

Natural Resources Conservation Service

Nevada Water Supply Outlook Report

March 1, 2016



Photo - 2/18/2016 Humboldt River just upstream of Winnemucca

Mid-Winter Thaw Fills Lower Humboldt River

A mild February melted wide-spread, low elevation snow across northern Nevada. The loss of snow covered area, combined with some rain, was enough to get the lower portion of the Humboldt River flowing again on February 6. By March 1, the [USGS gage at Imlay](#) measured a flow of 256 cubic feet per second, slightly above median for this time of year. Last year the river only flowed past Imlay for 134 days total, from March 18 to July 30. Since then, the channel has been dry. SNOTEL sites indicate that only a fraction of the snowpack in the [upper](#) and [lower](#) Humboldt basin has melted. March 1 snow water amounts remain near or above seasonal peak amounts. This river system appears to be primed for a good runoff and has the snow to drive it, even if conditions remain warm and dry. Last year's total March-July streamflow volume equaled just 6,600 acre-feet. This month's forecast for 2016 calls for 195,000 acre-feet during that period. This is good news for Rye Patch Reservoir and Lovelock area irrigators.

Background information about this report:

This report provides an analysis of water supply conditions across Nevada and a part of the eastern Sierra in California. It is published monthly from January to May. First of month data are summarized and used to forecast summer streamflow at various points. The report is best read in digital format which allows readers to click on the blue internet links. Email jeff.anderson@nv.usda.gov to join a digital subscription list.

Streamflow Forecasts: Most of the annual streamflow in the western United States originates as snowfall that accumulates in the mountains during the winter. As the snowpack accumulates, hydrologists can estimate the runoff that will occur when the snow melts. Measurements of [snow water equivalent \(SWE\)](#) at snow courses and SNOTEL sites, along with precipitation, antecedent streamflow, and El Niño / Southern Oscillation indices are used in computerized statistical models to produce streamflow runoff forecasts. **Forecasts in this report give the total volume of water expected to flow past a location during a specified period, such as March 1 to July 31.**

Forecasts of any kind 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. 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. **Unless otherwise stated the 50% exceedance forecast is the one referred to in the text of this report.** To quantify the range around this 50% value, four other forecasts are provided in the forecast tables, two smaller values (90% and 70% exceedances) and two larger values (30% and 10% exceedances). There is a 90% chance that the actual flow will be more than the minimum forecast (90% exceedance forecast). Likewise there is a 10% chance the actual flow will be more than the maximum forecast (10% exceedance forecast). Other forecasts can be interpreted similarly. The wider the spread between these values, the more forecast uncertainty.

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. Water 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 perhaps due to a dry climate outlook for the coming months, 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 if there is a 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, they should be prepared to deal with either more or less water.

Most **streamflow forecast volumes** in this report are expressed in KAF (thousand-acre-feet). Some smaller streams are forecast in acre-feet and noted as such in parentheses after the forecast name, such as “Marlette Lake Inflow (acre-feet)”. Forecasts for Lake Tahoe, Pyramid Lake and Walker Lake are expressed in feet of water surface elevation change during the forecast period. A rise in lake level is indicated by a positive value, while a drop in lake level is indicated by a negative number. The East Fork Carson River has two recession forecasts that provide the dates when spring river flows are expected to recede to 500 cfs and 200 cfs levels as the snowmelt decreases in late spring.

Streamflow Adjustments: Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream lakes, reservoirs and diversions. Certain forecasts are adjusted for these structures; these are footnoted with a (2) in the report. A summary of adjustments in this report follows:

Marlette Lake Inflow (2) = Marlette Lake Inflow, observed + Marlette Lake storage change

Little Truckee River above Boca Reservoir (2) = Little Truckee R above Boca Reservoir, observed + Sierra Valley Diversion + Independence Lake storage change + Stampede Reservoir storage change

Truckee River at Farad (2) (externally adjusted by US Water Master) = Truckee River at Farad, obs – Lake Tahoe outflow + Sierra Valley Diversion + Donner Lake storage change + Martis Lake storage change + Prosser Reservoir storage change + Independence Lake storage change + Stampede Reservoir storage change + Boca Reservoir storage change

East Walker River near Bridgeport (2) = East Walker River near Bridgeport, observed + Bridgeport Reservoir storage change

Owyhee River near Gold Creek (2) = Owyhee River near Gold Creek + Wildhorse Reservoir storage change

Lake Powell Inflow (2) (externally adjusted by Bureau of Reclamation)

“Normal” (Averages and Medians): Throughout this report conditions are expressed as a “percent of normal”. In this context “normal” is meant to be a catch-all word that refers to the statistical **average** for the 1981-2010 period when related to streamflow, precipitation and reservoir storage, and the statistical **median** for the 1981-2010 period when related to snowpack. For an explanation of why snowpack uses median visit: www.wcc.nrcs.usda.gov/normals/median_average.htm. Soil moisture has only been measured at SNOTEL sites since ~2006. Due to the short record the soil moisture normal is based on the short-term average for water years 2006-2015.

Maximums and Minimums: Graphs in this report display “Max” and “Min” lines for snowpack, precipitation and soil moisture. For snow and precipitation these are basin-wide, daily maximums and minimums for water years 1981-2015; for soil moisture the period is 2006-2015.

Watershed Snowpack Analysis: These tables summarize the snowpack percent of median for each main basin, and its sub-basins. Percentages are based on SNOTEL and snow course measurements. By selecting “Nevada” and report type “Snow” a full report with station-by-station data can be found here: <http://www.wcc.nrcs.usda.gov/basin.html>.

Nevada Water Supply Outlook Report

March 1, 2016

SUMMARY

March 1 snowpacks remain near, to above, normal across northern Nevada despite a mostly sunny February. The state saw just one major storm in February, making monthly precipitation just 30-60% of average. The dry spell caused statewide snowpack percentages to slide about 30% from last month. Even though this year's snowpack is the deepest since 2011, we haven't come close to making up the moisture deficits caused by the last four years of drought. A "Miracle March", like in 1991, 1995 and 2011, would go a long ways towards putting a dent in these deficits. Looking ahead, the weather forecast looks very active for the first 10 days of March, but time will tell if 2016 can be added to this list. Most March 1 streamflow forecasts are 90-110% of average flow this summer. Forecasts are likely to improve by April 1 if March storms produce what weather forecasts indicate. With minimal reservoir storage Nevada needs good streamflow this year.

SNOWPACK

The March 1 basin snowpack percentages range from 89% of median in the Truckee Basin to 123% in the Snake River Basin. Statewide snowpack percentages are down about 30% from what was reported on February 1. The biggest declines were in the Northern Great Basin, Lower Humboldt, Owyhee and Eastern Nevada which all lost more than 40%. The smallest declines were about 20% in the Upper Humboldt and Clover Valley - Franklin River basins. The decline in percentages was mostly due to the lack of new snow compared to ever increasing normal values, rather than melting snow. The [snowpack percent of peak graphs](#) (scroll to the bottom of linked page) show that most basins are now closer to their seasonal peak amounts than they were on February 1. The February 17 storm added enough new snow to balance out or exceed the melt. Across the NRCS network, only four, lower-elevation stations were melted out on March 1. Below the elevation of those sites, and on south facing aspects, there was a widespread disappearance of snow. This melt primed the soils and bumped up streamflow especially for the Humboldt River as demonstrated on this month's cover.

PRECIPITATION

Water year precipitation amounts since October 1 are still near average in the Sierra. Water year precipitation is 114-130% for the Northern Great Basin, Humboldt, Clover, Owyhee and Snake basins and up 142% in Eastern Nevada. February precipitation was only 30% of average in the Sierra basins and Northern Great Basin. The Upper Humboldt, Owyhee and Snake basins did a little better with 40-60% of average for the month. These monthly amounts make this February one of driest on record in some areas. February precipitation at six SNOTEL sites [north of Lake Tahoe](#) ranked in the top five driest years. [Elsewhere](#), the SNOTELs north of Winnemucca were in the top four, while it was the driest February on record at Lamoille #3 and Corral Canyon SNOTELs in the Rubies, and Taylor Canyon and Big Bend SNOTELs in the Owyhee headwaters. Weather forecast look very active for the first 10 days of March. Hopefully these storms will bring enough moisture to boost the snowpack and water year precipitation well above normal by April 1. In the Sierra, a "Miracle March" similar to 1991, 1995 or 2011 would bring 200-300% of average precipitation and boost snowpacks 60-70% by April 1.

SOIL MOISTURE

Soil moisture continues to be above average in all basins. March 1 soil moisture levels are near the highest recorded for this time of year based on SNOTEL data going back to 2006 in the following basins: Truckee, Walker, Upper and Lower Humboldt, Snake, and Owyhee.

RESERVOIRS

Reservoirs continued to rebound in February. Lake Tahoe rose a little over 2 inches last month, but remains 9 inches below its natural rim. Reservoir storage along the Truckee River is now 25% of capacity, and storage increased 12,100 acre-feet during February in Boca and Stampede reservoirs. Walker River storage went up 8,600 acre-feet and is now 31% of capacity. Lahontan Reservoir more than doubled its volume of stored water in February and now contains over 53,000 acre-feet, 18% of capacity. Even Rye Patch Reservoir moved its needle up a percent to 6% of capacity, it gained 314 acre-feet.

STREAMFLOW FORECASTS

Most forecasts are 90-110% of average for streams across the eastern Sierra and northern Nevada. Forecasts in eastern Nevada and for Salmon Falls Creek in the Snake Basin are slightly higher at 115-125%. The best forecasts continues to be for Owyhee River near Gold Creek which is 140%. Water managers should take note that February's sunny, warm conditions brought snow densities up to 35-40%, even at snow courses near 8000 feet. Melt typically begins at about 40% density, so snowpacks are a few weeks ahead of schedule when it comes to melt potential. Many of the lower elevation SNOTEL sites have already showed active melt. It won't take much additional energy to begin snow melt in earnest and water managers can expect earlier than normal streamflow if these warm, dry conditions persist.

UPCOMING EVENTS

Northern Nevada Streamflow, Weather and Reservoir Forecast Meeting

The public is invited to attend presentations by the Natural Resources Conservation Service, National Weather Service, and the US Bureau of Reclamation regarding the 2016 streamflow, precipitation and reservoir forecasts for the Truckee, Carson, Walker, and Humboldt rivers.

When: Wednesday, March 23, 2016 2:00-4:00 PM, No RSVP necessary.

Where: Nevada Division of Water Resources; 901 S. Stewart Street Suite 2002, Carson City, NV

Snow Survey Book Event: Pat Armstrong will be discussing his book ["The Log of a Snow Survey – Skiing and Working in a Mountain Winter World"](#) at the University of Nevada Reno on Wednesday, March 9th from 5-6:50pm in the Raggio Building, Room 2006. The public is welcome, no RSVP's are necessary.

Western Snow Conference, April 18-21, 2016, Seattle, WA <http://www.westernsnowconference.org>

Humboldt River Basin Water Authority (HRBWA) Meeting

The NRCS will provide a presentation and answer questions on the 2016 snowpack and streamflow outlook within the Humboldt River Basin. The meeting is open to the public.

When: Friday, May 13, 2016, 10am-4pm, NRCS will present at about 11:15am.

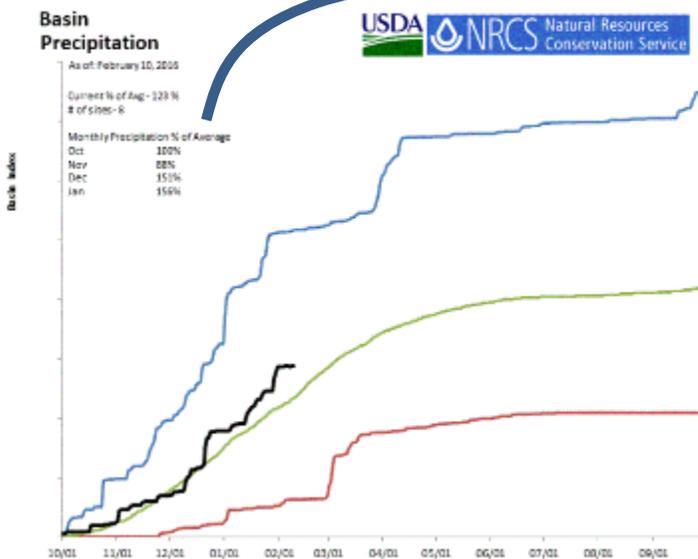
Where: Winnemucca Inn, 741 W Winnemucca Blvd, Winnemucca, NV 89445

SNOW SURVEY PRODUCT HIGHLIGHT

This section highlights products that are linked from the [Nevada Snow Survey Program website](#). This month the [Basin Precipitation Graphs](#) and [Basin Soil Moisture Graphs](#) are the focus.

