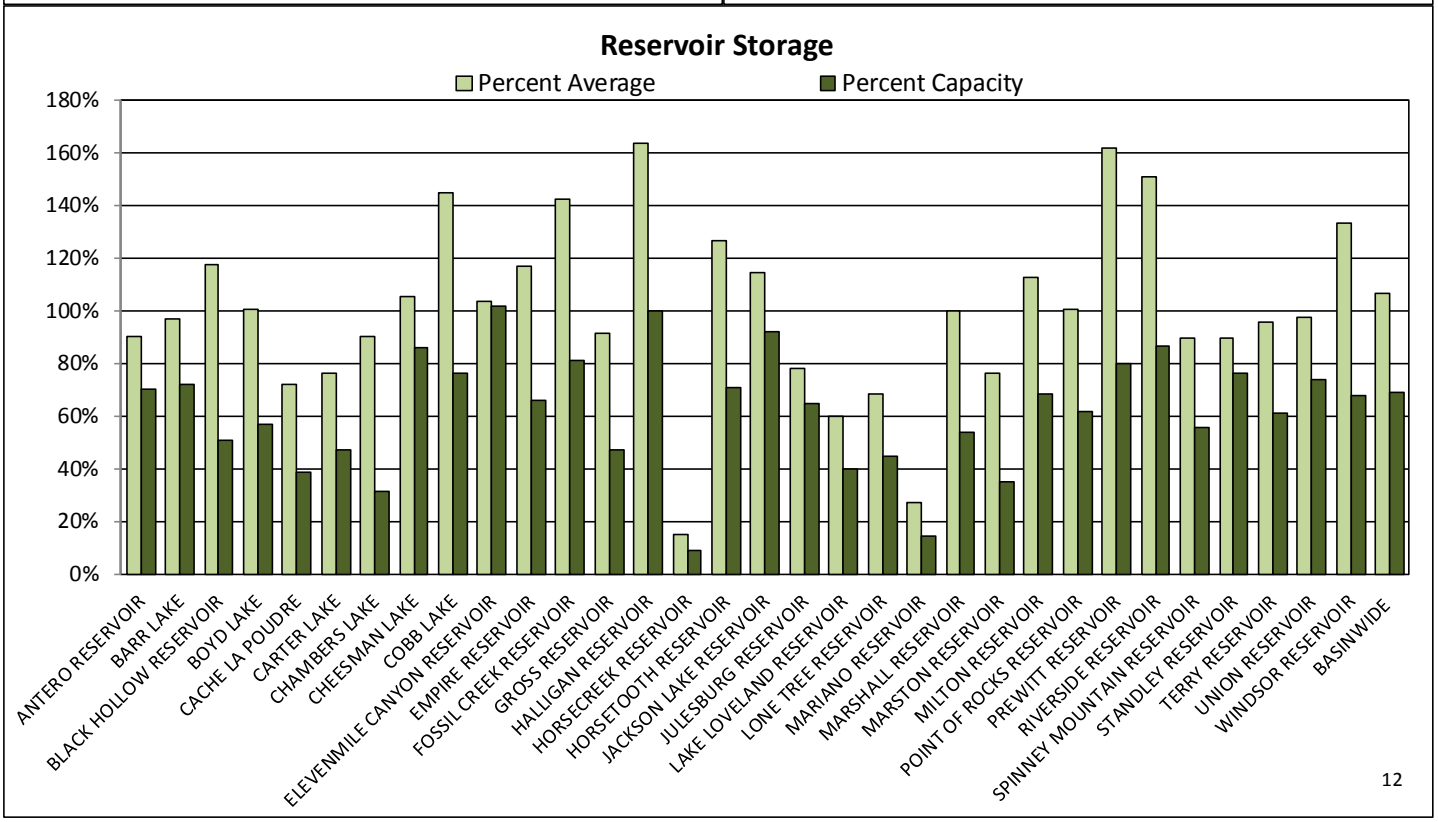
SOUTH PLATTE RIVER BASIN

January 1, 2017

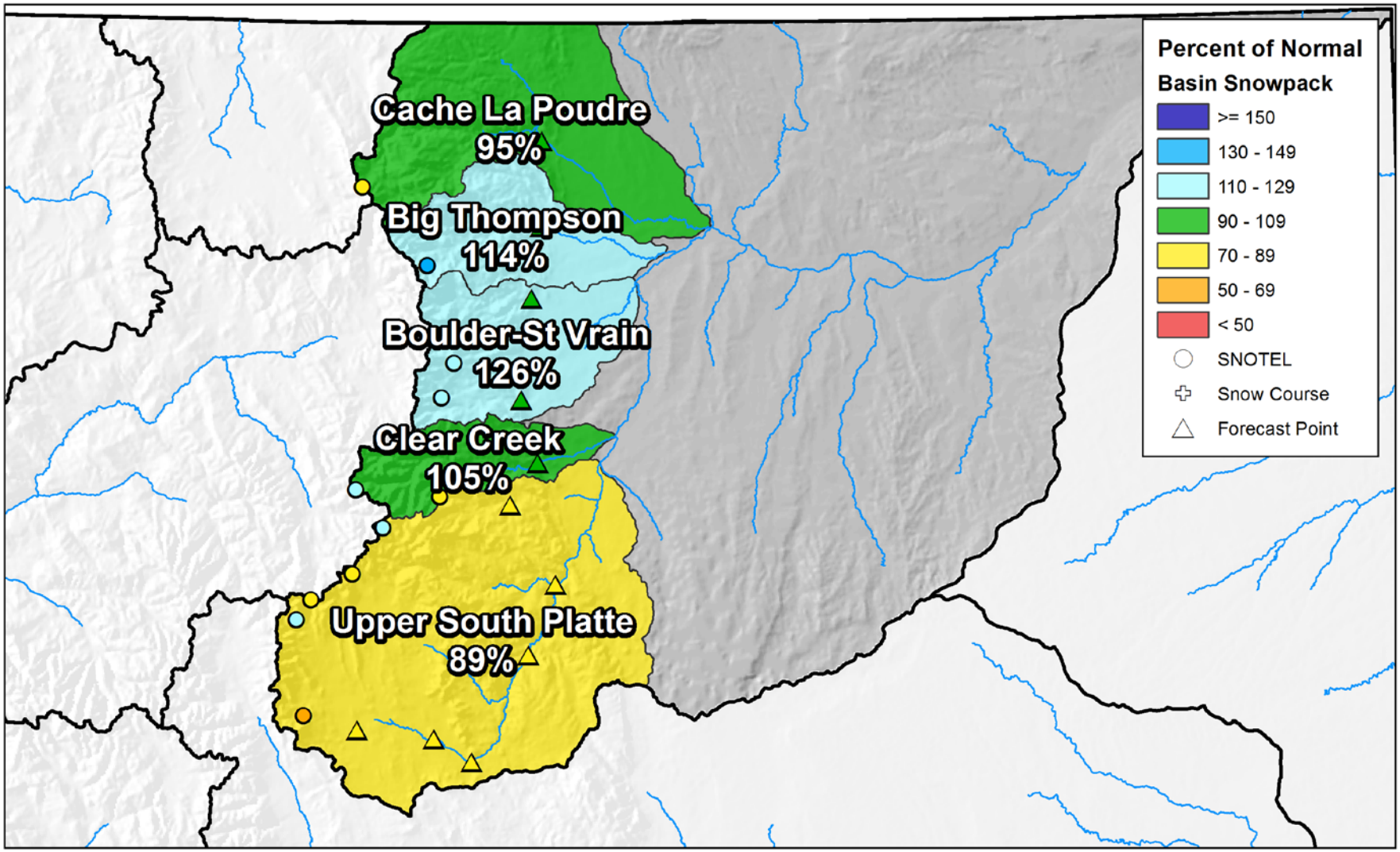
Snowpack in the South Platte River basin is above normal at 105% of the median. Precipitation for December was 186% of average which brings water year-to-date precipitation to 104%. Reservoir storage at the end of December was 104% of average compared to 107% last year. Streamflow forecasts range from 100% of average for Saint Vrain Creek at Lyons to 77% for the South Platte River at South Platte.







South Platte River Basin Snowpack and Streamflow Forecasts
January 1, 2017



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South Platte River Basin
Streamflow Forecasts - January 1, 2017

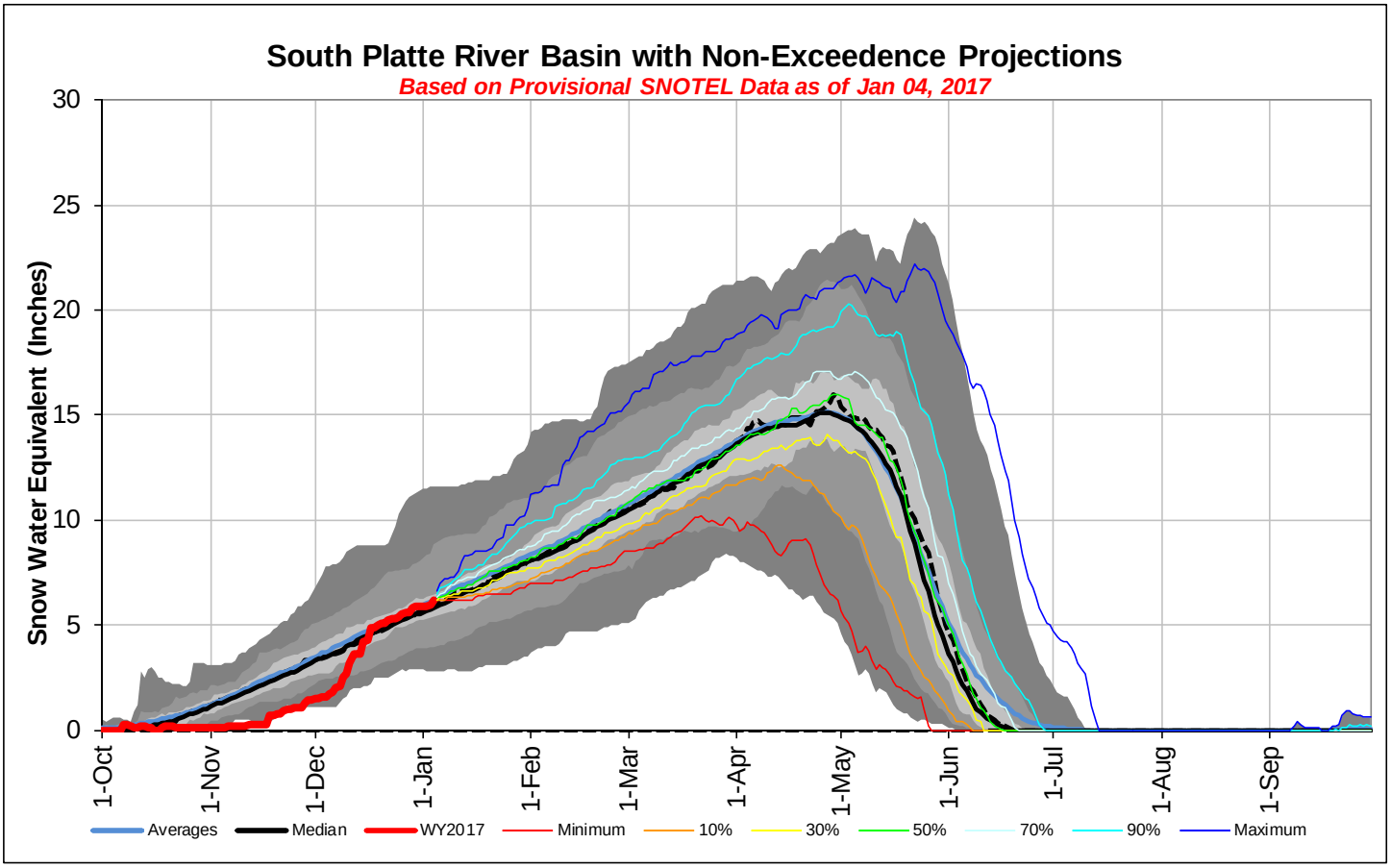
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