You should already be familiar with these graphs from the January and February Water Supply Outlook Reports. Now these graphs are updated every day and available online. Each graph provides a simple way to determine where water year precipitation or soil moisture levels are in relationship to maximum, minimum and average amounts. The precipitation graph contains a table summarizing monthly precipitation as a percent of average for each month this water year.

Basin Precipitation Graphs



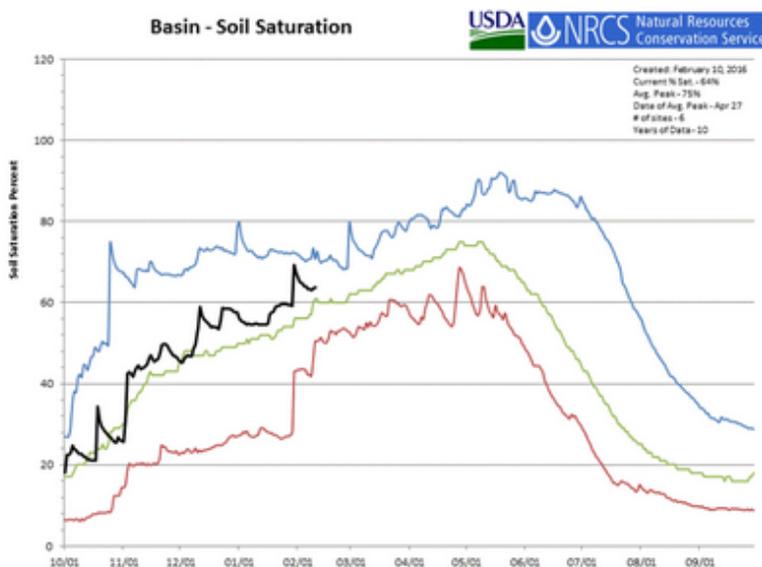
Monthly Precipitation % of Average	
Oct	100%
Nov	88%
Dec	151%
Jan	156%

NEW! Basin Precipitation Graphs - Displays daily time series plot of current water year SNOTEL precipitation for a group of sites in the selected basin.

Select a basin

Maximum, minimum and normal (average) lines are based on all data since 1981.

Soil Moisture Graphs



NEW! Basin Soil Moisture Graphs - Displays current year daily time series plot of basin soil moisture calculated as a weighted average from sensors at 2", 8" and 20" depths at each SNOTEL site.

Select a basin

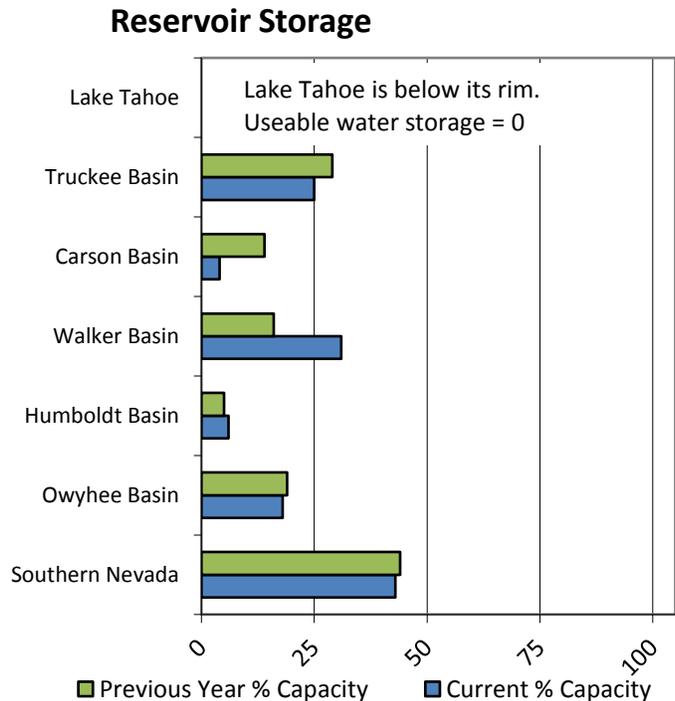
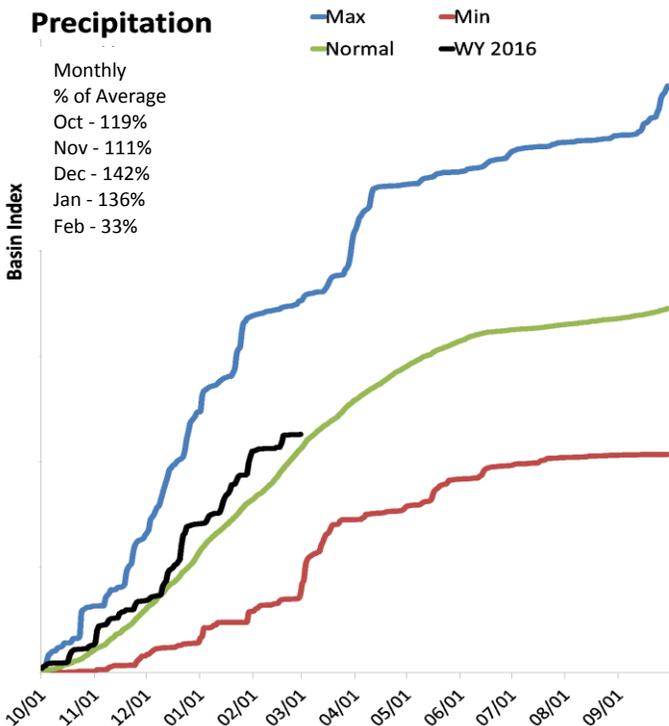
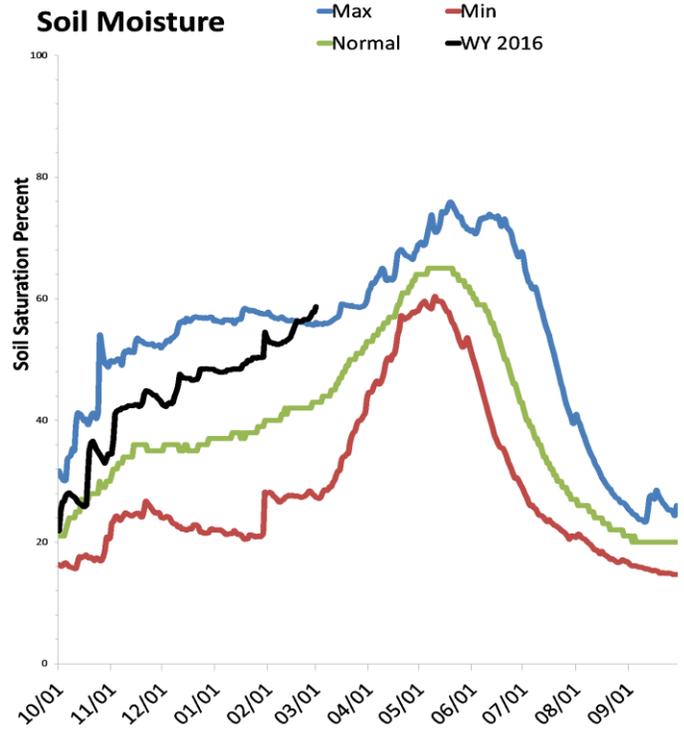
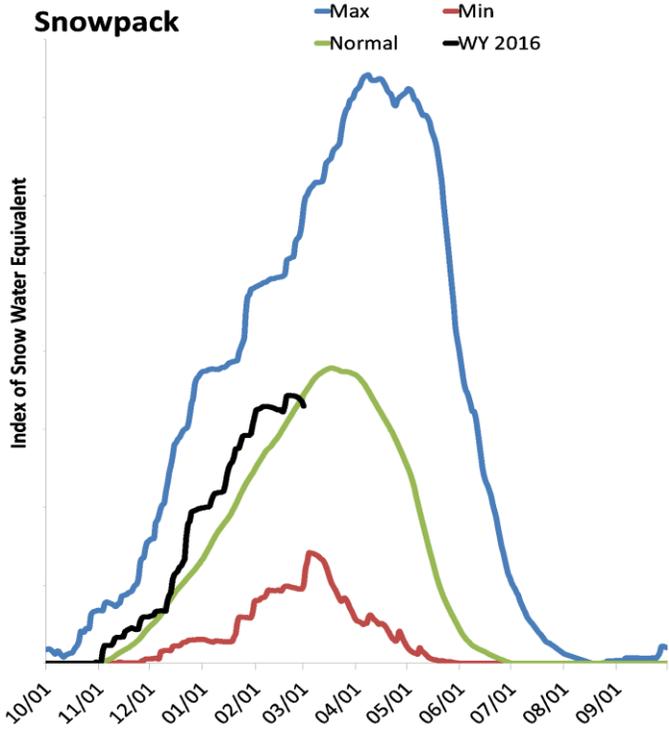
The maximum, minimum and normal (average) lines are calculated from SNOTEL period of record soils moisture data that starts ~2006 at most sites.

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State of Nevada & Eastern Sierra

3/1/2016

The snowpack across Northern Nevada and the Eastern Sierra (Truckee, Tahoe, Carson and Walker basins) is near normal at 99% of median, compared to 42% last year. Precipitation in February was much below average at 33%, which brings the seasonal accumulation (Oct-Feb) to 109% of average. Soil moisture is 58% compared to 50% last year. Reservoir storage ranges from 0% of useable capacity in Lake Tahoe to 43% of capacity in Southern Nevada.

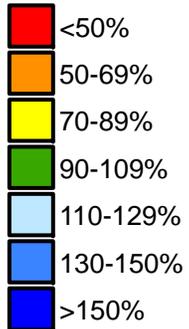


Nevada & Eastern Sierra

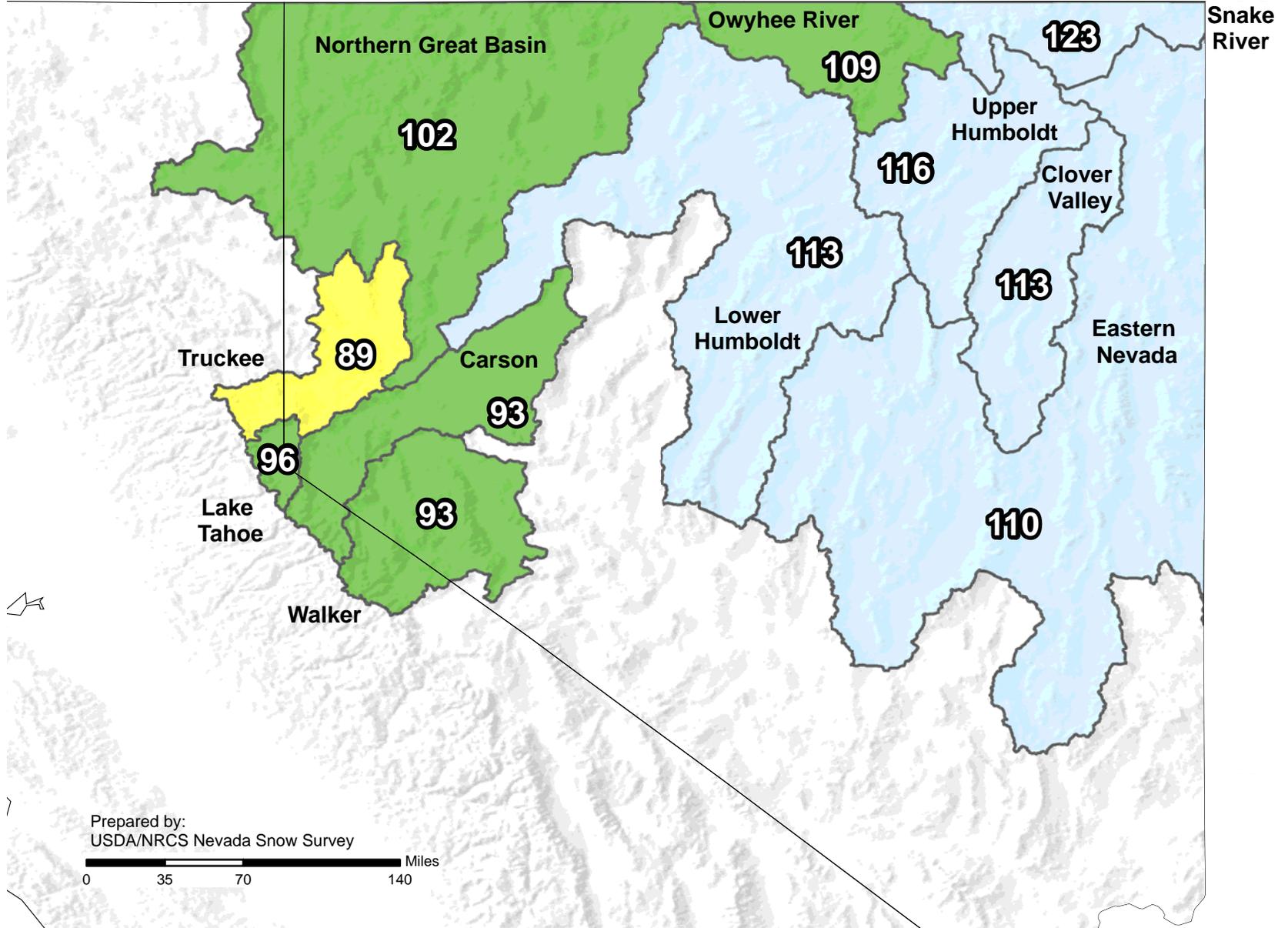
Percent of Median Snowpack

March 1, 2016

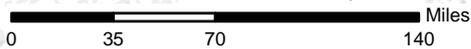
1st of Month Snow
Water Equivalent
Basin-wide Percent
of 1981-2010 Median



*Provisional data
subject to revision*



Prepared by:
USDA/NRCS Nevada Snow Survey

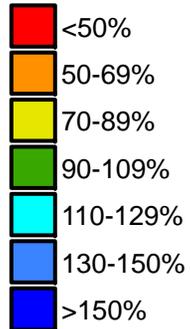


Map data based on the first of month snow water equivalent found at selected SNOTEL and snow course sites in or near the basin compared to the median value for those sites. SNOTEL data based on the first reading of the day (typically midnight). Snow course data based on measurements taken within the last 5 days of preceding month. A table based, station-by-station, report of the underlying data can be found by selecting "Nevada" and report type "Snowpack" for the date listed above on the following webpage: <http://www.wcc.nrcs.usda.gov/basin.html>.

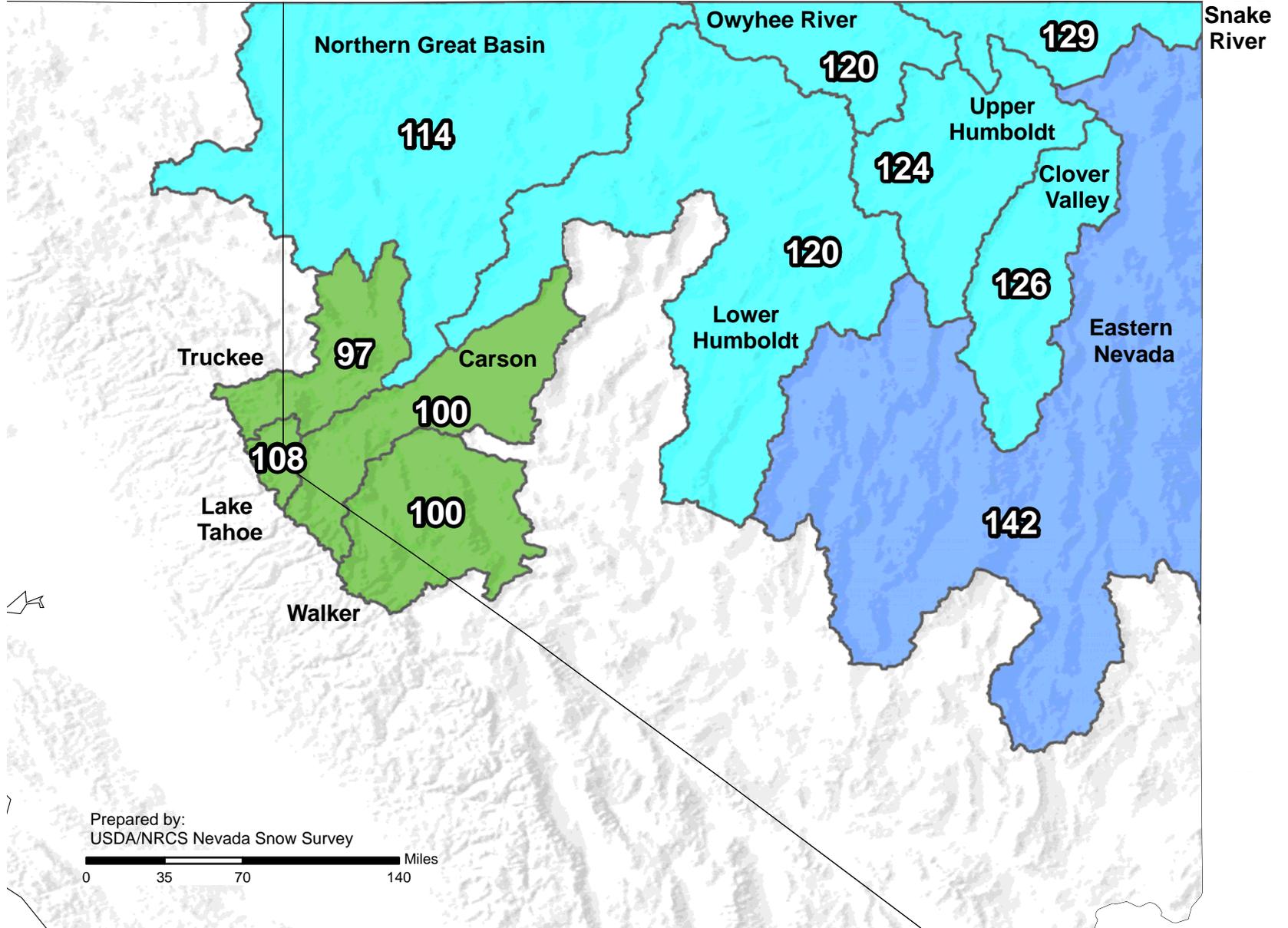


Nevada & Eastern Sierra Water Year to Date Precipitation March 1, 2016

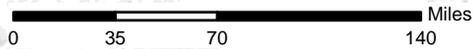
Basin-wide
Water Year
Precipitation to date
as a Percent of
the 1981-2010 Average



*Provisional data
subject to revision*



Prepared by:
USDA/NRCS Nevada Snow Survey



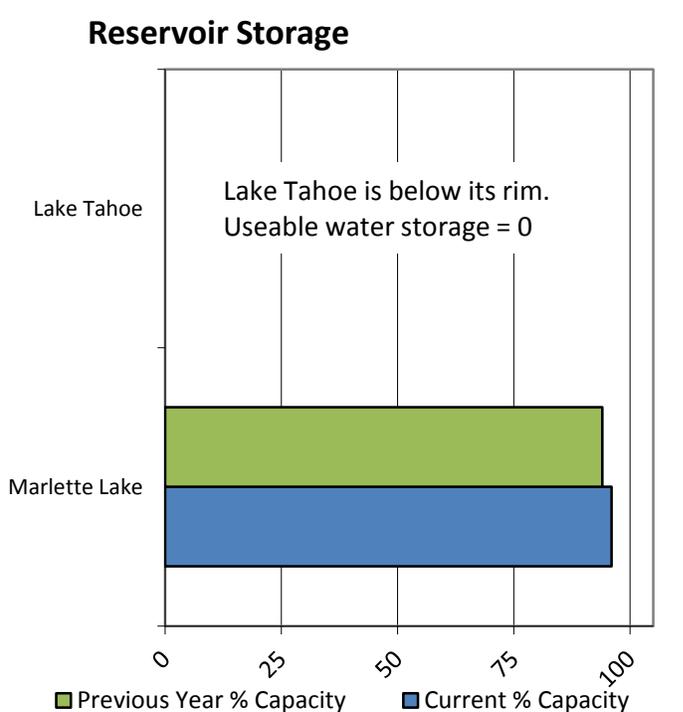
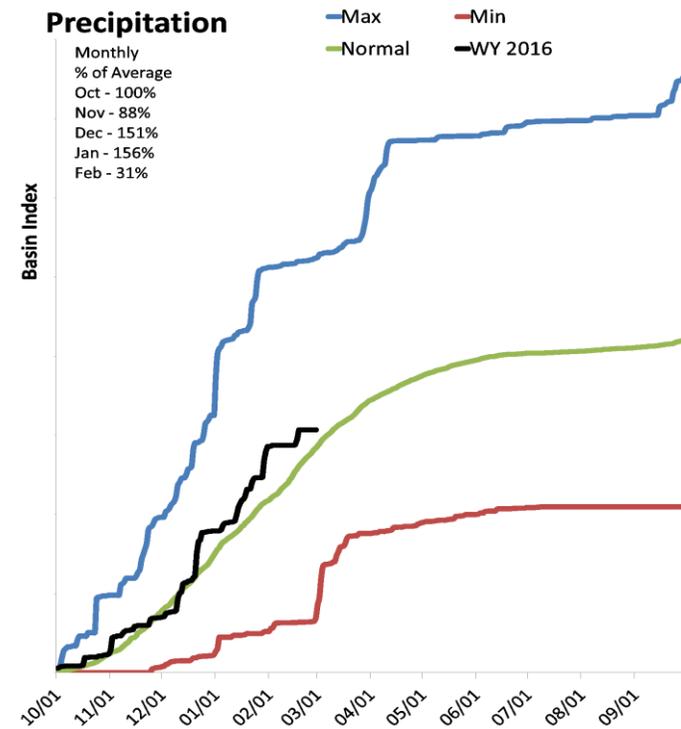
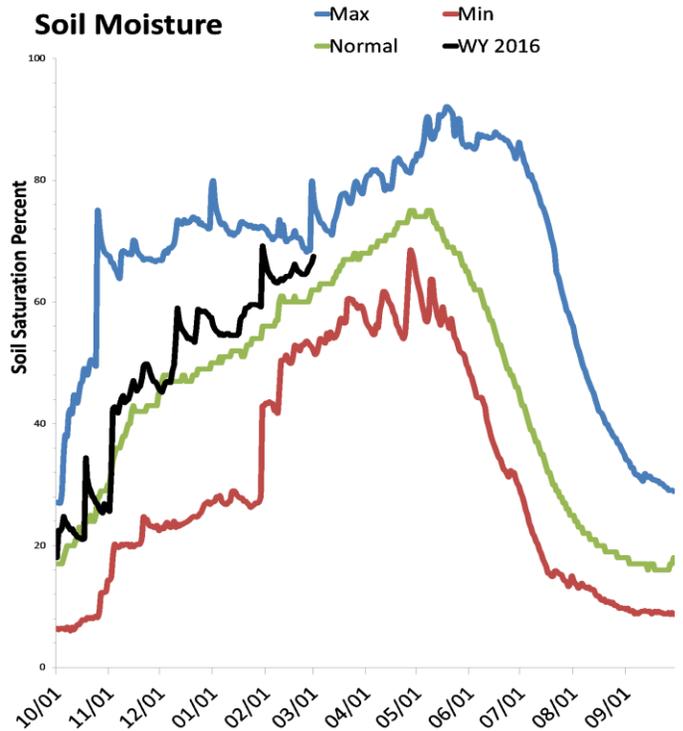
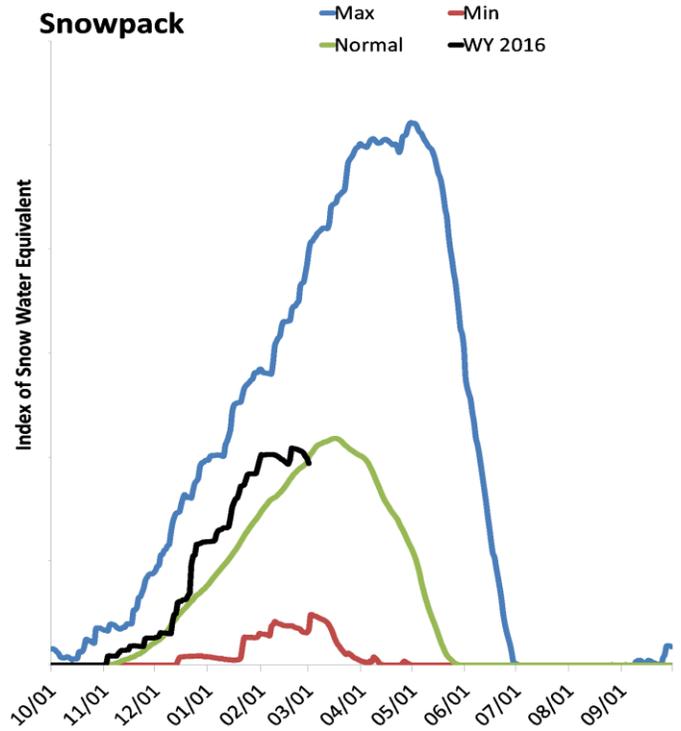
Map data based water year to date precipitation for the first of the month at selected SNOTEL sites in or near the basin compared to the average value for those sites. SNOTEL data based on the first reading of the day (typically midnight). A table based, station-by-station, report of the underlying data can be found by selecting "Nevada" and report type "Precipitation" for the date listed above on the following webpage: <http://www.wcc.nrcs.usda.gov/basin.html>.