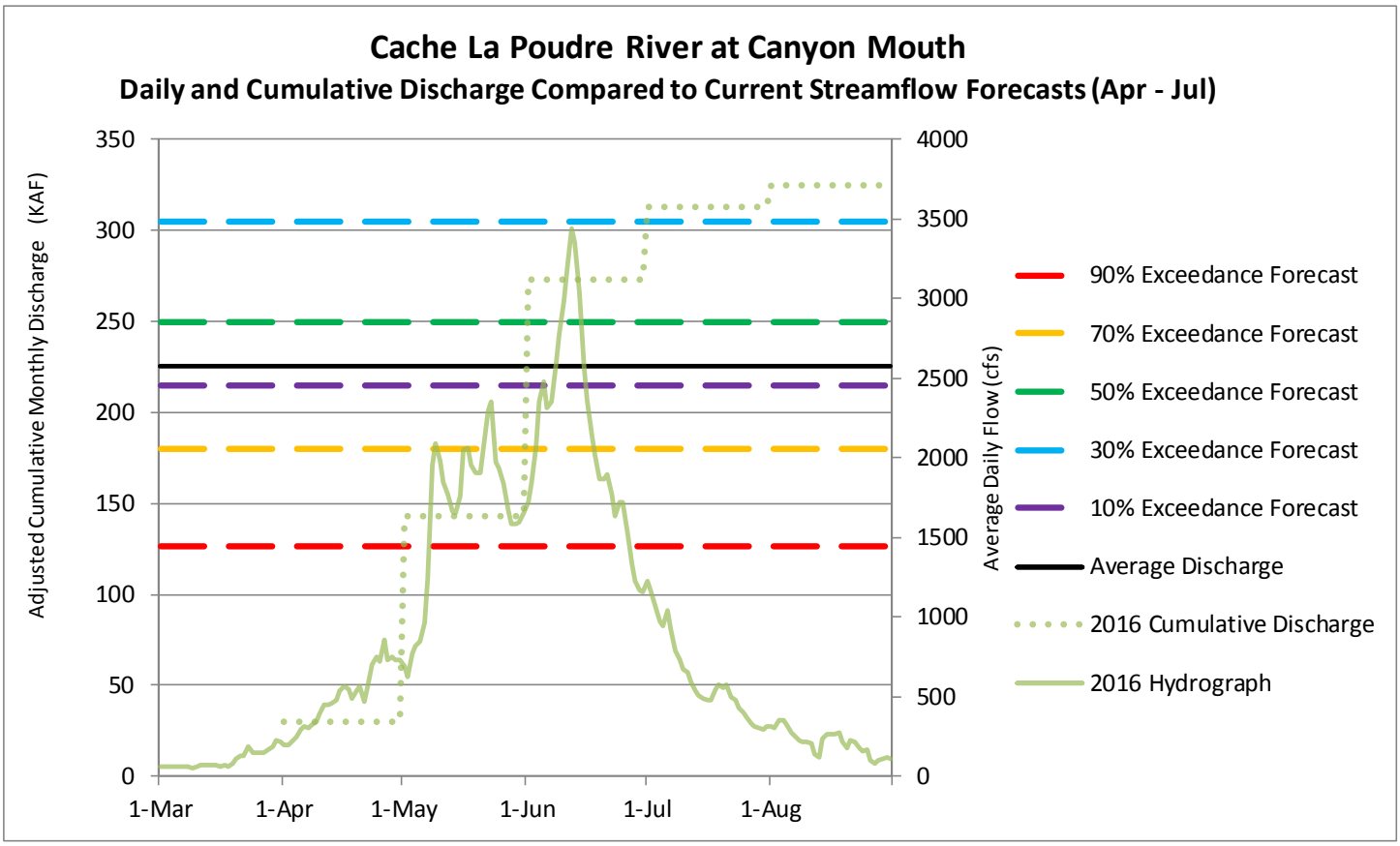
SOUTH PLATTE RIVER BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Antero Reservoir Inflow[2]								
	APR-JUL	4.4	8.7	11.6	80%	14.6	18.9	14.5
	APR-SEP	5.3	10.3	13.7	77%	17.1	22	17.8
Spinney Mountain Reservoir Inflow[2]								
	APR-JUL	21	31	41	85%	53	79	48
	APR-SEP	25	39	51	84%	70	107	61
Elevenmile Canyon Reservoir Inflow[2]								
	APR-JUL	21	34	43	86%	51	64	50
	APR-SEP	25	39	54	84%	74	118	64
Cheesman Lake Inflow[2]								
	APR-JUL	38	62	78	78%	94	118	100
	APR-SEP	48	73	97	77%	129	196	126
South Platte R at South Platte[2]								
	APR-JUL	66	109	139	77%	169	210	180
	APR-SEP	82	127	171	76%	230	355	225
Bear Ck ab Evergreen								
	APR-JUL	5.7	9.2	12.8	78%	17.8	29	16.4
	APR-SEP	7.8	12.4	16.8	80%	23	36	21
Clear Ck at Golden								
	APR-JUL	76	93	105	100%	117	134	105
	APR-SEP	89	112	128	100%	143	166	128
St. Vrain Ck at Lyons[2]								
	APR-JUL	61	77	88	100%	100	116	88
	APR-SEP	72	91	104	101%	117	136	103
Boulder Ck nr Orodell[2]								
	APR-JUL	39	48	54	100%	60	69	54
	APR-SEP	44	55	63	100%	70	82	63
South Boulder Ck nr Eldorado Springs[2]								
	APR-JUL	25	32	37	95%	42	50	39
	APR-SEP	27	35	41	95%	47	56	43
Big Thompson R at Canyon Mouth[2]								
	APR-JUL	58	76	87	97%	99	117	90
	APR-SEP	69	91	106	99%	121	143	107
Cache La Poudre at Canyon Mouth[2]								
	APR-JUL	126	180	215	96%	250	305	225
	APR-SEP	141	200	240	96%	280	340	250

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 December, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Antero Reservoir	14.0	0.0	15.5	19.9
Barr Lake	21.7	16.8	22.3	30.1
Black Hollow Reservoir	3.3	3.0	2.8	6.5
Boyd Lake	27.6	33.1	27.4	48.4
Cache La Poudre	3.9	8.5	5.4	10.1
Carter Lake	51.8	52.9	67.5	108.9
Chambers Lake	2.8	4.2	3.1	8.8
Cheesman Lake	67.9	69.5	64.3	79.0
Cobb Lake	17.0	18.7	11.7	22.3
Elevenmile Canyon Reservoir	99.7	99.4	95.9	98.0
Empire Reservoir	24.1	18.6	20.6	36.5
Fossil Creek Reservoir	9.0	7.9	6.3	11.1
Gross Reservoir	14.1	20.5	15.4	29.8
Halligan Reservoir	6.4	5.3	3.9	6.4
Horsecreek Reservoir	1.3	5.0	8.5	14.7
Horsetooth Reservoir	106.1	93.7	83.5	149.7
Jackson Lake Reservoir	24.0	24.0	20.9	26.1
Julesburg Reservoir	13.3	16.5	17.0	20.5
Lake Loveland Reservoir	4.1	1.7	6.8	10.3
Lone Tree Reservoir	3.9	6.0	5.7	8.7
Mariano Reservoir	0.8	1.1	2.9	5.4
Marshall Reservoir	5.4	6.1	5.4	10.0
Marston Reservoir	4.6	10.0	6.0	13.0
Milton Reservoir	16.1	18.8	14.3	23.5
Point Of Rocks Reservoir	43.6	53.0	43.3	70.6
Prewitt Reservoir	22.5	19.1	13.9	28.2
Ralph Price Reservoir	12.0	13.5		16.2
Riverside Reservoir	48.5	43.5	32.1	55.8
Spinney Mountain Reservoir	27.4	35.7	30.5	49.0
Standley Reservoir	32.1	38.8	35.8	42.0
Terry Reservoir	4.9	5.7	5.1	8.0
Union Reservoir	9.6	11.9	9.8	13.0
Windsor Reservoir	10.3	9.4	7.7	15.2
Basin-wide Total	741.8	758.4	711.3	1079.5
# of reservoirs	32	32	32	32

Watershed Snowpack Analysis January 1, 2017	# of Sites	% Median	Last Year % Median
BIG THOMPSON BASIN	3	114%	106%
BOULDER CREEK BASIN	3	122%	114%
CACHE LA POUDRE BASIN	2	95%	90%
CLEAR CREEK BASIN	2	105%	120%
SAINT VRAIN BASIN	1	152%	133%
UPPER SOUTH PLATTE BASIN	6	89%	142%
SOUTH PLATTE RIVER BASIN	17	105%	116%



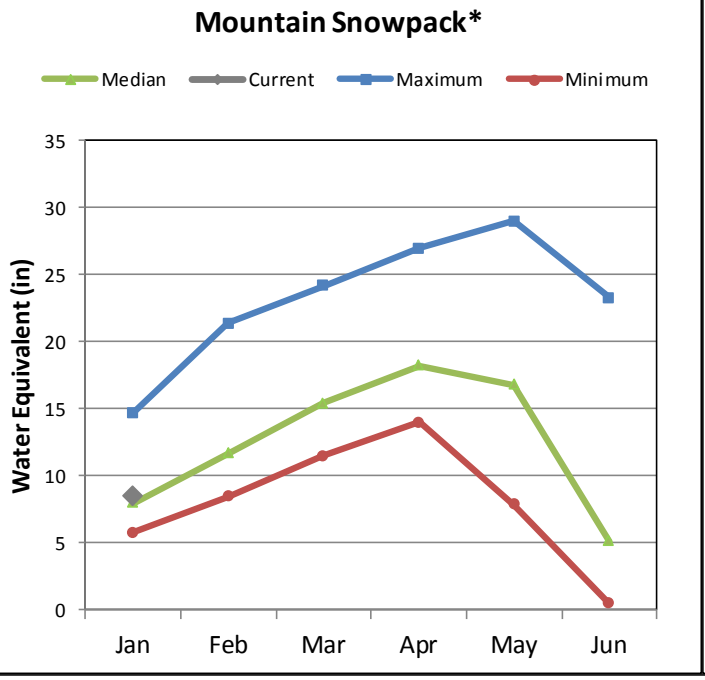


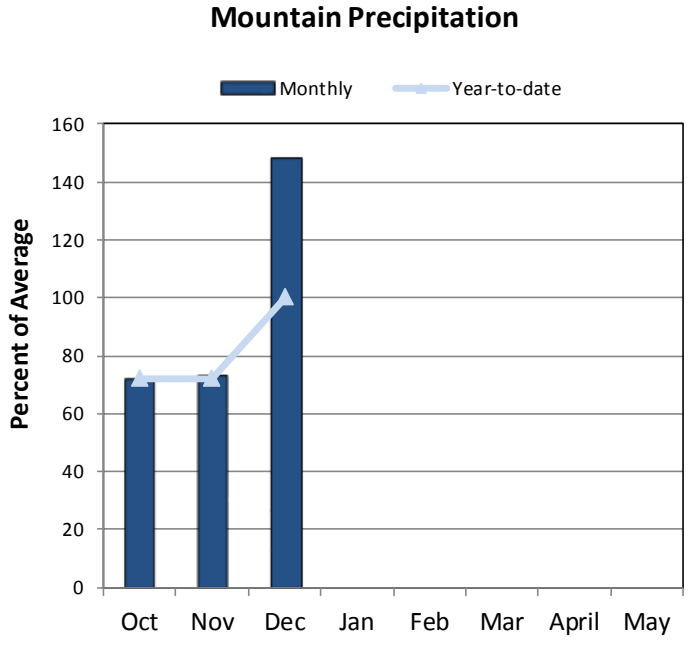
Please refer to the sections at the end of this report for further explanation concerning these graphs.

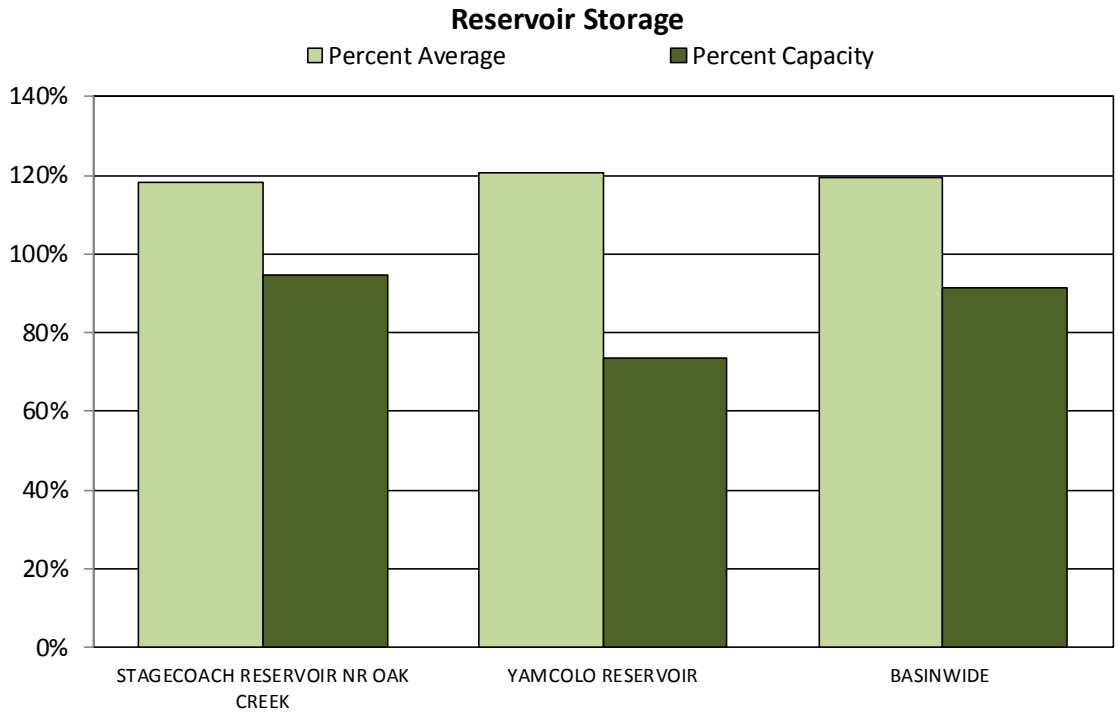
YAMPA, WHITE, NORTH PLATTE AND LARAMIE RIVER BASINS

January 1, 2017

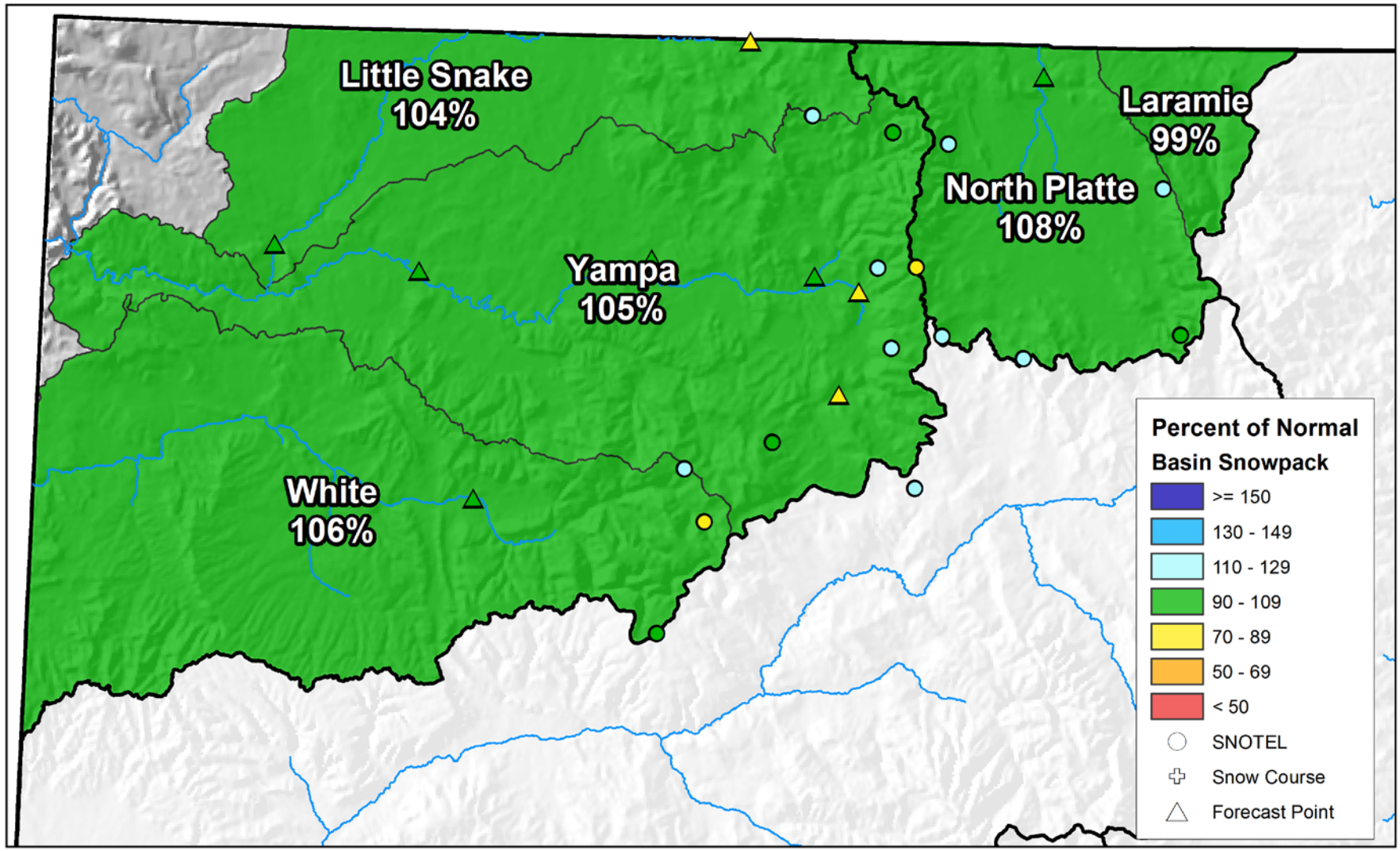
Snowpack in the Yampa, White & North Platte basins is above normal at 106% of the median. Precipitation for December was 148% of average and water year-to-date precipitation is 100% of average. Reservoir storage at the end of December was 118% of average compared to 119% last year. Streamflow forecasts range from 102% of average for the Elk River near Milner to 84% for the Little Snake River near Dixon.