Lake Tahoe Basin

3/1/2016

Snowpack in the Lake Tahoe Basin is near normal at 96% of median, compared to 23% last year. Precipitation in February was much below average at 31%, which brings the seasonal accumulation (Oct-Feb) to 108% of average. Soil moisture is 67% compared to 63% last year. Lake Tahoe's water elevation is 6222.24 ft, which is 0.76 ft below the lake's natural rim and equals a storage deficit of approximately 93 thousand acre-feet. Last year the elevation was 6222.85 ft which equaled a storage deficit of approximately 19 thousand acre-feet. Lake Tahoe is forecast to rise 1.6 feet from March 1 to its highest elevation.



Lake Tahoe Basin Streamflow Forecasts - March 1, 2016

Lake Tahoe Basin	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						30yr Avg (KAF)
		90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	
Marlette Lake Inflow ²	MAR-JUL	116	660	1030	85%	1400	1940	1213
	APR-JUL	-46	450	765	84%	1080	1540	911
Lake Tahoe Rise Gates Closed ¹	MAR-HIGH	0.57	1.28	1.6	92%	1.92	2.6	1.73
	APR-HIGH	0.7	0.99	1.25	95%	1.45	2.2	1.31

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

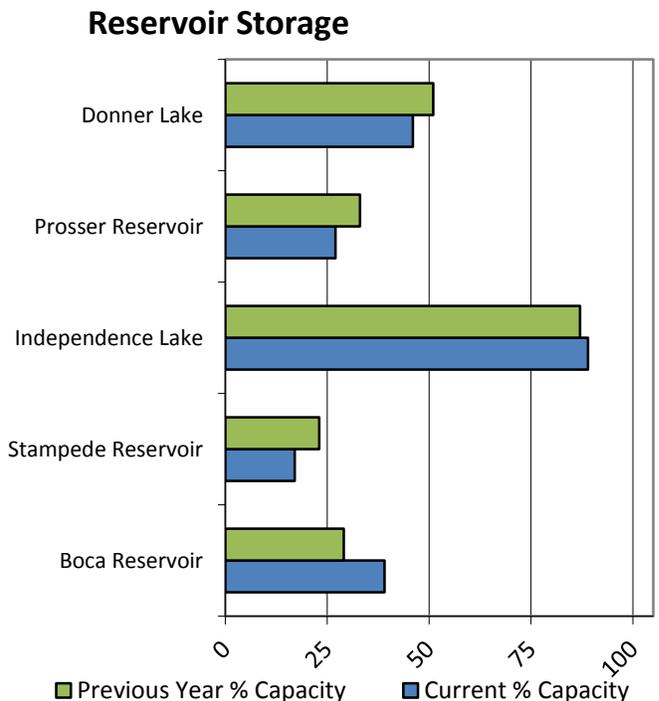
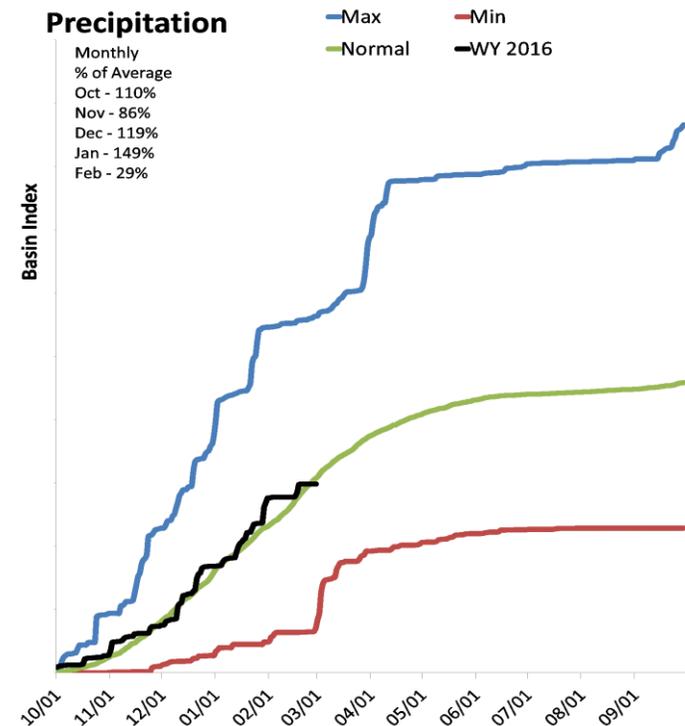
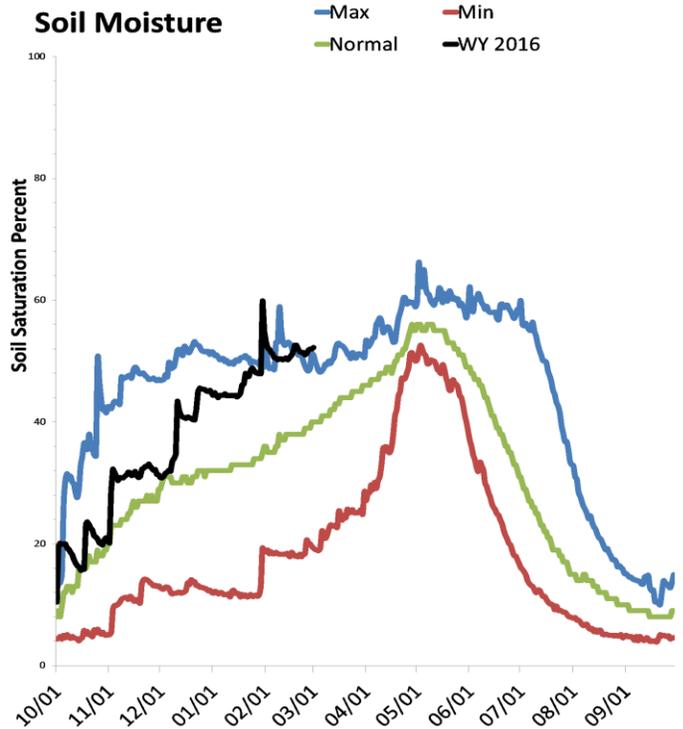
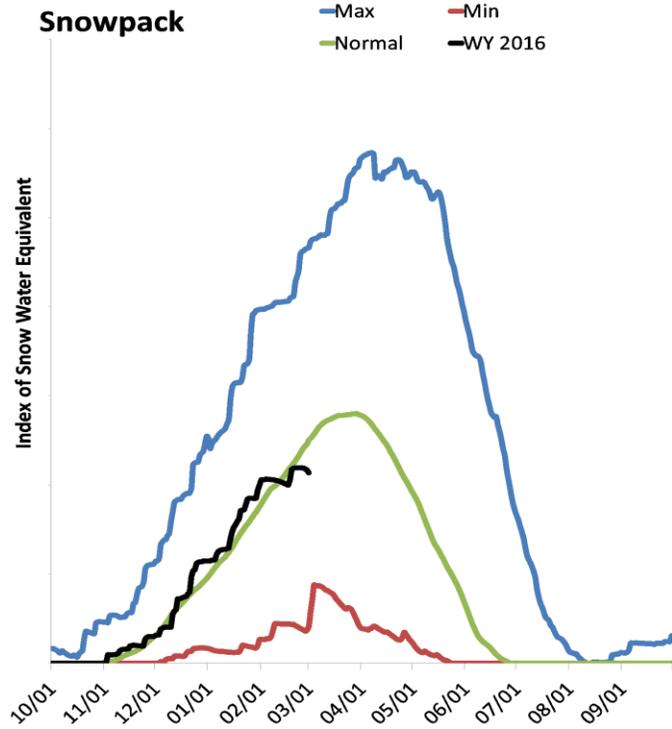
Reservoir Storage End of February, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Tahoe	0.0	0.0	296.7	744.6
Marlette Lk nr Carson City, NV	11.3	11.1	11.8	11.8
Basin-wide Total	11.3	11.1	308.5	756.4
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
Lake Tahoe Basin	16	96%	23%

Truckee River Basin

3/1/2016

Snowpack in the Truckee River Basin is below normal at 89% of median, compared to 32% last year. Precipitation in February was much below average at 29%, which brings the seasonal accumulation (Oct-Feb) to 97% of average. Soil moisture is 52% compared to 48% last year. Combined reservoir storage is 25% of capacity, compared to 29% last year. Forecast streamflow volumes range from 83% to 102% of average.



Truckee River Basin Streamflow Forecasts - March 1, 2016

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

Truckee River Basin	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Sagehen Ck nr Truckee	MAR-JUL	3.1	4.3	5.3	83%	6.5	8.9	6.4
	APR-JUL	2.5	3.6	4.5	80%	5.7	8.1	5.6
L Truckee R ab Boca Reservoir ²	MAR-JUL	56	83	101	102%	119	146	99
	APR-JUL	60	73	85	101%	102	120	84
Truckee R at Farad ²	MAR-JUL	148	225	280	91%	330	410	307
	APR-JUL	170	210	235	92%	285	330	255
Galena Ck at Galena Ck State Pk	MAR-JUL	2.8	3.9	4.6	95%	5.3	6.4	4.85
	APR-JUL	2.4	3.5	4.2	96%	4.9	6	4.37
Steamboat Ck at Steamboat	MAR-JUL	2.4	4.7	7	89%	9.9	15.5	7.9
	APR-JUL	2.4	4.7	7	89%	9.9	15.5	7.9
Pyramid Lake Elevation Change ¹	LOW-HIGH	-2.3	0.3	1.2	71%	2.1	3.9	1.7

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

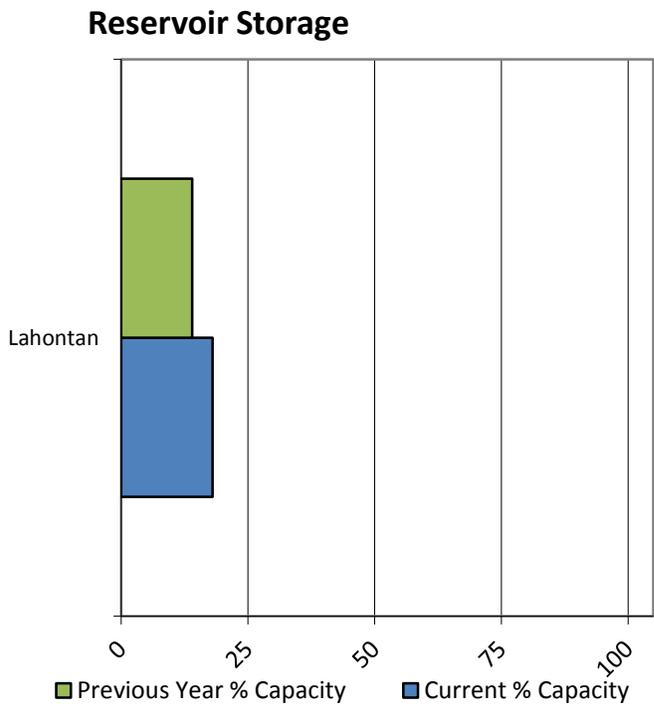
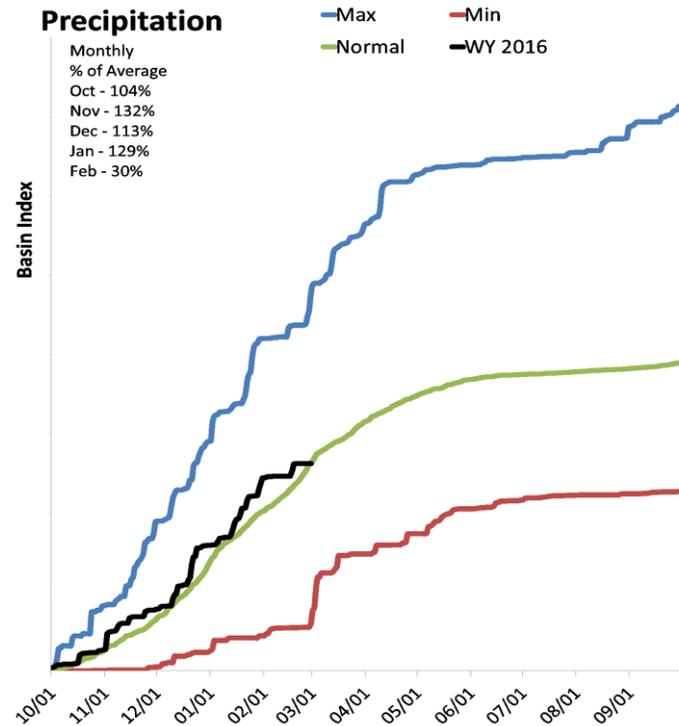
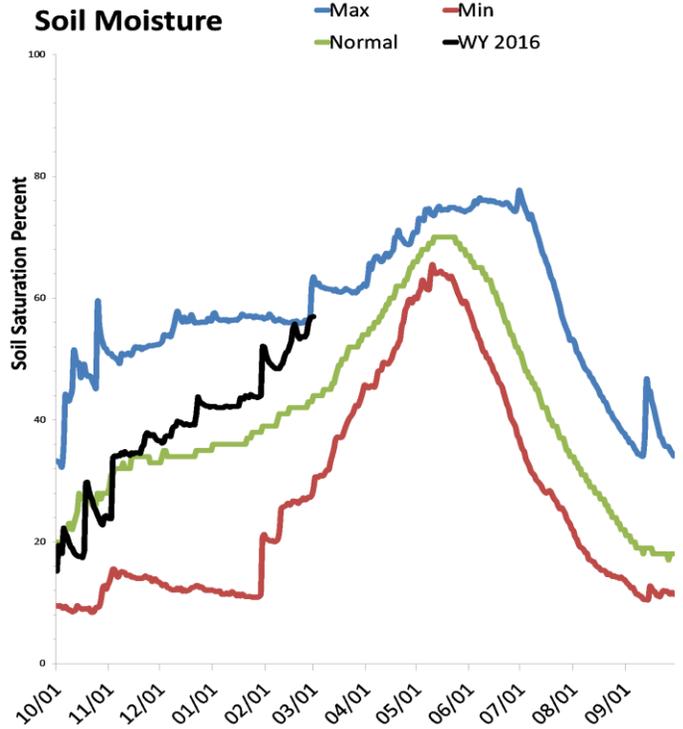
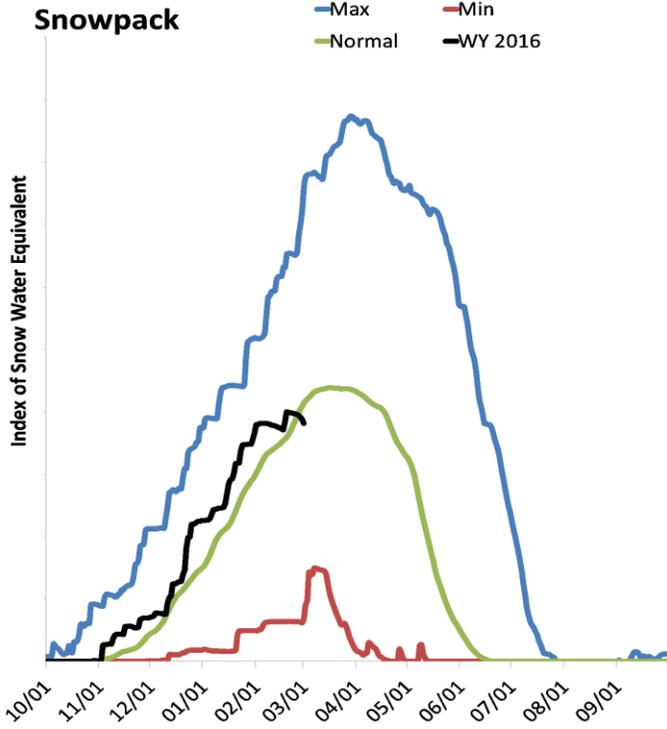
Reservoir Storage End of February, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Boca Reservoir	15.9	12.0	16.7	40.9
Donner Lake	4.3	4.9	3.7	9.5
Independence Lake	15.4	15.0	13.7	17.3
Prosser Reservoir	7.8	9.5	9.7	28.6
Stampede Reservoir	37.5	52.5	146.7	226.5
Basin-wide Total	81.0	93.8	190.5	322.8
# of reservoirs	5	5	5	5

Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
Truckee River Basin	13	89%	32%
Little Truckee River	5	89%	31%
Sagehen & Independence Creeks	3	81%	31%
Galena Creek	1	96%	52%
Steamboat Creek	1	96%	52%
Truckee River above Pyramid Lake	28	92%	27%

Carson River Basin

3/1/2016

Snowpack in the Carson River Basin is near normal at 93% of median, compared to 36% last year. Precipitation in February was much below average at 30%, which brings the seasonal accumulation (Oct-Feb) to 100% of average. Soil moisture is 57% compared to 50% last year. Storage in Lahontan Reservoir is 18% of capacity, compared to 14% last year. Forecast streamflow volumes range from 90% to 116% of average.



Carson River Basin Streamflow Forecasts - March 1, 2016

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

Carson River Basin	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
EF Carson R nr Gardnerville	MAR-JUL	91	147	185	90%	225	280	205
	APR-JUL	71	127	165	89%	205	260	186
	200 cfs	13 Jun	30 Jun	12 Jul		24 Jul	10 Aug	01 Jul
	500 cfs	24 May	09 Jun	19 Jun		29 Jun	15 Jul	25 Jun
WF Carson R nr Woodfords	MAR-JUL	36	52	63	107%	74	90	59
	APR-JUL	28	44	55	102%	66	82	54
Carson R nr Carson City	MAR-JUL	105	163	210	100%	265	350	210
	APR-JUL	81	135	180	101%	230	315	179
King Canyon Ck nr Carson City	MAR-JUL	0.02	0.25	0.44	116%	0.63	0.92	0.38
	APR-JUL	0.01	0.26	0.43	113%	0.6	0.85	0.38
Ash Canyon Ck nr Carson City	MAR-JUL	0.96	1.28	1.5	106%	1.72	2	1.41
	APR-JUL	0.72	1.01	1.2	107%	1.4	1.68	1.12
Carson R at Ft Churchill	MAR-JUL	107	157	200	100%	250	335	200
	APR-JUL	120	146	170	99%	210	260	171

- 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

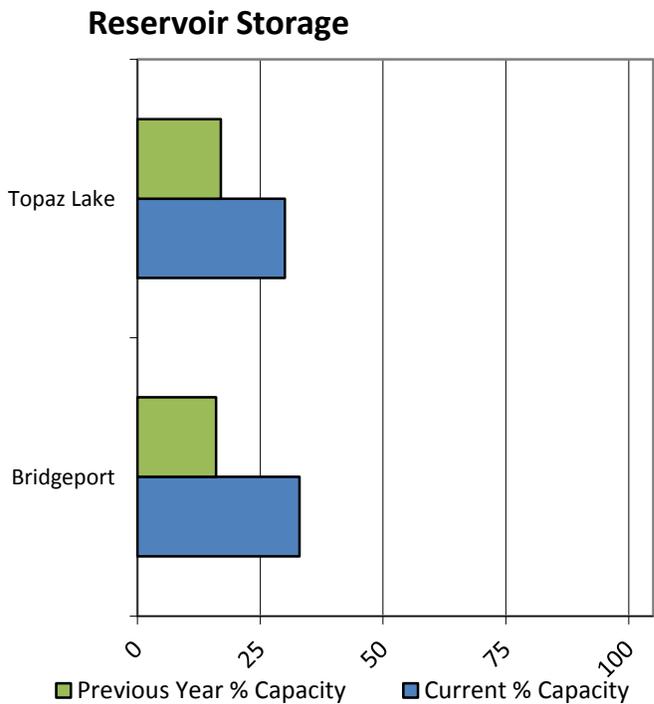
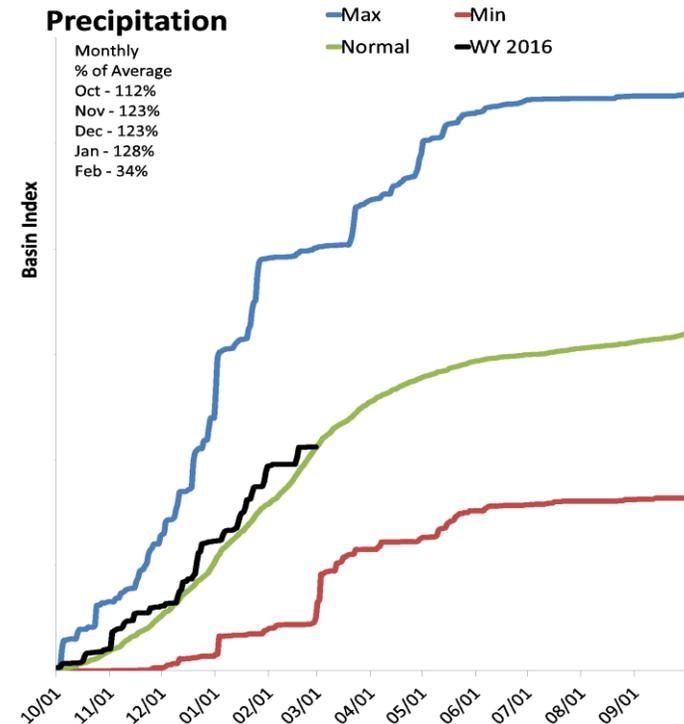
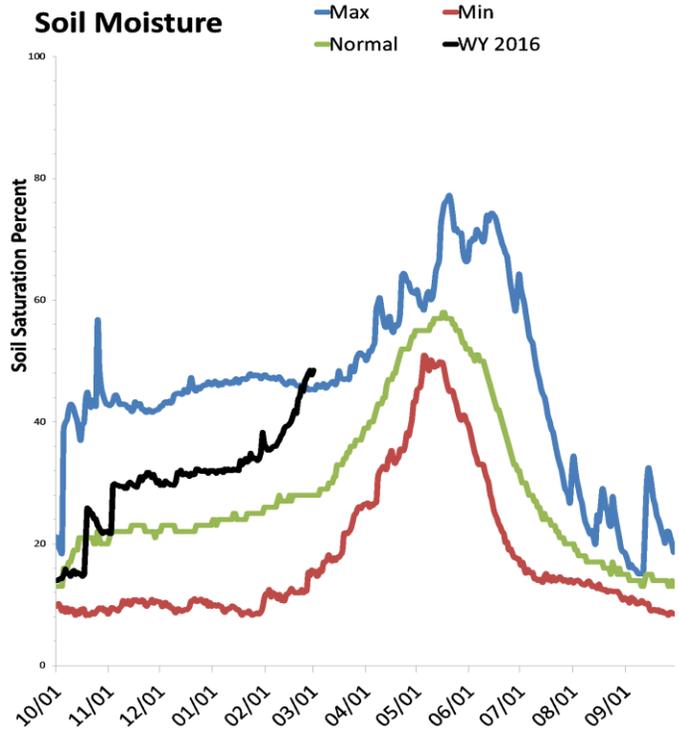
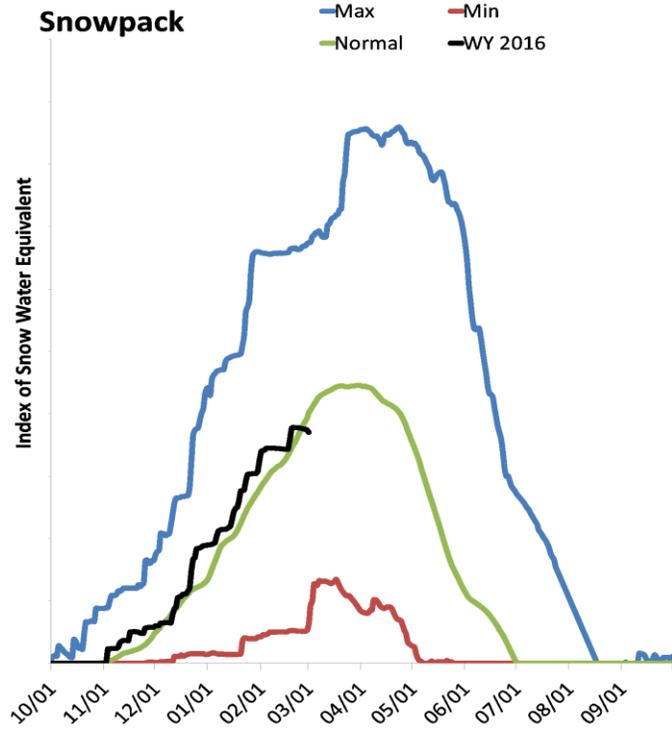
Reservoir Storage End of February, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lahontan Reservoir, NV	53.3	42.5	170.8	295.1
Basin-wide Total	53.3	42.5	170.8	295.1
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
Carson River Basin	11	93%	36%
East Fork Carson River	6	92%	37%
West Fork Carson River	8	96%	32%