Yampa, White, and North Platte River Basins Snowpack and Streamflow Forecasts
January 1, 2017



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Yampa-White-North Platte River Basins
Streamflow Forecasts - January 1, 2017

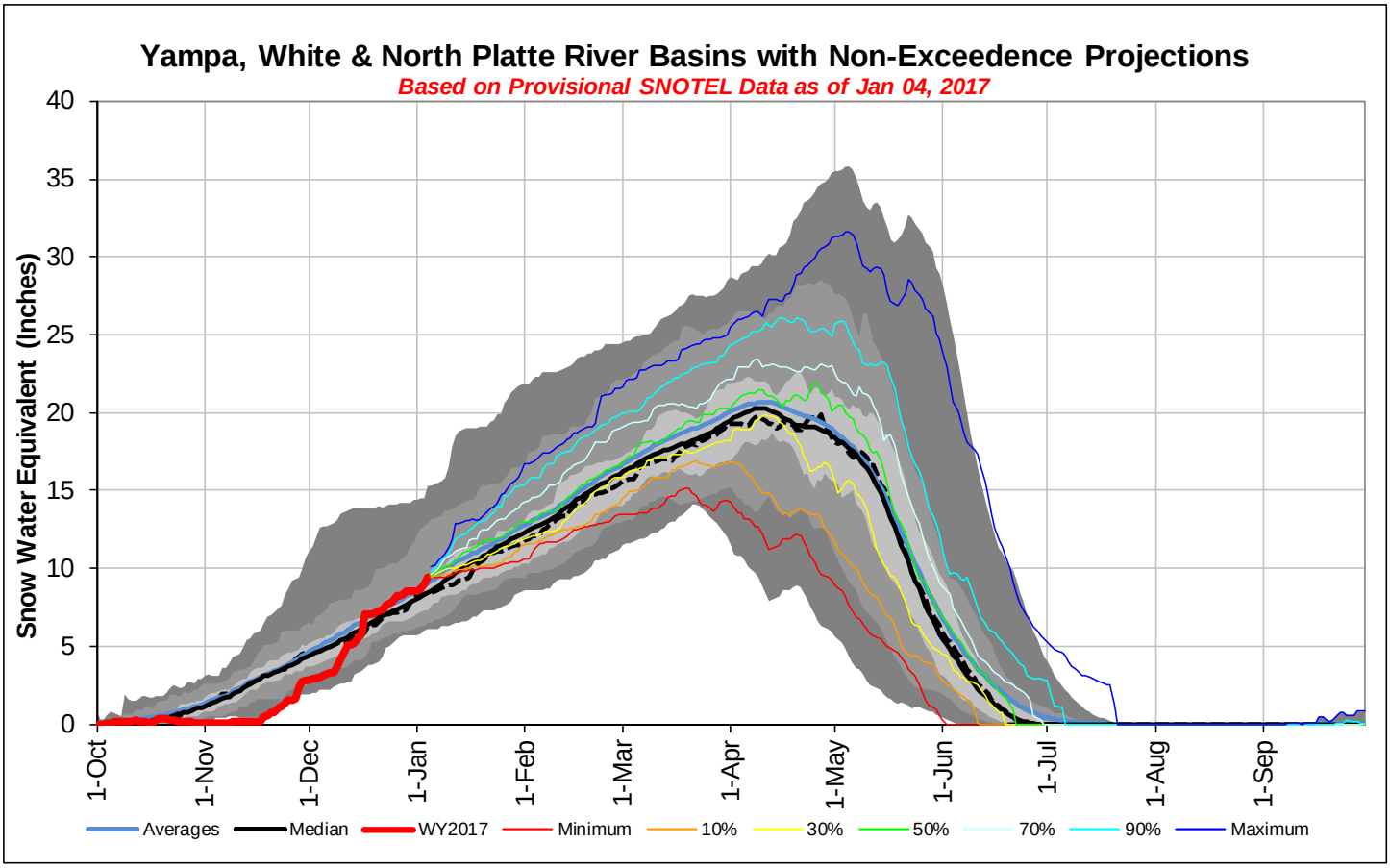
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

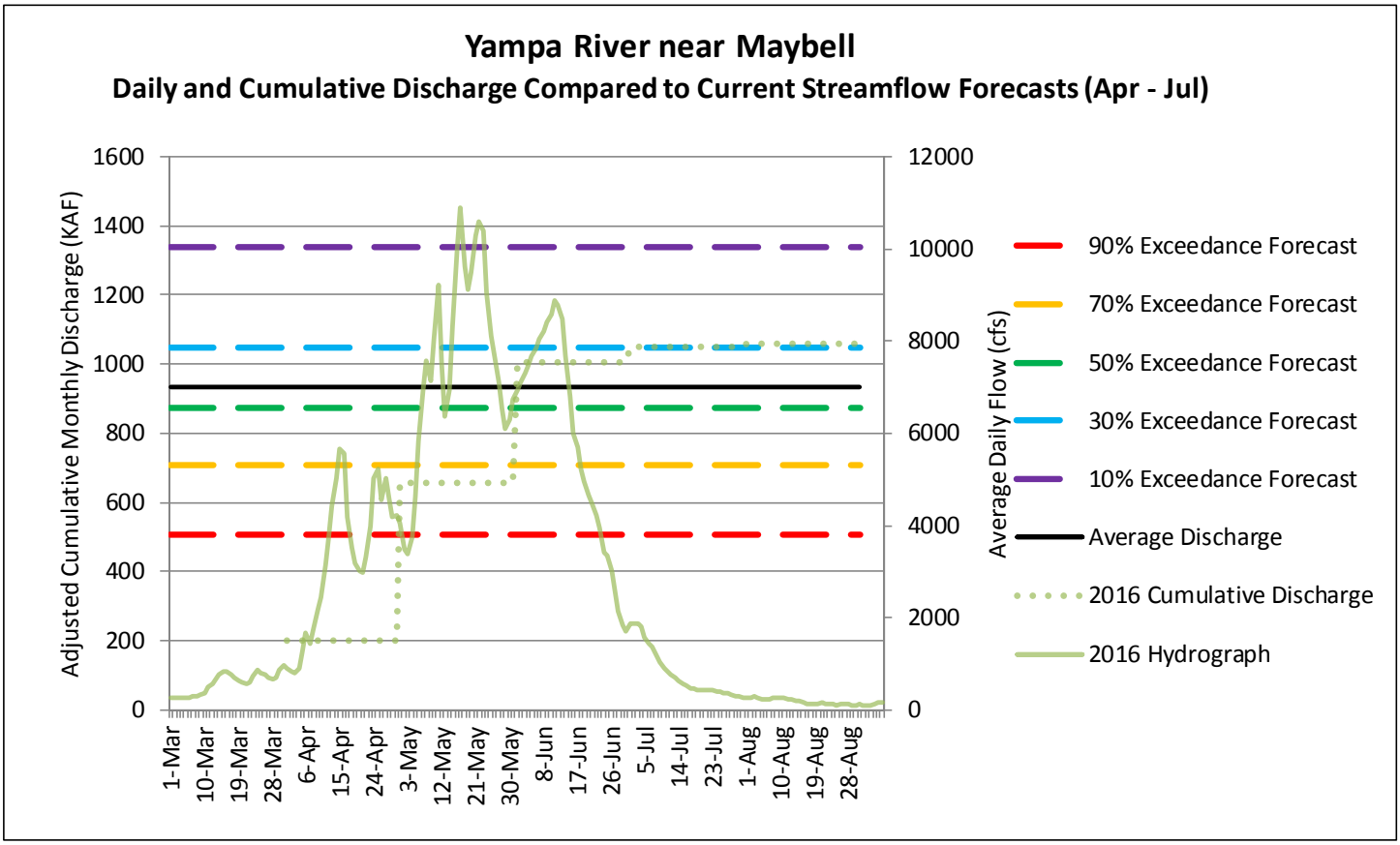
YAMPA-WHITE-NORTH PLATTE RIVER BASINS	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
North Platte R nr Northgate								
	APR-JUL	101	181	235	104%	290	370	225
	APR-SEP	115	200	260	104%	320	405	250
Laramie R nr Woods[2]								
	APR-JUL	54	88	110	96%	133	166	115
	APR-SEP	61	97	121	96%	145	181	126
Yampa R ab Stagecoach Reservoir [2]								
	APR-JUL	7.2	14	20	87%	27	39	23
Yampa R at Steamboat Springs[2]								
	APR-JUL	133	185	225	87%	270	340	260
Elk R nr Milner								
	APR-JUL	196	270	325	102%	385	485	320
Elkhead Ck ab Long Gulch								
	APR-JUL	31	52	70	96%	90	124	73
Yampa R nr Maybell[2]								
	APR-JUL	505	710	875	94%	1050	1340	935
Little Snake R nr Slater[2]								
	APR-JUL	75	109	135	87%	164	210	156
Little Snake R nr Dixon[2]								
	APR-JUL	112	210	290	84%	385	550	345
Little Snake R nr Lily[2]								
	APR-JUL	152	240	310	90%	390	525	345
White R nr Meeker								
	APR-JUL	156	210	255	91%	300	380	280

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 December, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Stagecoach Reservoir nr Oak Creek	34.6	34.7	29.3	36.5
Yamcolo Reservoir	6.4	6.6	5.3	8.7
Basin-wide Total	41.0	41.3	34.6	45.2
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis January 1, 2017	# of Sites	% Median	Last Year % Median
LARAMIE RIVER BASIN	2	99%	119%
NORTH PLATTE RIVER BASIN	8	108%	101%
LARAMIE & NORTH PLATTE RIVER BASINS	10	107%	104%
ELK RIVER BASIN	2	110%	93%
YAMPA RIVER BASIN	9	105%	105%
WHITE RIVER BASIN	4	106%	107%
YAMPA & WHITE RIVER BASINS	12	103%	103%
LITTLE SNAKE RIVER BASIN	7	104%	95%
YAMPA-WHITE-NORTH PLATTE RIVER BASINS	26	106%	104%



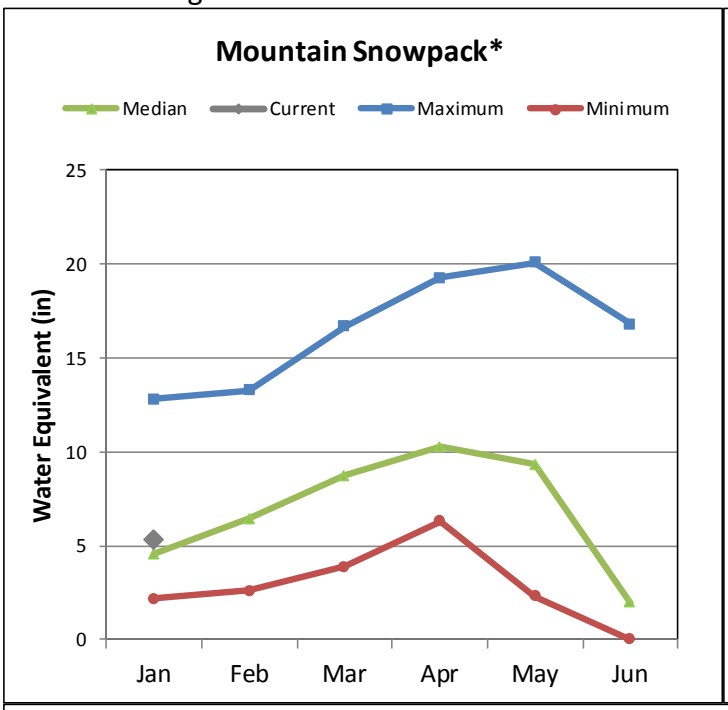


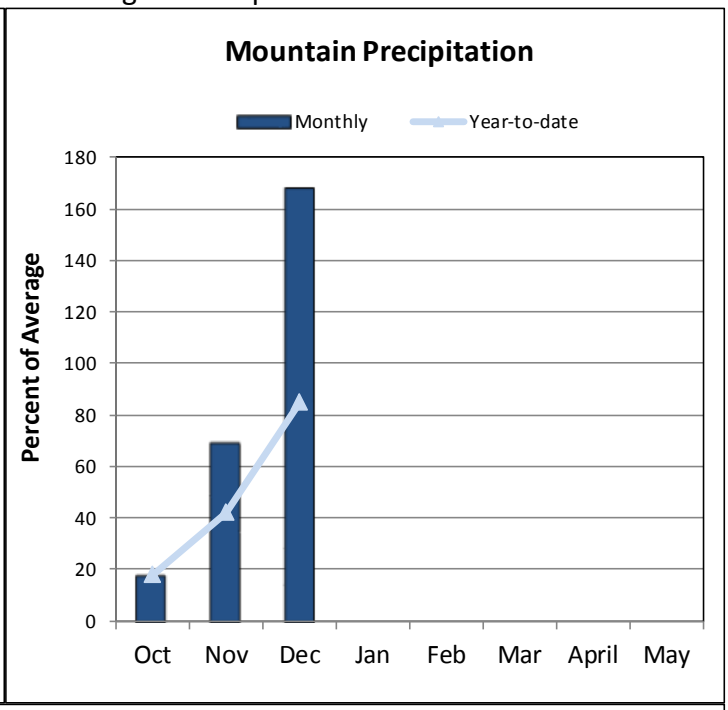
Please refer to the sections at the end of this report for further explanation concerning these graphs.