Walker River Basin

3/1/2016

Snowpack in the Walker River Basin is near normal at 93% of median, compared to 39% last year. Precipitation in February was much below average at 34%, which brings the seasonal accumulation (Oct-Feb) to 100% of average. Soil moisture is 47% compared to 35% last year. Combined reservoir storage is 31% of capacity, compared to 16% last year. Forecast streamflow volumes range from 94% to 100% of average.



Walker River Basin Streamflow Forecasts - March 1, 2016

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

Walker River Basin	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
E Walker R nr Bridgeport ²	MAR-AUG	33	59	76	100%	93	119	76
	APR-AUG	31	53	68	101%	83	105	67
W Walker R bl L Walker nr Coleville	MAR-JUL	99	135	160	94%	185	220	170
	APR-JUL	90	126	150	93%	174	210	162
W Walker R nr Coleville	MAR-JUL	109	145	170	99%	195	230	172
	APR-JUL	95	131	155	95%	179	215	163
Walker Lake Elevation Change ¹	LOW-HIGH	-1.1	0.69	1.5	106%	2.3	4.1	1.41

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

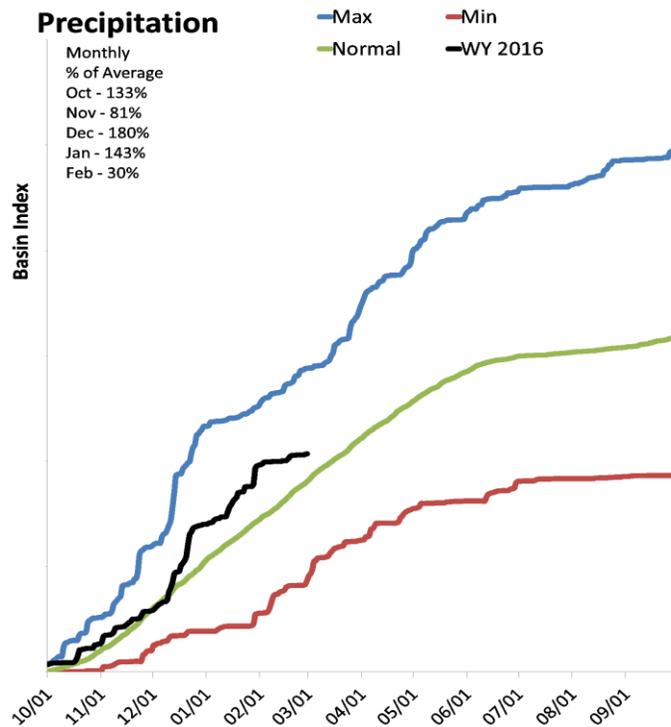
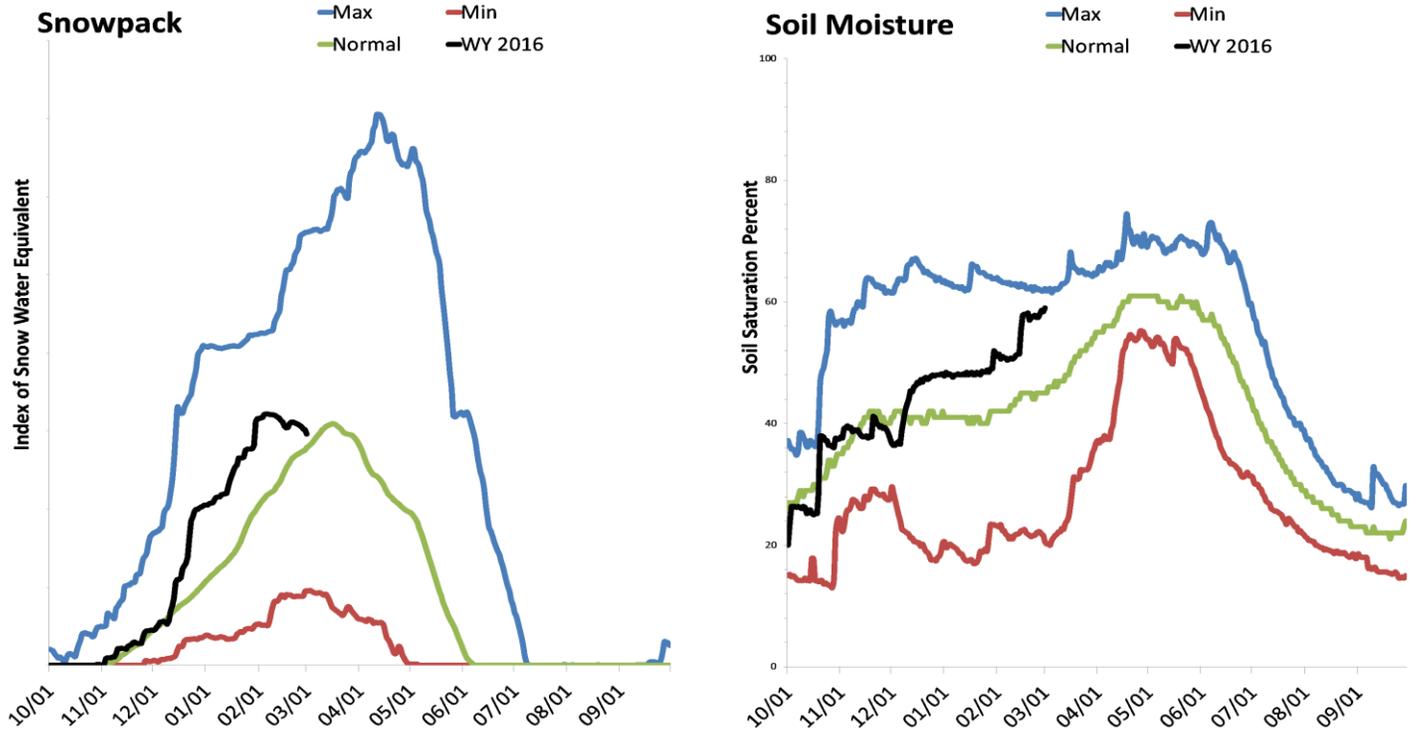
Reservoir Storage End of February, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Bridgeport Reservoir	13.9	6.7	24.4	42.5
Topaz Lk nr Topaz, CA	17.9	9.9	28.6	59.4
Basin-wide Total	31.8	16.6	53.0	101.9
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
Walker River Basin	8	93%	39%
East Walker River above Bridgeport	2	105%	32%
West Walker River above Coleville	6	92%	41%

Northern Great Basin

3/1/2016

Snowpack in the Northern Great Basin is near normal at 102% of median, compared to 31% last year. Precipitation in February was much below average at 29%, which brings the seasonal accumulation (Oct-Feb) to 114% of average. Soil moisture is 61% compared to 54% last year. Forecast streamflow volumes range from 88% to 97% of average.



Northern Great Basin Streamflow Forecasts - March 1, 2016

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

Northern Great Basin	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Davis Ck	APR-JUL	3600	5100	6400	88%	8100	11500	7233
	APR-SEP	4200	5800	7200	90%	9000	12400	7991
Bidwell Ck nr Fort Bidwell	APR-JUL	6.4	9.3	11.2	93%	13.1	16	12
Eagle Ck nr Eagleville	APR-JUL	1.01	2.8	4	93%	5.2	7	4.3
McDermitt Ck nr McDermitt	MAR-JUN	5.2	12.2	17	97%	22	29	17.5
	APR-JUL	3.7	9.4	13.2	94%	17	23	14