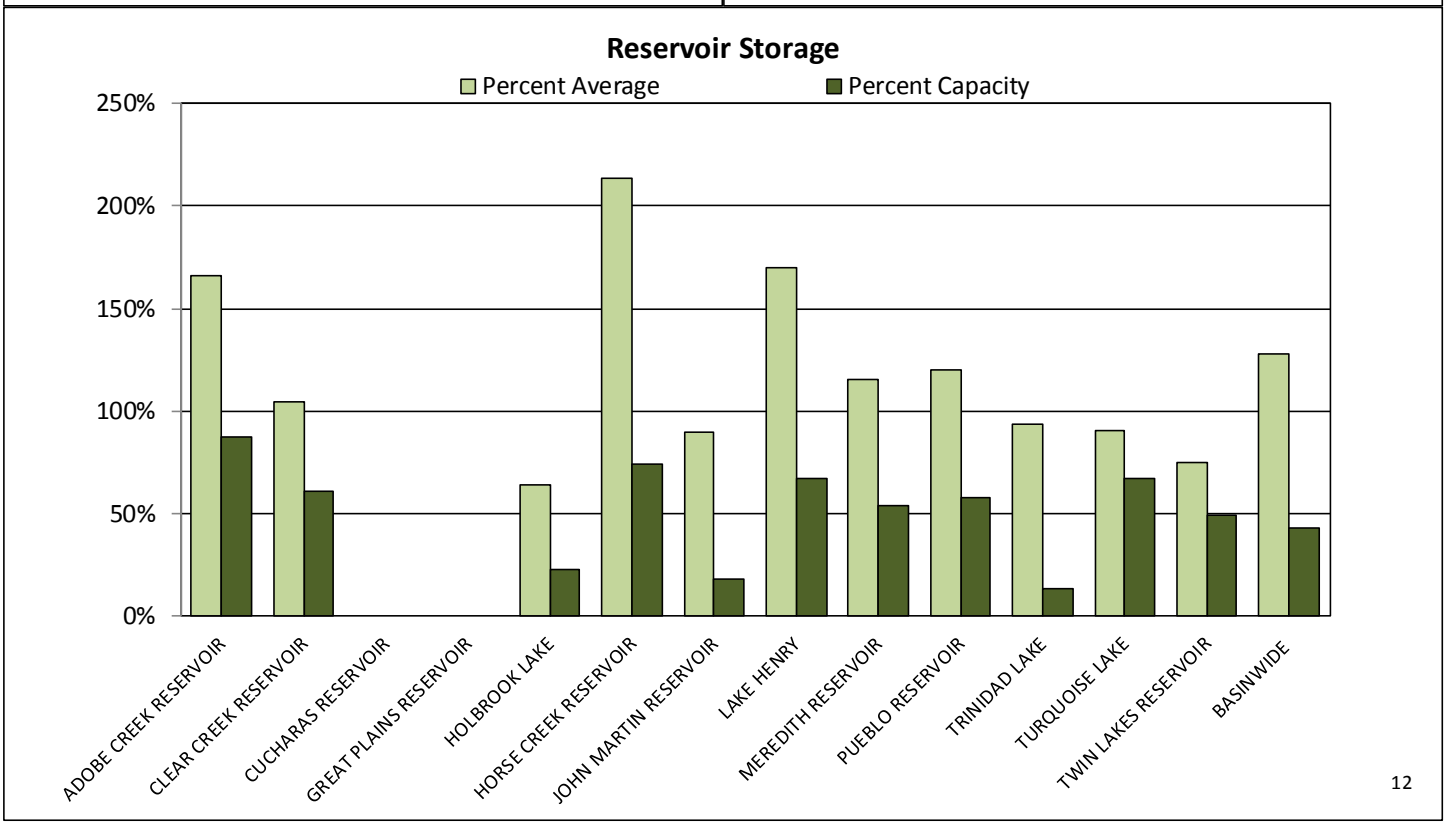
ARKANSAS RIVER BASIN

January 1, 2017

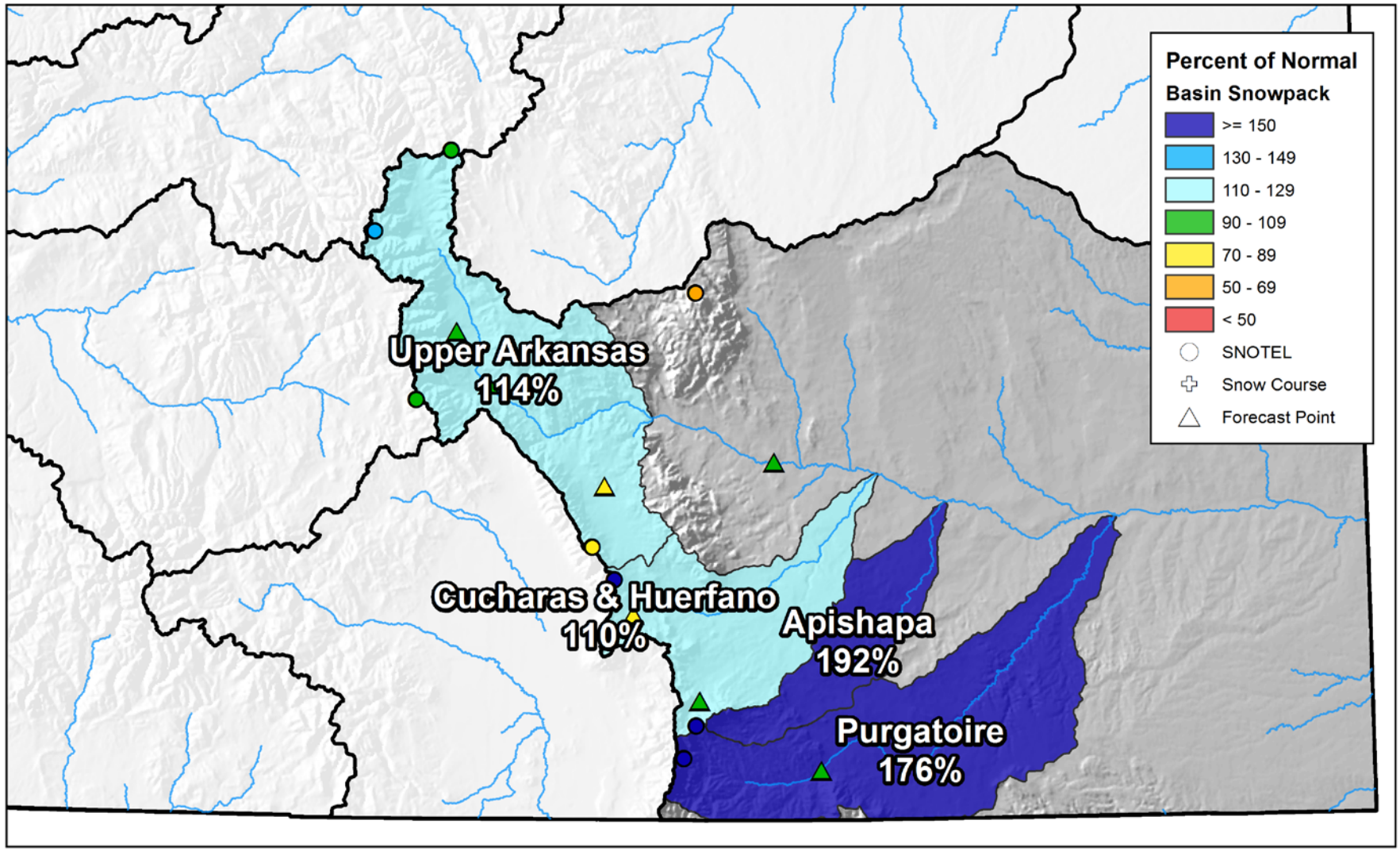
Snowpack in the Arkansas River basin is above normal at 116% of the median. Precipitation for December was 168% of average which brings water year-to-date precipitation to 85% of average. Reservoir storage at the end of December was 101% of average compared to 128% last year. Current streamflow forecasts range from 102% of average for the Arkansas River at Salida to 75% of average for Grape Creek near Westcliffe.







Arkansas River Basin Snowpack and Streamflow Forecasts
January 1, 2017



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Arkansas River Basin
Streamflow Forecasts - January 1, 2017

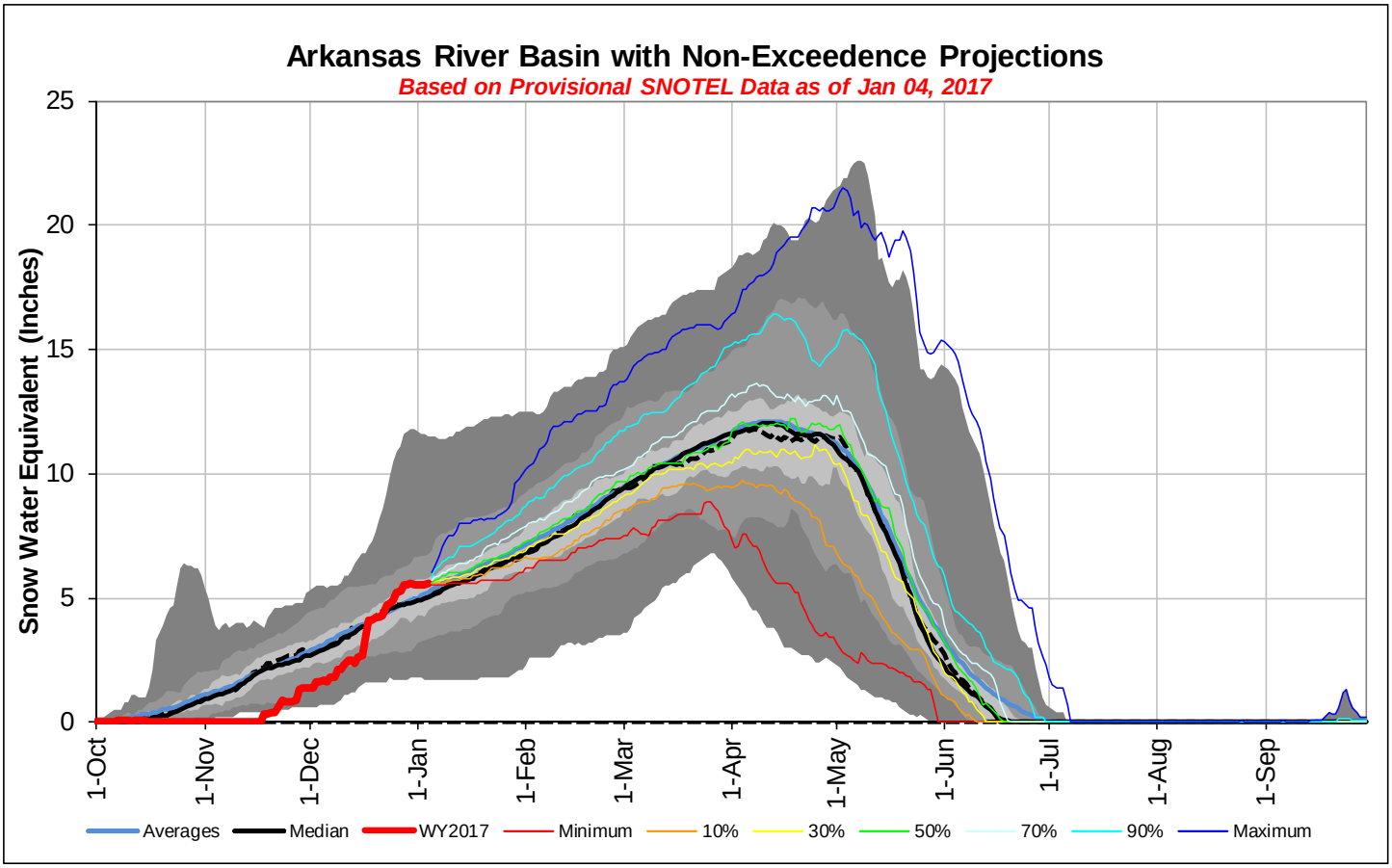
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