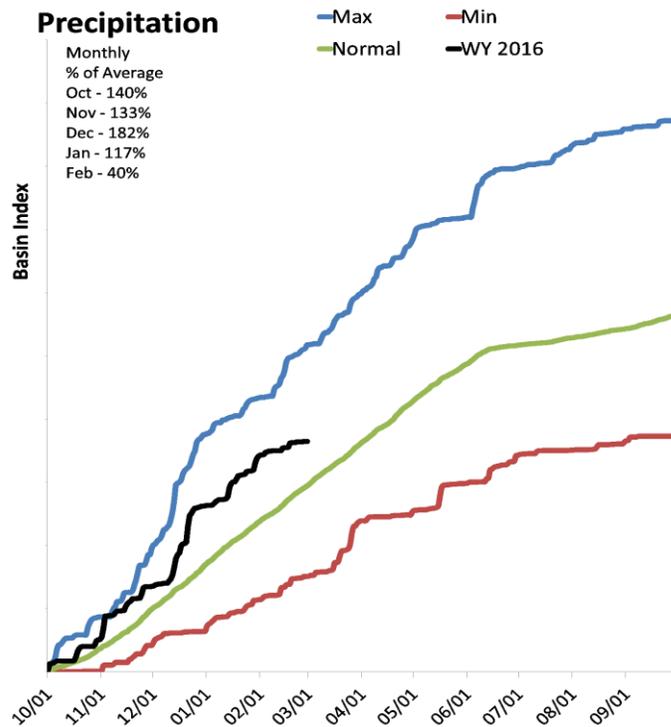
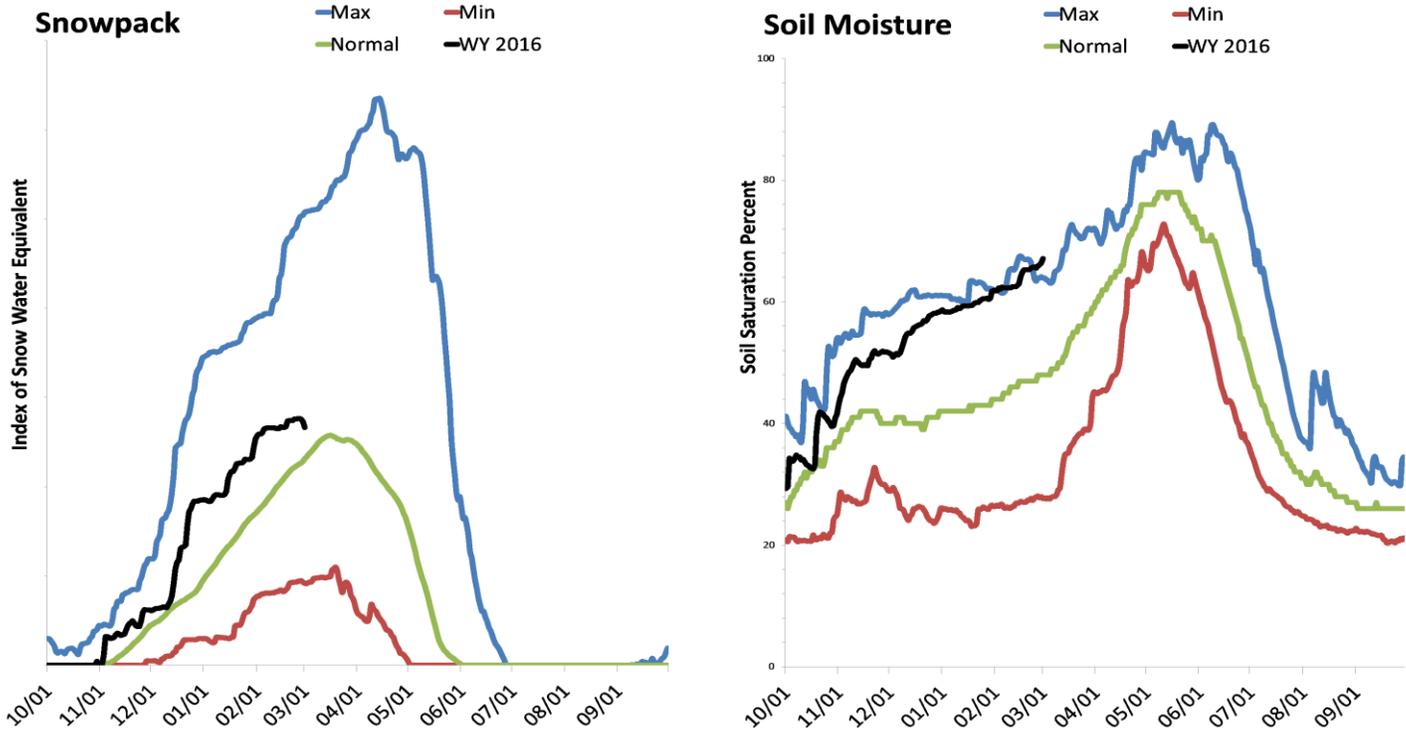
- 1) 90% and 10% exceedance probabilities are actually 95% and 5%
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- 3) Median value used in place of average

Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
Northern Great Basin	14	102%	31%
Surprise Valley - Warner Mtns	2	122%	45%
McDermitt Creek	3	74%	34%
Quinn River	8	94%	28%

Upper Humboldt River Basin

3/1/2016

Snowpack in the Upper Humboldt River Basin above Palisade is above normal at 116% of median, compared to 60% last year. Precipitation in February was much below average at 40%, which brings the seasonal accumulation (Oct-Feb) to 124% of average. Soil moisture is 67% compared to 62% last year. Forecast streamflow volumes range from 107% to 114% of average.



Upper Humboldt River Basin Streamflow Forecasts - March 1, 2016

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

Upper Humboldt River Basin	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Marys R nr Deeth	MAR-JUL	31	40	46	112%	52	61	41
	APR-JUL	23	33	40	111%	47	57	36
Lamoille Ck nr Lamoille	MAR-JUL	21	28	33	110%	38	45	30
	APR-JUL	19.4	26	31	107%	36	43	29
NF Humboldt R at Devils Gate	MAR-JUL	26	39	48	109%	57	70	44
	APR-JUL	11.5	26	36	106%	46	61	34
Humboldt R nr Elko	MAR-JUL	109	163	200	110%	237	291	182
	APR-JUL	77	131	168	109%	205	259	154
SF Humboldt R at Dixie	MAR-JUL	32	62	82	114%	102	132	72
	APR-JUL	27	55	74	112%	93	121	66
Humboldt R nr Carlin	MAR-JUL	210	265	300	109%	335	390	274
	APR-JUL	159	215	255	107%	295	350	238
Humboldt R at Palisade	MAR-JUL	183	245	290	107%	335	395	270
	APR-JUL	133	197	240	107%	285	345	225

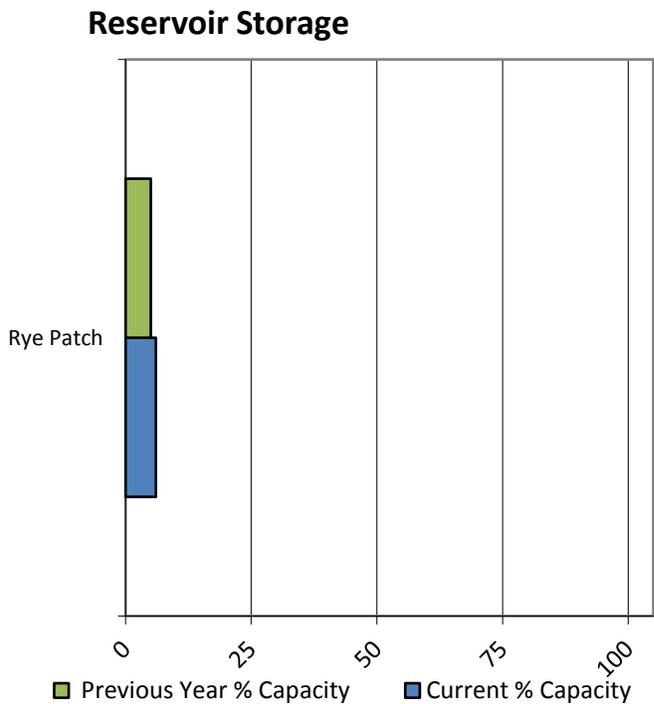
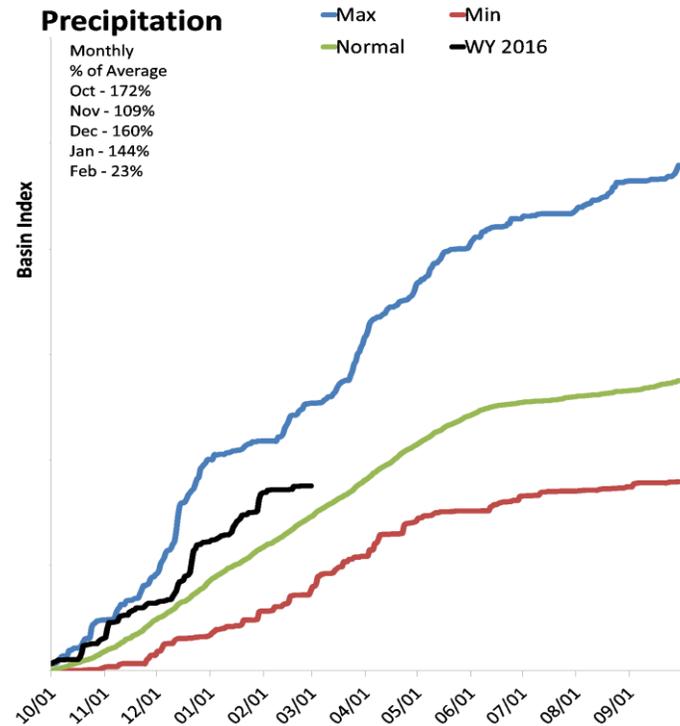
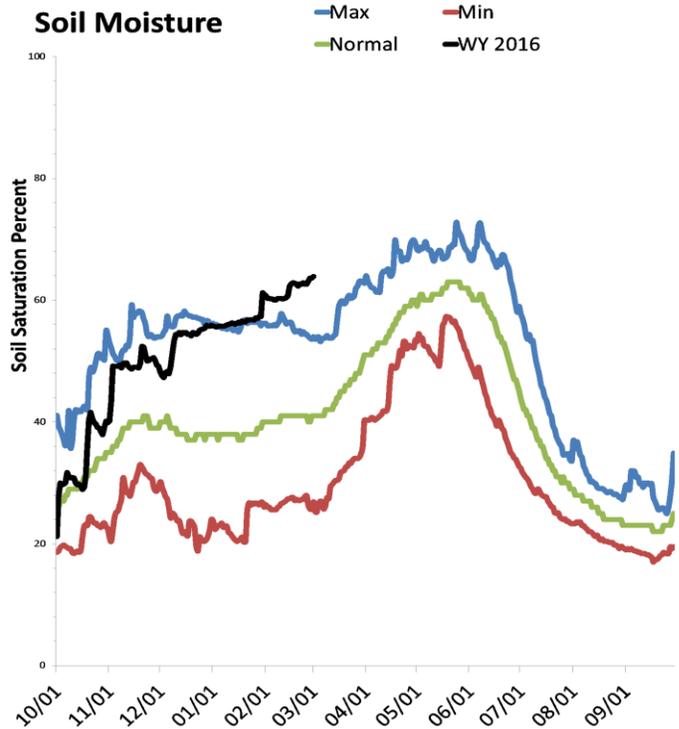
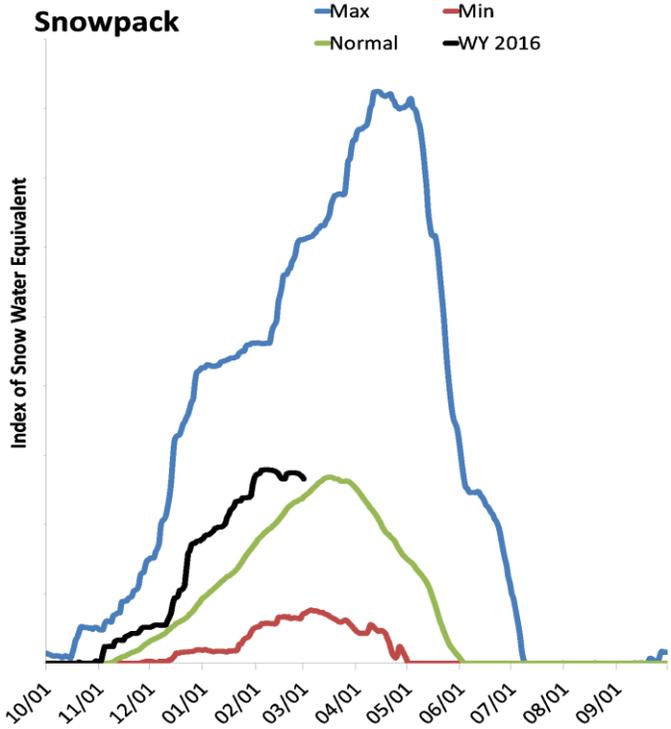
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Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
Upper Humboldt River Basin	24	116%	60%
Mary's River	5	117%	61%
Lamoille Creek	3	111%	62%
North Fork Humboldt River	5	120%	34%
South Fork Humboldt River	5	136%	58%

Lower Humboldt River Basin

3/1/2016

Snowpack in the Lower Humboldt River Basin below Palisade is above normal at 113% of median, compared to 34% last year. Precipitation in February was much below average at 22%, which brings the seasonal accumulation (Oct-Feb) to 120% of average. Soil moisture is 61% compared to 51% last year. Storage in Rye Patch Reservoir is 6% of capacity, compared to 5% last year. Forecast streamflow volumes range from 88% to 107% of average.