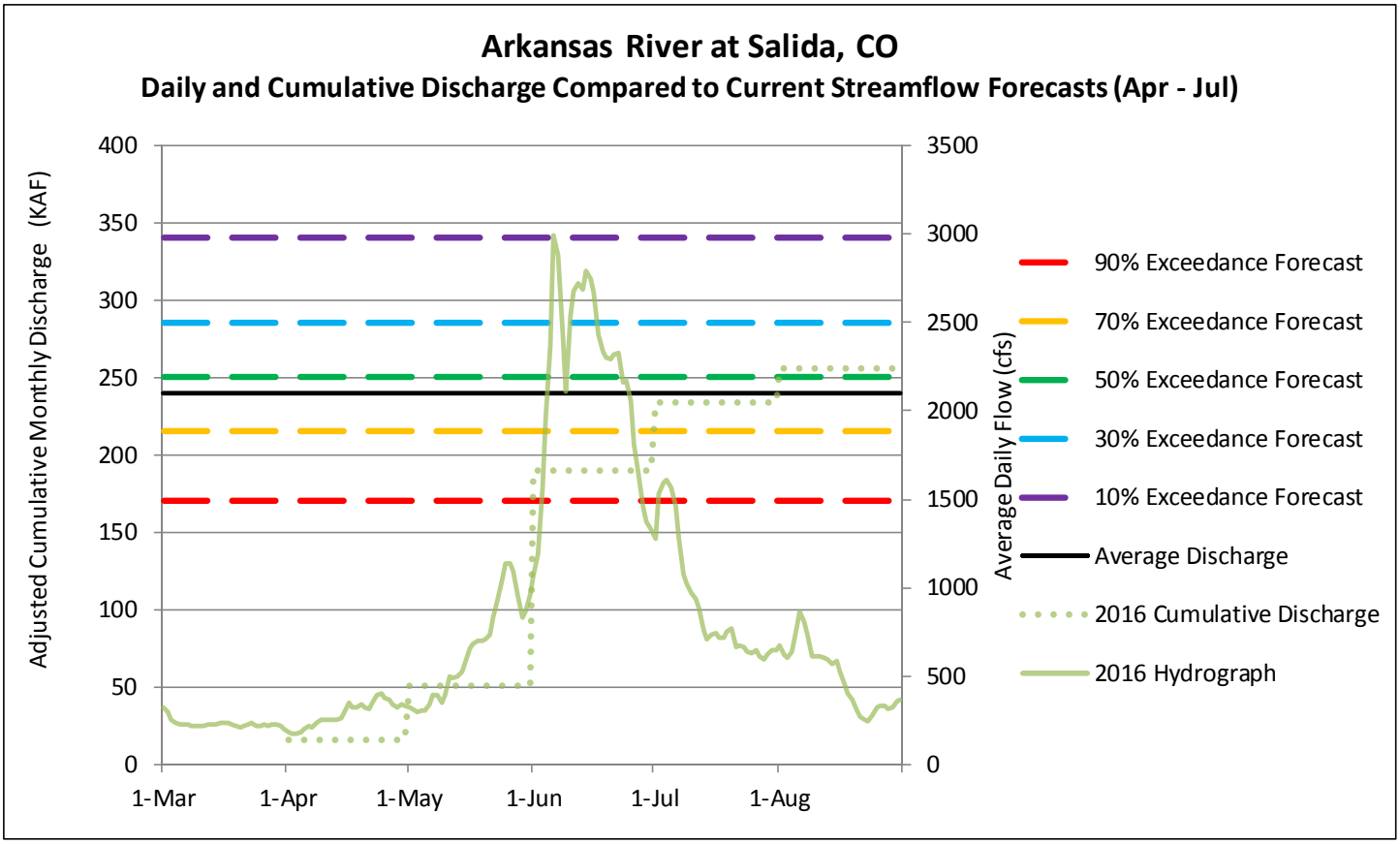
ARKANSAS RIVER BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Chalk Ck nr Nathrop								
	APR-JUL	10.6	16.4	21	100%	26	35	21
	APR-SEP	13.9	21	26	100%	32	42	26
Arkansas R at Salida[2]								
	APR-JUL	169	210	245	102%	280	335	240
	APR-SEP	215	265	305	103%	345	415	295
Grape Ck nr Westcliffe								
	APR-JUL	1.6	6.6	11.9	75%	18.8	32	15.9
	APR-SEP	4.6	9.9	14.7	75%	20	31	19.6
Pueblo Reservoir Inflow[2]								
	APR-JUL	215	300	365	101%	440	555	360
	APR-SEP	285	385	460	101%	545	680	455
Huerfano R nr Redwing								
	APR-JUL	5.4	7.9	9.9	83%	12.1	15.7	11.9
	APR-SEP	7.4	10.4	12.7	84%	15.2	19.4	15.2
Cucharas R nr La Veta								
	APR-JUL	3.8	7.7	11.1	91%	15.2	22	12.2
	APR-SEP	4.9	9.1	12.8	91%	17.1	24	14.1
Trinidad Lake Inflow[2]								
	MAR-JUL	11.6	24	34	92%	46	68	37
	APR-SEP	16.8	30	42	89%	55	79	47

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 December, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Adobe Creek Reservoir	54.3	60.7	32.7	62.0
Clear Creek Reservoir	7.0	7.3	6.7	11.4
Cucharas Reservoir			5.3	40.0
Great Plains Reservoir	0.0	0.0	30.0	150.0
Holbrook Lake	1.6	2.0	2.5	7.0
Horse Creek Reservoir	20.1	20.4	9.4	27.0
John Martin Reservoir	110.4	224.1	122.8	616.0
Lake Henry	6.3	6.7	3.7	9.4
Meredith Reservoir	22.8	24.9	19.7	42.0
Pueblo Reservoir	205.1	224.7	170.8	354.0
Trinidad Lake	22.9	25.2	24.4	167.0
Turquoise Lake	85.4	88.9	94.1	127.0
Twin Lakes Reservoir	42.6	48.7	57.0	86.0
Basin-wide Total	578.5	733.6	573.8	1658.8
# of reservoirs	12	12	12	12

Watershed Snowpack Analysis January 1, 2017	# of Sites	% Median	Last Year % Median
UPPER ARKANSAS BASIN	3	114%	115%
CUCHARAS & HUERFANO BASINS	3	110%	133%
PURGATOIRE RIVER BASIN	2	176%	135%
ARKANSAS RIVER BASIN	8	116%	124%



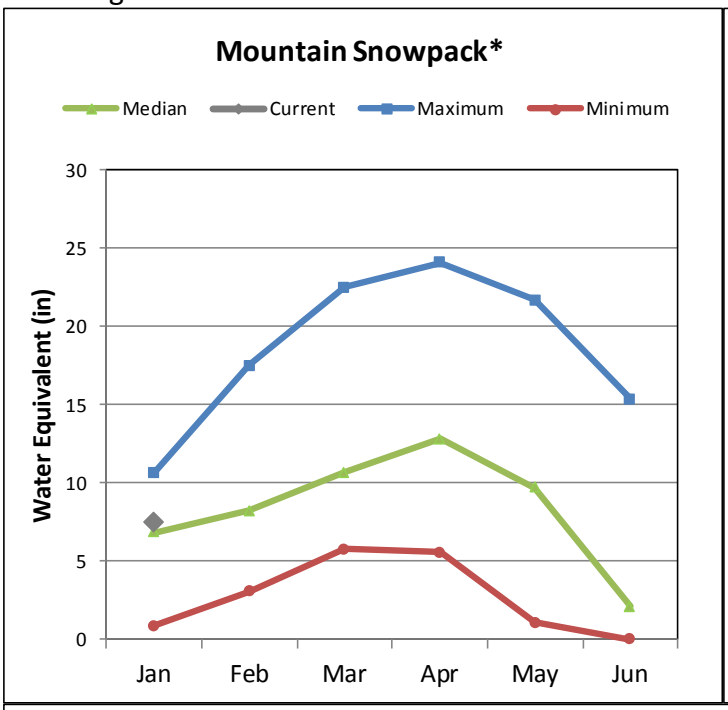


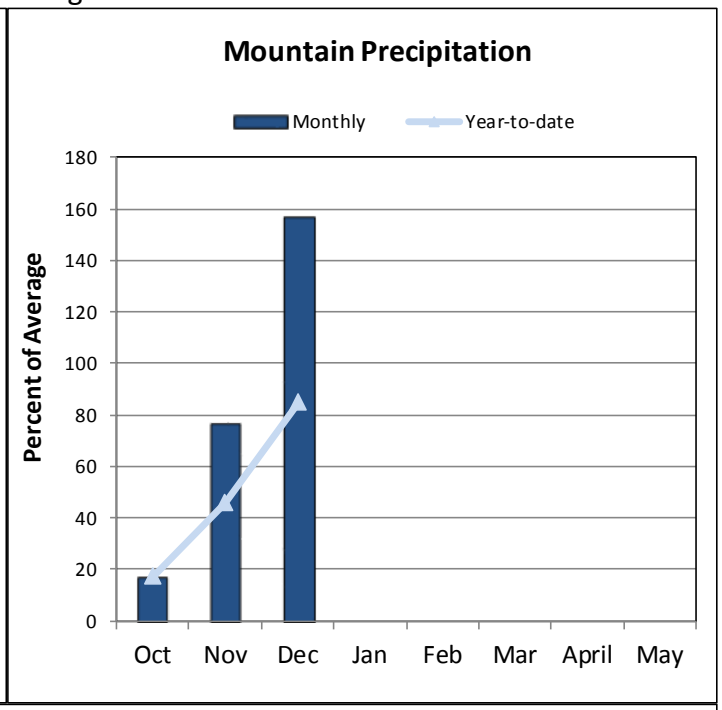
Please refer to the sections at the end of this report for further explanation concerning these graphs.

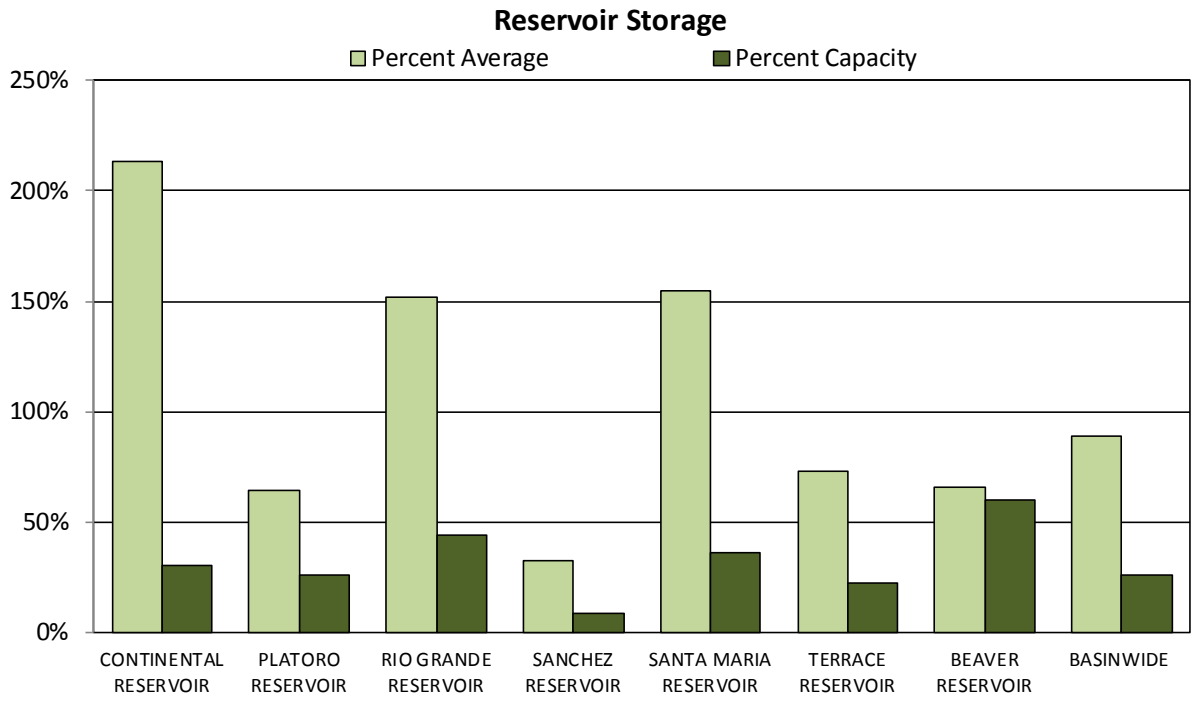
UPPER RIO GRANDE RIVER BASIN

January 1, 2017

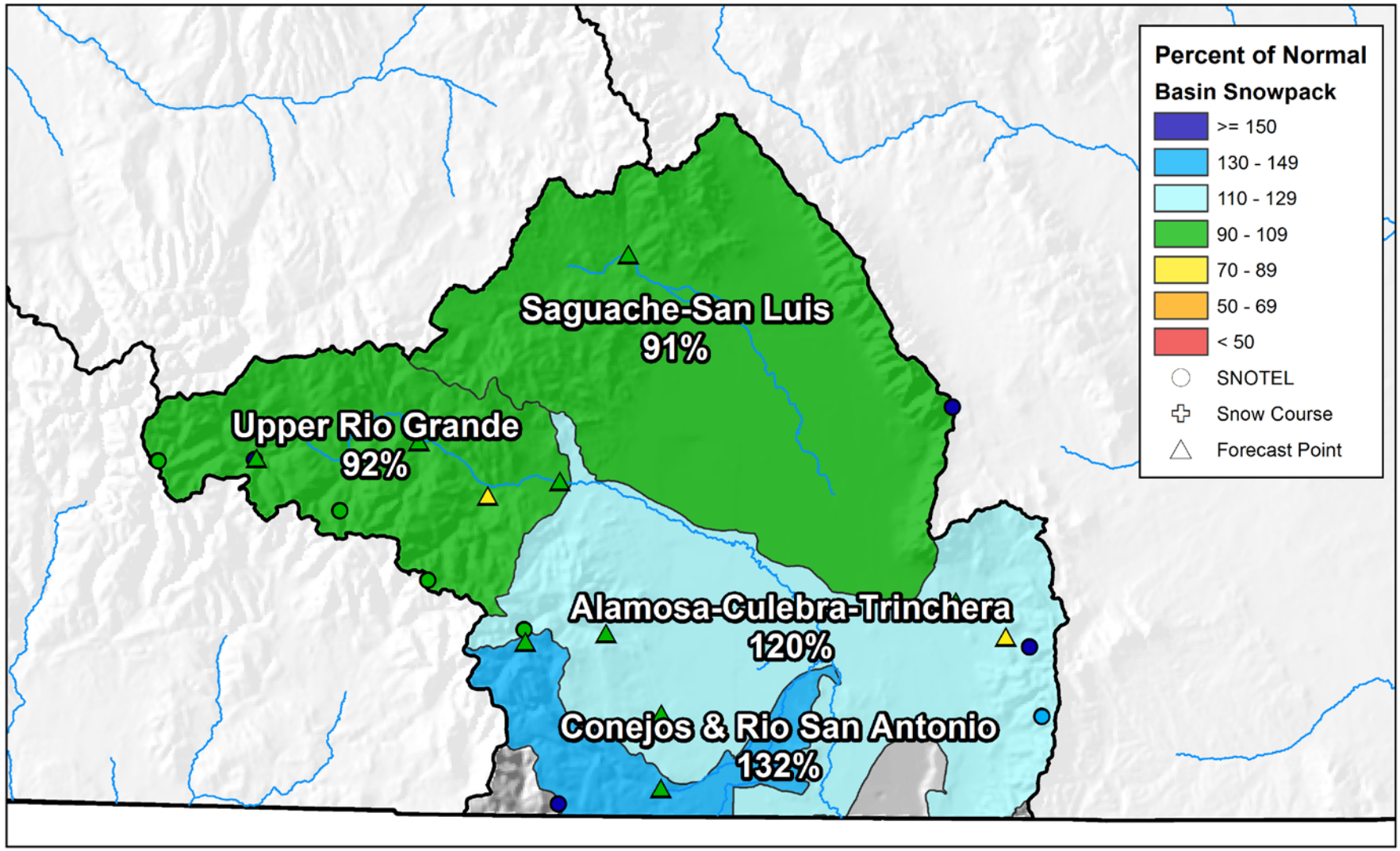
Snowpack in the Upper Rio Grande River basin is above normal at 109% of median. Precipitation for December was 157% of average which brings water year-to-date precipitation to 85% of average. Reservoir storage at the end of December was 86% of average compared to 89% last year. Streamflow forecasts range from 110% of average for the Los Pinos River near Ortiz to 70% of average for the Rio Grande River near Lobatos.







Upper Rio Grande River Basin Snowpack and Streamflow Forecasts
January 1, 2017



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Upper Rio Grande Basin
Streamflow Forecasts - January 1, 2017

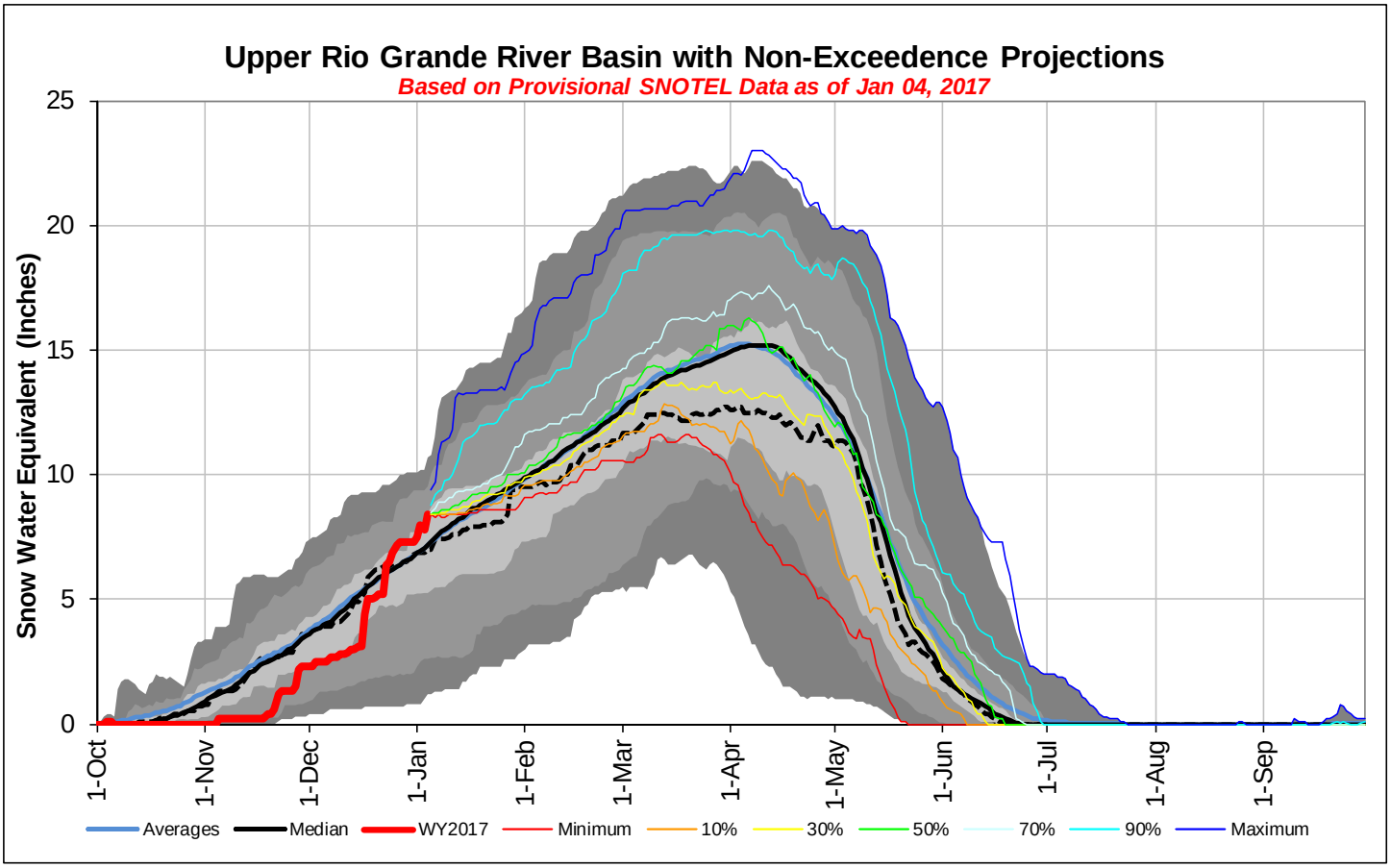
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

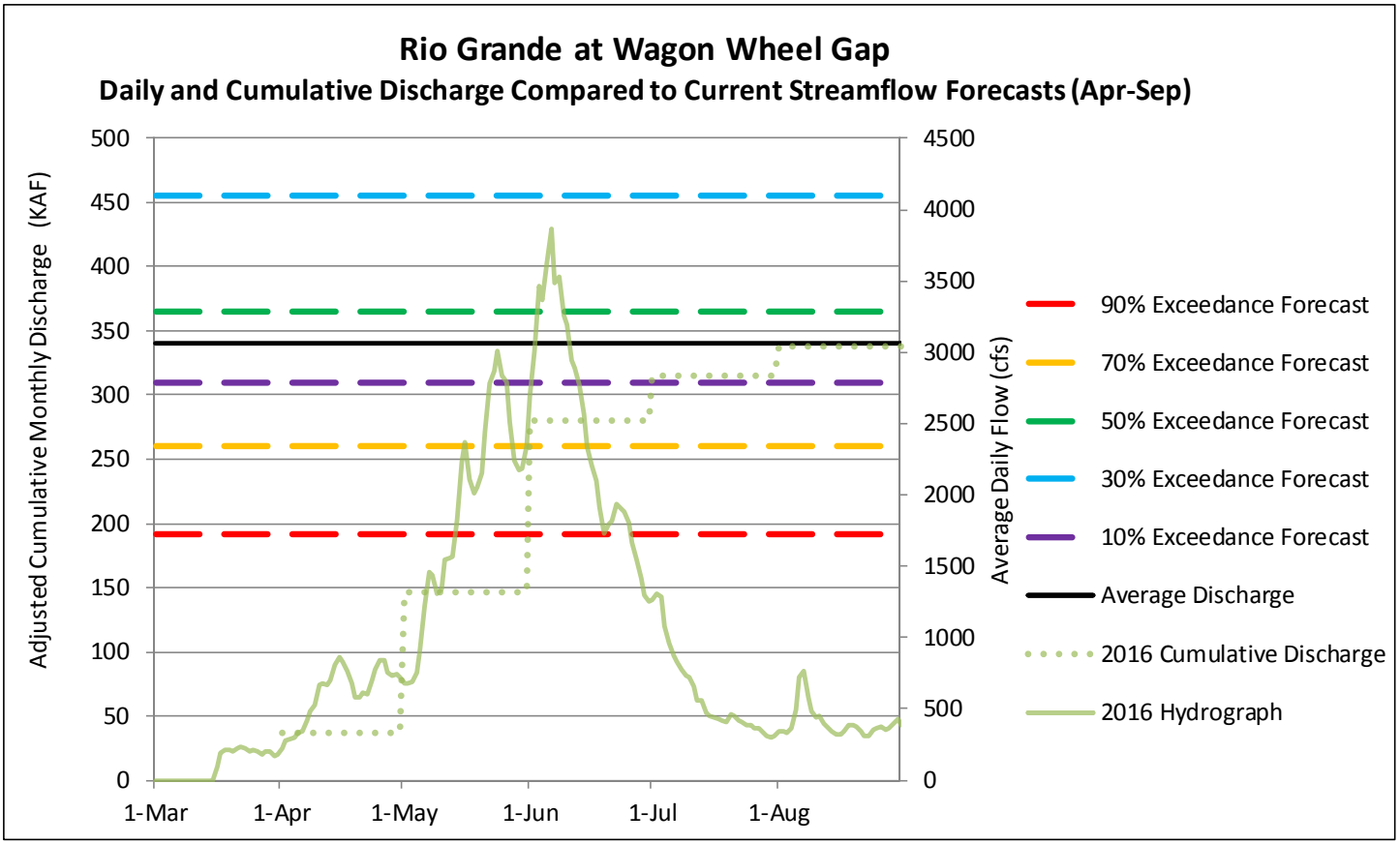
UPPER RIO GRANDE BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Rio Grande at Thirty Mile Bridge[2]								
	APR-JUL	68	89	105	93%	122	150	113
	APR-SEP	78	102	120	93%	140	171	129
Rio Grande at Wagon Wheel Gap[2]								
	APR-SEP	192	260	310	91%	365	455	340
SF Rio Grande at South Fork[2]								
	APR-SEP	71	94	112	88%	131	163	127
Rio Grande nr Del Norte [2]								
	APR-SEP	295	395	470	91%	550	685	515
Saguache Ck nr Saguache								
	APR-SEP	16.7	24	30	94%	37	48	32
Alamosa Ck ab Terrace Reservoir								
	APR-SEP	39	51	61	90%	70	86	68
La Jara Ck nr Capulin								
	MAR-JUL	4.7	6.8	8.4	94%	10.1	13	8.9
Trinchera Ck ab Turners Ranch								
	APR-SEP	6.9	9.4	11.2	89%	13.3	16.6	12.6
Sangre de Cristo Ck [2]								
	APR-SEP	4.9	9.7	13.9	85%	18.9	28	16.3
Ute Ck nr Fort Garland								
	APR-SEP	5.9	9.4	12.3	96%	15.5	21	12.8
Platoro Reservoir Inflow								
	APR-JUL	35	44	51	91%	59	70	56
	APR-SEP	39	49	57	92%	65	78	62
Conejos R nr Mogote [2]								
	APR-SEP	121	157	184	95%	215	260	194
San Antonio R at Ortiz								
	APR-SEP	8.3	13.1	17	109%	21	29	15.6
Los Pinos R nr Ortiz								
	APR-SEP	50	67	80	110%	94	117	73
Culebra Ck at San Luis								
	APR-SEP	10.2	15.6	19.9	87%	25	33	23
Costilla Reservoir Inflow								
	MAR-JUL	6.7	9.1	10.9	98%	13	16.3	11.1
Costilla Ck nr Costilla [2]								
	MAR-JUL	14.9	21	26	100%	32	41	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 December, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Beaver Reservoir	2.7	1.8	4.1	4.5
Continental Reservoir	8.1	2.6	3.8	27.0
Platoro Reservoir	15.4	13.3	24.0	60.0
Rio Grande Reservoir	22.5	28.1	14.8	51.0
Sanchez Reservoir	8.8	11.2	27.5	103.0
Santa Maria Reservoir	16.1	19.4	10.4	45.0
Terrace Reservoir	4.0	3.9	5.5	18.0
Basin-wide Total	77.6	80.3	90.1	308.5
# of reservoirs	7	7	7	7

Watershed Snowpack Analysis January 1, 2017	# of Sites	% Median	Last Year % Median
ALAMOSA CREEK BASIN	1	95%	123%
CONEJOS & RIO SAN ANTONIO BASINS	2	132%	135%
CULEBRA & TRINCHERA BASINS	3	131%	136%
HEADWATERS RIO GRANDE RIVER BASIN	6	92%	118%
UPPER RIO GRANDE BASIN	12	109%	126%



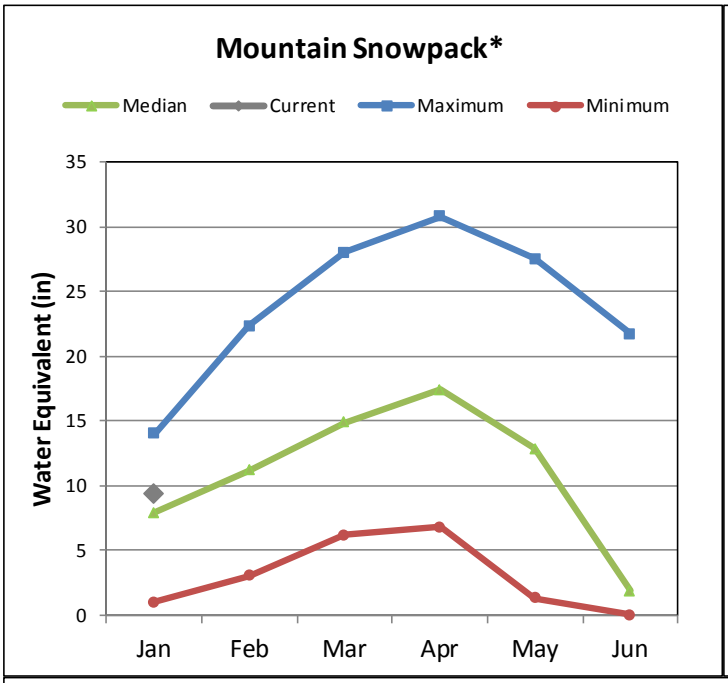


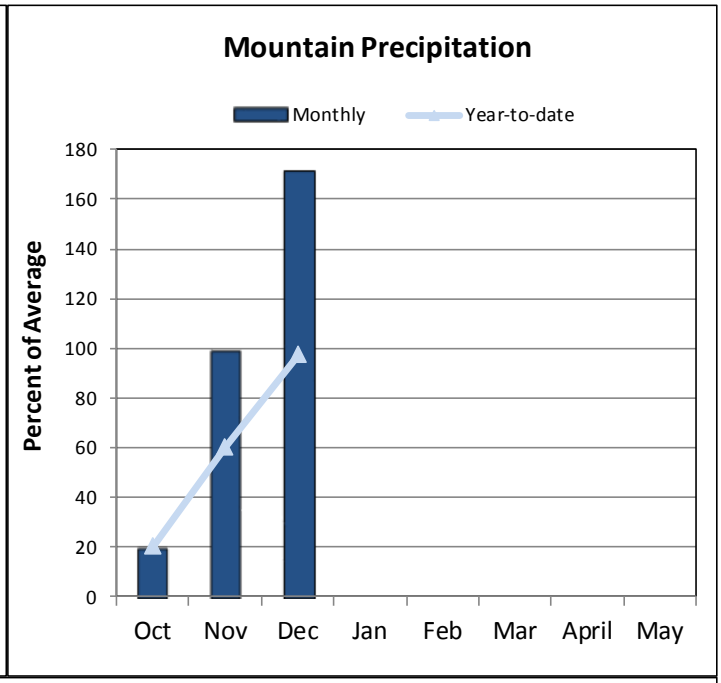
Please refer to the sections at the end of this report for further explanation concerning these graphs.

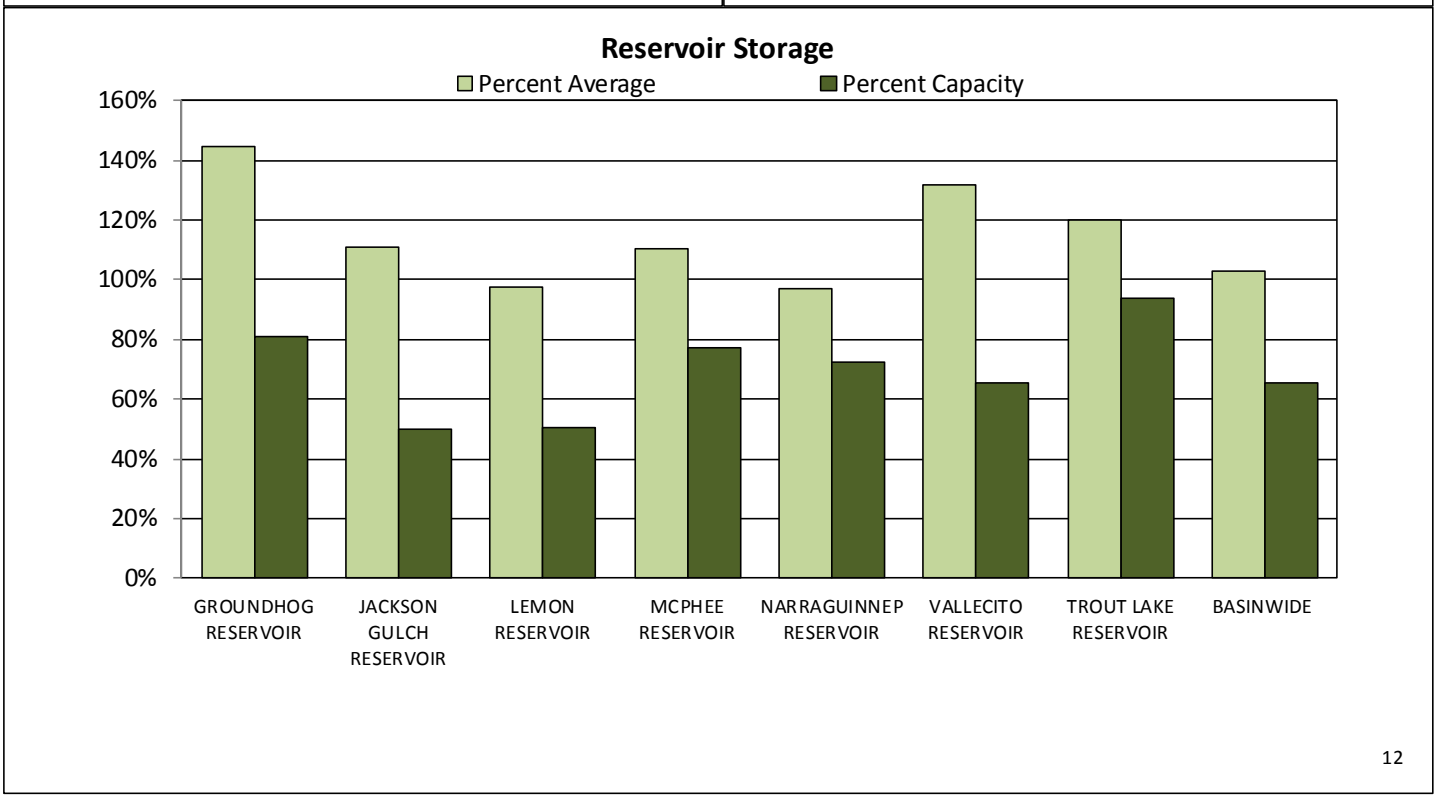
SAN MIGUEL, DOLORES, ANIMAS, AND SAN JUAN RIVER BASINS

January 1, 2017

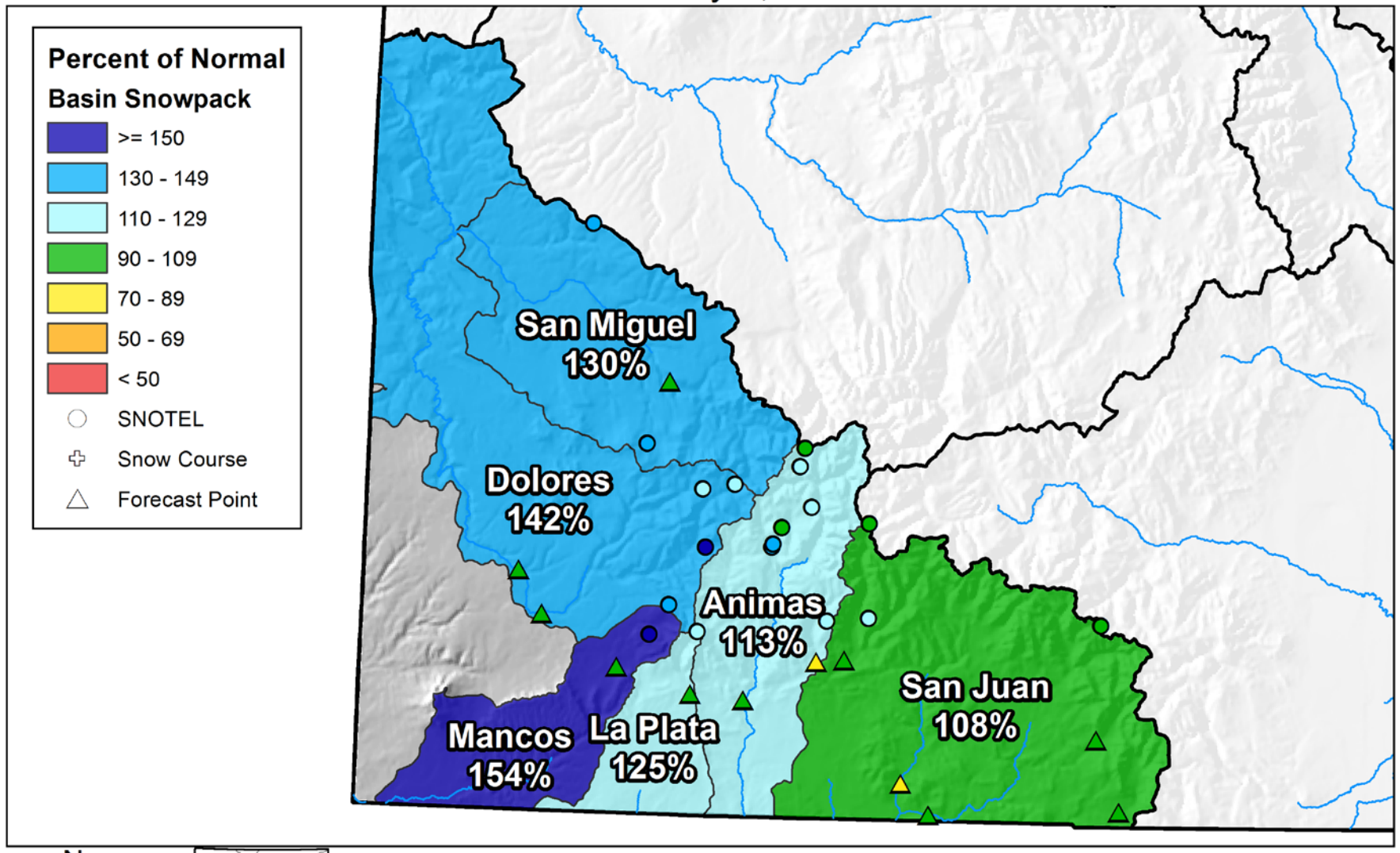
Snowpack in the combined southwest river basins is above normal at 120% of median. Precipitation for December was 171% of average which brings water year-to-date precipitation to 97% of average. Reservoir storage at the end of December was 114% of average compared to 103% last year. Current streamflow forecasts range from 103% of average for Mancos River near Mancos to 85% for the inflow to Lemon Reservoir.







San Miguel, Dolores, Animas, and San Juan River Basins
Snowpack and Streamflow Forecasts
January 1, 2017



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San Miguel-Dolores-Animas-San Juan River Basins
Streamflow Forecasts - January 1, 2017

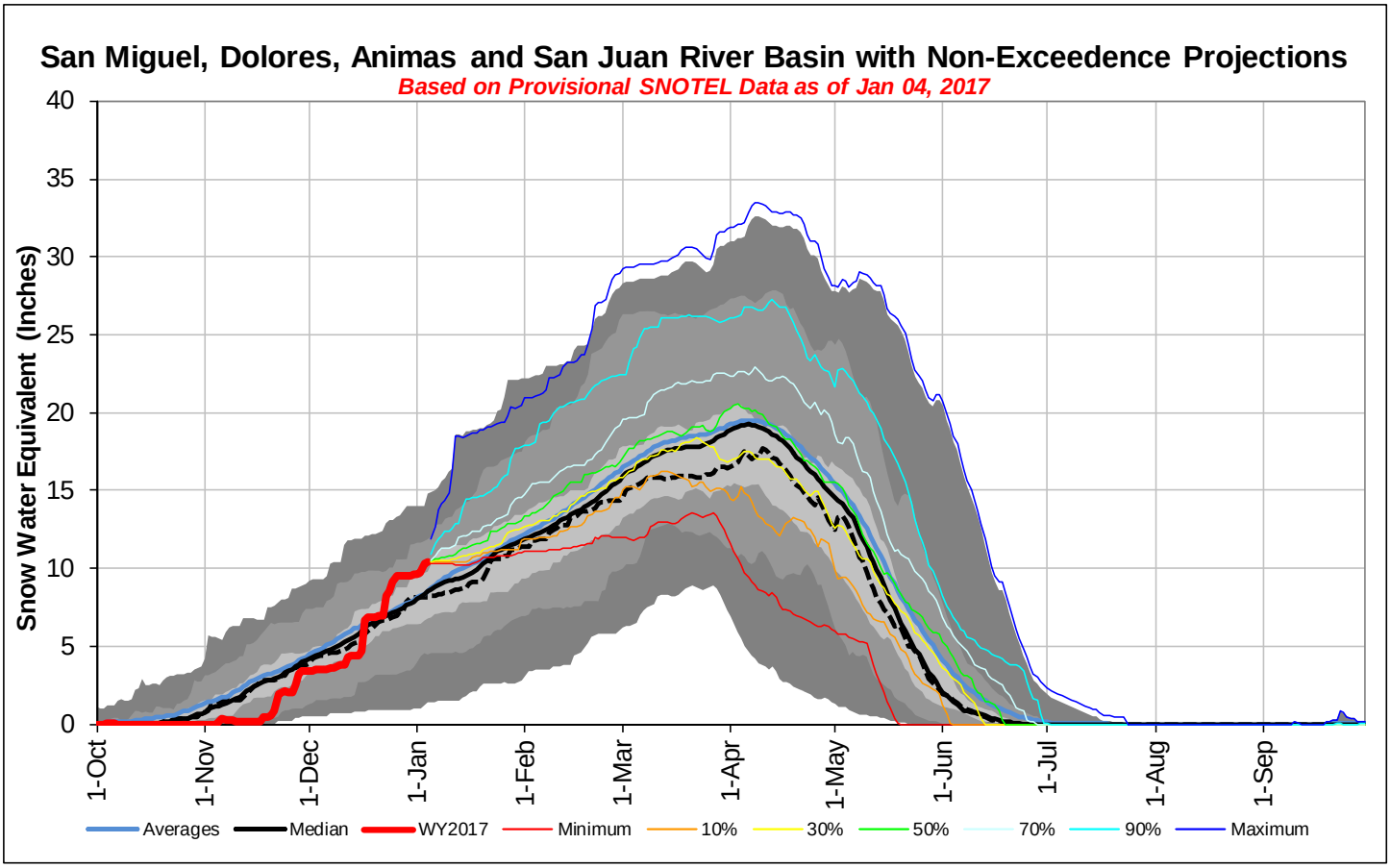
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

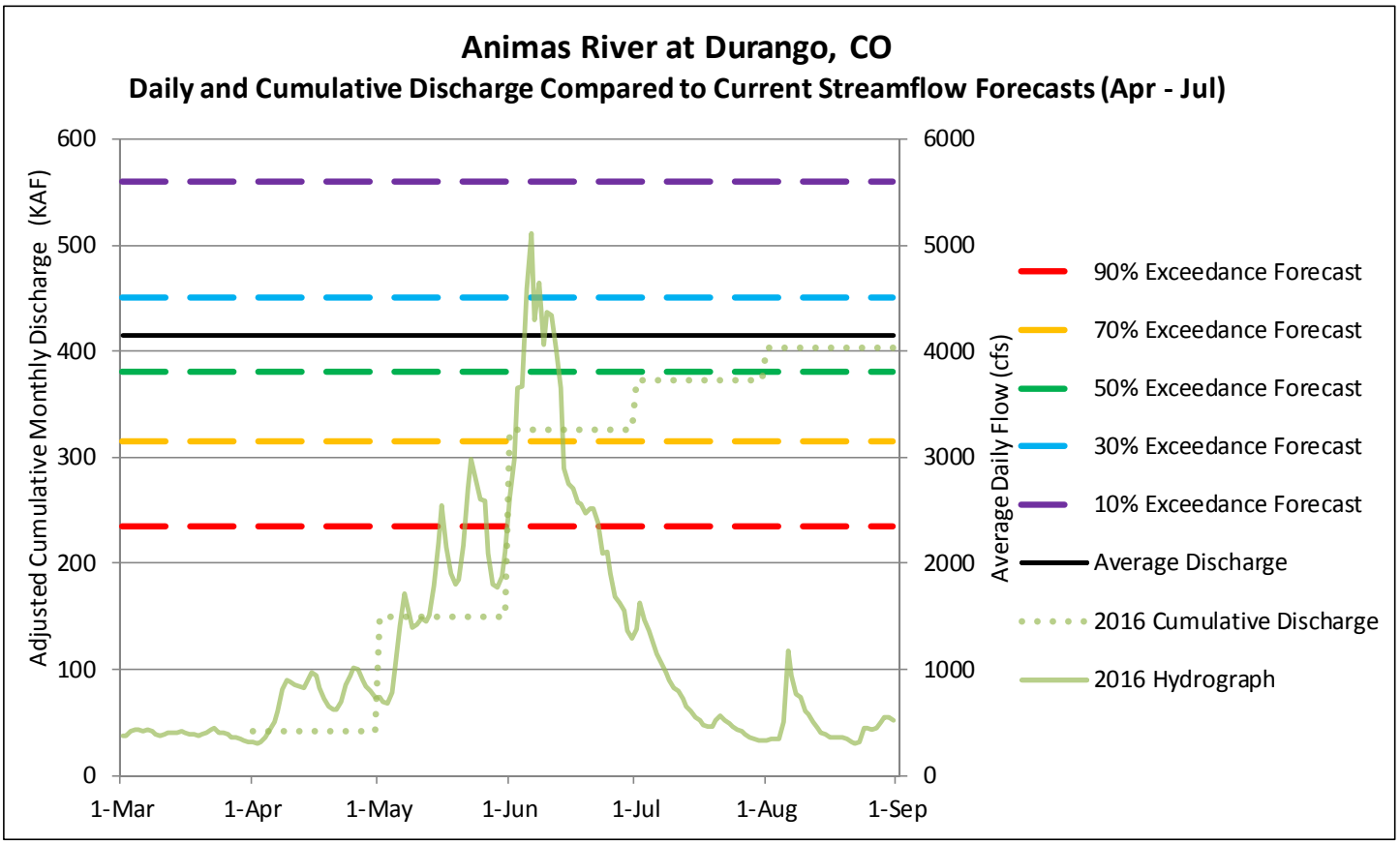
SAN MIGUEL-DOLORES-ANIMAS-SAN JUAN RIVER BASINS	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Dolores R at Dolores	APR-JUL	135	192	235	96%	285	365	245
McPhee Reservoir Inflow	APR-JUL	149	220	280	95%	345	455	295
San Miguel R nr Placerville	APR-JUL	76	103	123	96%	145	181	128
Cone Reservoir Inlet	APR-JUL	1.68	2.4	3	97%	3.6	4.7	3.1
Gurley Reservoir Inlet	APR-JUL	12.1	14.9	17	104%	19.2	23	16.3
Lilylands Reservoir Inlet	APR-JUL	1.36	2.1	2.7	100%	3.3	4.4	2.7
Rio Blanco at Blanco Diversion [2]	APR-JUL	35	47	55	102%	65	80	54
Navajo R at Oso Diversion [2]	APR-JUL	41	56	67	103%	79	98	65
San Juan R nr Carracas [2]	APR-JUL	230	320	385	101%	460	575	380
Piedra R nr Arboles	APR-JUL	100	147	184	88%	225	290	210
Vallecito Reservoir Inflow	APR-JUL	111	148	175	90%	205	255	194
Navajo Reservoir Inflow [2]	APR-JUL	415	570	690	94%	820	1030	735
Animas R at Durango	APR-JUL	235	315	380	92%	450	560	415
Lemon Reservoir Inflow	APR-JUL	28	39	47	85%	57	72	55
La Plata R at Hesperus	APR-JUL	11.8	17.9	23	100%	28	37	23
Mancos R nr Mancos [2]	APR-JUL	16.5	25	32	103%	40	54	31

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 December, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Groundhog Reservoir	17.8	18.9	12.3	22.0
Jackson Gulch Reservoir	5.0	5.1	4.5	10.0
Lemon Reservoir	20.2	20.8	20.7	40.0
Mcphee Reservoir	293.2	243.8	265.6	381.0
Narraguinnep Reservoir	13.7	15.8	14.1	19.0
Trout Lake Reservoir	3.0	2.7	2.5	3.2
Vallecito Reservoir	82.3	85.9	62.4	126.0
Basin-wide Total	435.2	393.0	382.1	601.2
# of reservoirs	7	7	7	7

Watershed Snowpack Analysis January 1, 2017	# of Sites	% Median	Last Year % Median
ANIMAS RIVER BASIN	9	113%	115%
DOLORES RIVER BASIN	5	142%	157%
SAN MIGUEL RIVER BASIN	3	130%	161%
SAN JUAN RIVER BASIN	3	108%	125%
SAN MIGUEL-DOLORES-ANIMAS-SAN JUAN RIVER BASINS	19	120%	130%





Please refer to the sections at the end of this report for further explanation concerning these graphs.

How to Read Non-Exceedance Projections Graphs

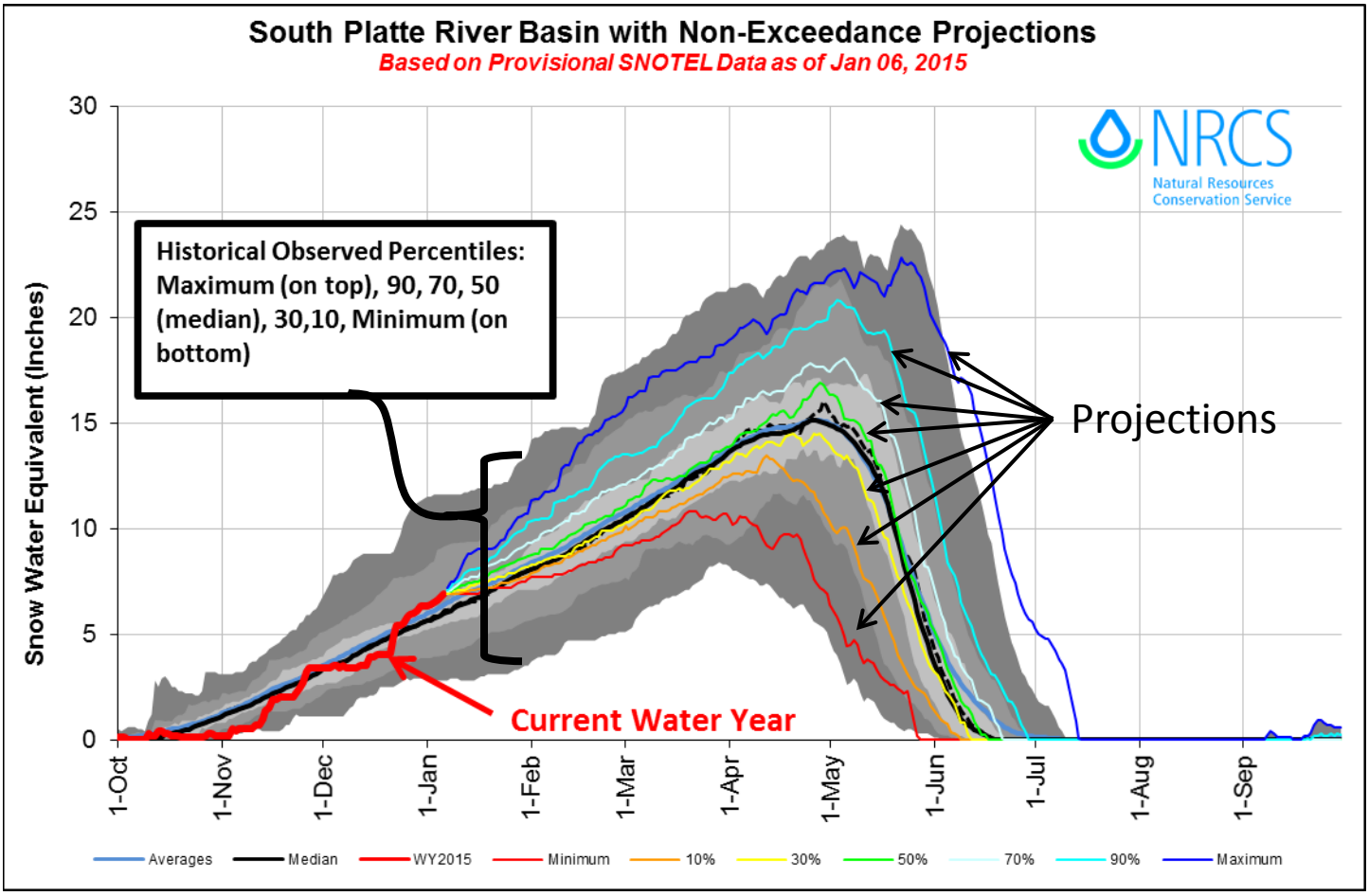
The graphs show snow water equivalent (SWE) projections (in inches) for the October 1 through September 30 water year. Basin "observed" SWE values are computed using SNOTEL sites which are characteristic of the snowpack of the particular basin. The SWE observations at these sites are averaged and normalized to produce these basin snowpack graphs. This new graph format uses non-exceedance projections.

Current water year is represented by the heavy red line terminating on the last day the graphic was updated.

Historical observed percentile range is shown as a gray background area on the graph. Shades of gray indicate maximum, 90 percentile, 70 percentile, 50 percentile (solid black line), 30 percentile, 10 percentile, and minimum for the period of record.

Projections for maximum, 90 percent, 70 percent, 50 percent (most probabilistic snowpack projection, based on median), 30 percent, 10 percent, and minimum exceedances are projected forward from the end of the current line as different colored lines.

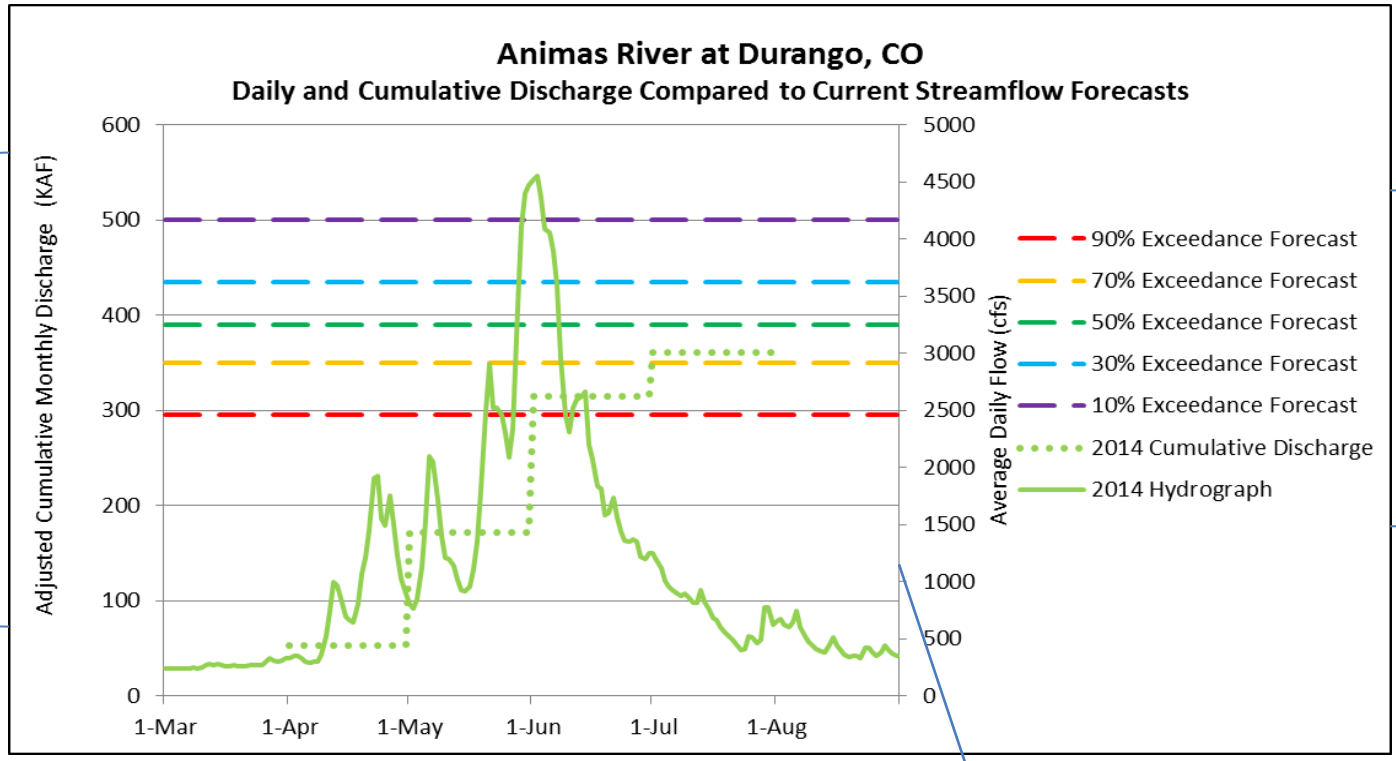
For more detailed information on these graphs visit:
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_062291.pdf



Explanation of Flow Comparison Charts

The flow comparison charts were developed to provide a quick comparison between the previous years' observed hydrograph, cumulative seasonal discharge, the current streamflow forecasts, and the current years' observed discharge (both hydrograph and cumulative discharge, as the season progresses). Forecast points for these products were generally chosen to be lower in the basin to best represent the basin-wide streamflow response for the season; the true degree of representativeness will vary between basins. When making comparisons of how the shape of the hydrograph relates to the monthly (and seasonal) cumulative discharges it is important to note that the hydrograph represents observed daily flows at the forecast point while the cumulative values may be adjusted for changes in reservoir storage and diversions to best represent what would be "natural flows" if these impoundments and diversions did not exist. This product can provide additional guidance regarding how to most wisely utilize the five exceedance forecasts based on past observations, current trends, and future uncertainty for a wide variety of purposes and water users.

The left y-axis represents values of adjusted cumulative discharge (KAF). This axis is to be used for comparing the current and previous years to the current five volumetric seasonal exceedance forecasts. This graphic only displays the previous years data but data for the current water year will be added as the season progresses.



The legend displays the symbology and color schemes for the various parameters represented. Exceedance forecasts represent total cumulative discharge for the April through July time period with the exception of the Rio Grande at Wagon Wheel Gap (Apr-Sep).

The right y-axis represents observed daily average discharge at the forecast point of interest. This graphic only displays the previous years data but data for the current water year will be added as the Season progresses.

How Forecasts Are Made

For more water supply and resource management information, contact:

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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 snow courses and automated SNOTEL sites, along with precipitation, antecedent streamflow, and indices of the El Niño / Southern Oscillation are used in computerized 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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In addition to the water supply outlook reports, water supply forecast information for the Western United States is available from the Natural Resources Conservation Service and the National Weather Service monthly, January through June. The information may be obtained from the Natural Resources Conservation Service web page at http://www.wcc.nrcs.usda.gov/wsf/westwide.html

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