Lower Humboldt River Basin Streamflow Forecasts - March 1, 2016

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

Lower Humboldt River Basin	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Rock Ck nr Battle Mtn	MAR-JUL	19.4	25	29	107%	33	39	27
	APR-JUL	12.6	16.4	19	104%	22	25	18.2
Humboldt R at Comus	MAR-JUL	123	205	260	102%	315	395	255
	APR-JUL	92	163	210	98%	260	330	215
L Humboldt R nr Paradise	MAR-JUL	0.53	5.8	10.2	97%	14.6	21	10.5
	APR-JUL	0.58	5.4	9.6	99%	13.9	20	9.7
Martin Ck nr Paradise	MAR-JUL	8	16.9	23	105%	29	38	22
	APR-JUL	3.3	12.1	18	103%	24	33	17.5
Humboldt R nr Imlay	MAR-JUL	13.2	121	195	88%	270	375	222
	APR-JUL	-4.4	96	165	88%	235	335	188

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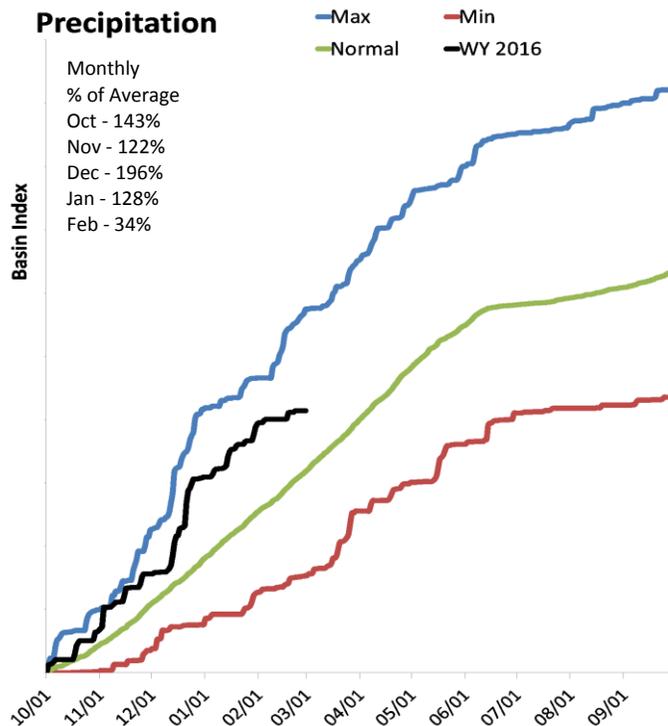
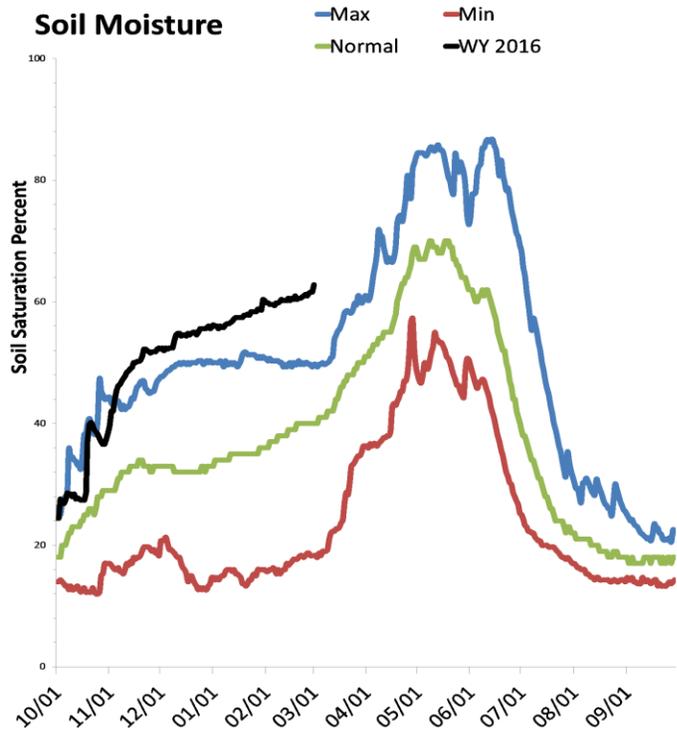
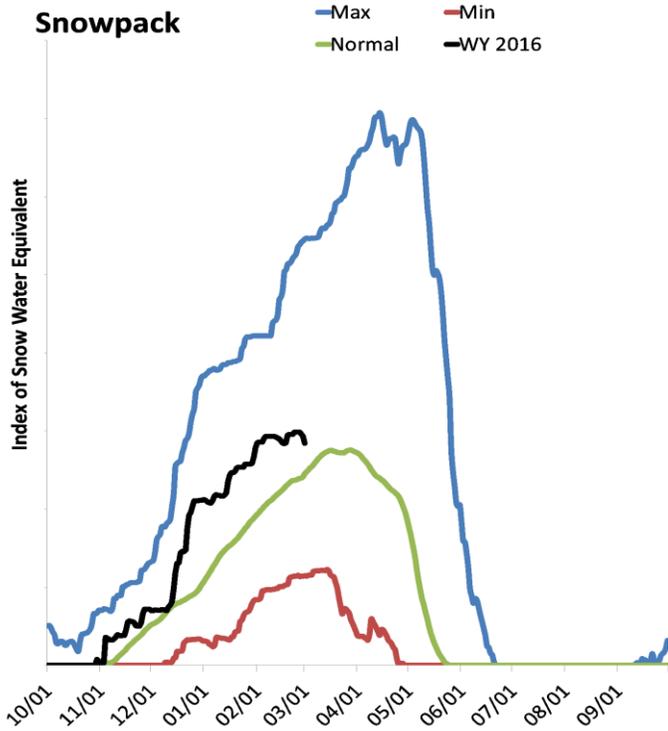
Reservoir Storage End of February, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Rye Patch Re nr Rye Patch, NV	10.9	9.7	76.7	194.3
Basin-wide Total	10.9	9.7	76.7	194.3
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
Lower Humboldt River Basin	7	113%	34%
Rock Creek	1	143%	0%
Reese River	2	127%	32%
Martin Creek	3	101%	29%
Little Humboldt River	5	107%	35%
Humboldt River above Imlay	31	116%	54%

Clover Valley & Franklin River Basin

3/1/2016

Snowpack in the Clover Valley and Franklin River Basin is above normal at 113% of median, compared to 70% last year. Precipitation in February was much below average at 34%, which brings the seasonal accumulation (Oct-Feb) to 126% of average. Soil moisture is 63% compared to 52% last year. The forecast streamflow volume for the Franklin River is 101% of average.



ATTENTION WATER USERS:

On December 23, 2015 Hole-in-Mountain SNOTEL was destroyed by an avalanche. That site's data has been removed from the graphs in this report. As such graphs in this report are based the remaining sites listed in the update report. Snow surveyors will continue to visit the Hole-in-Mountain location to make manual snow tube measurements to allow data editors to estimate first of month snow. First of month precipitation will be estimated using statistical relationships with nearby sites. These estimates are reflected in data presented in the paragraph above and the following page's snowpack analysis. Hole-in-Mountain SNOTEL will hopefully be relocated next summer to a safer location and new averages will be developed in the coming years.

Clover Valley & Franklin River Basin Streamflow Forecasts - March 1, 2016

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

Clover Valley & Franklin River Basin	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Franklin Ck nr Arthur	APR-JUL	5	6.2	7	101%	7.8	9	6.9

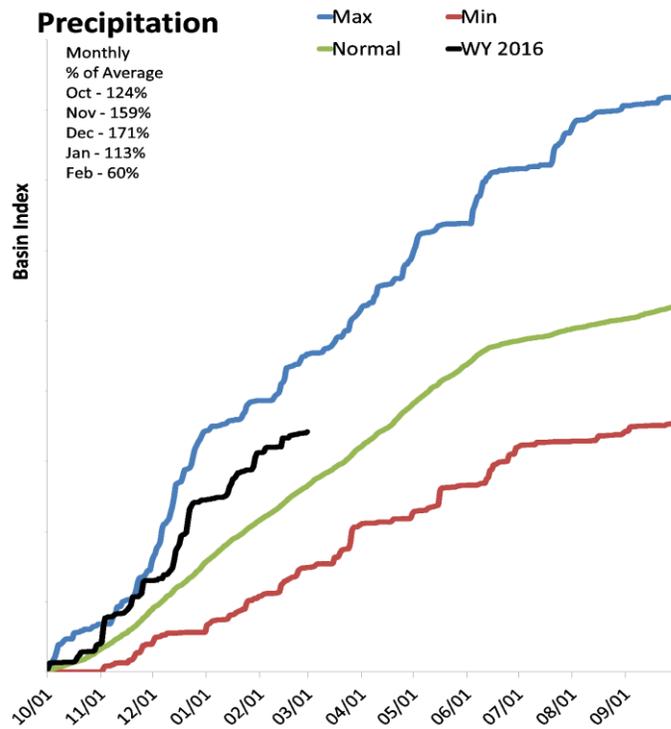
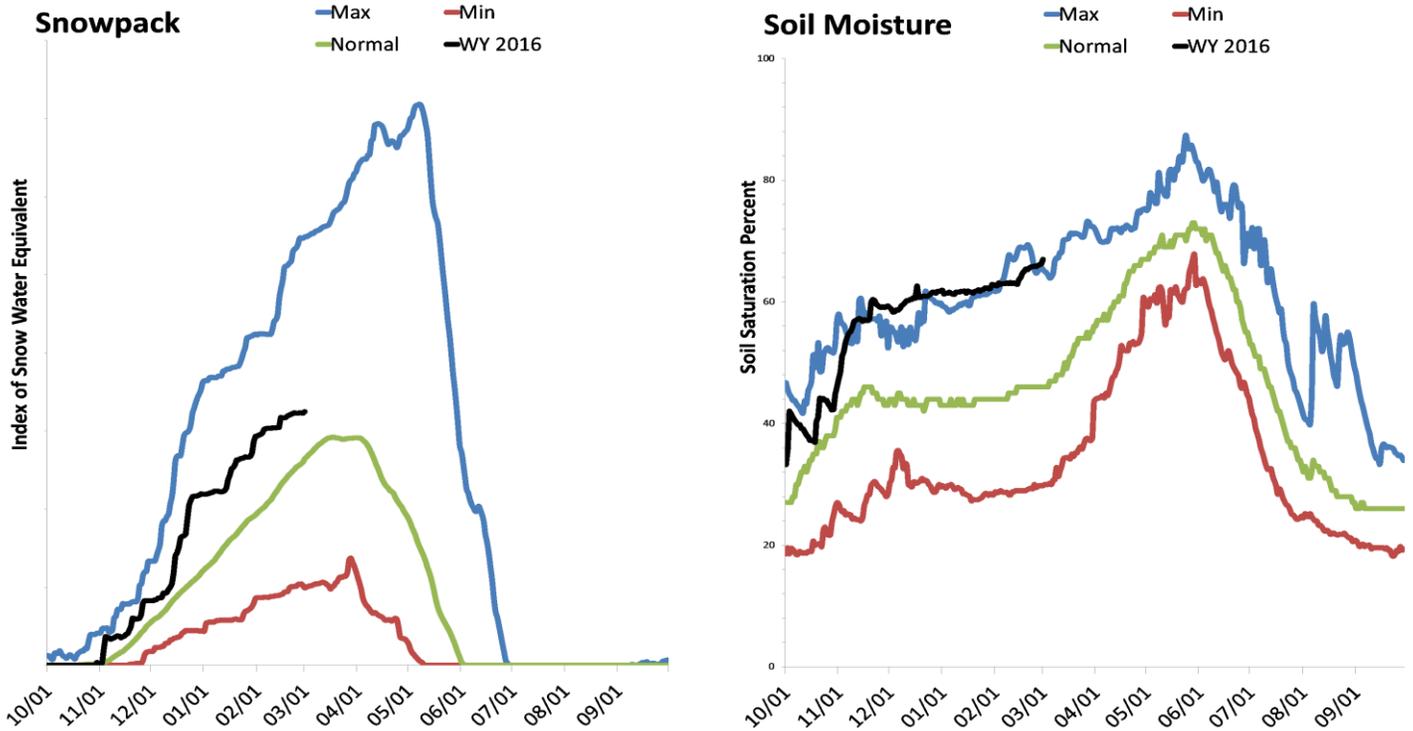
- 1) 90% and 10% exceedance probabilities are actually 95% and 5%
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- 3) Median value used in place of average

Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
Clover Valley & Franklin River Basin	8	113%	70%
Clover Valley	4	102%	65%
Franklin River	7	116%	70%

Snake River Basin

3/1/2016

Snowpack in the Snake River Basin is above normal at 123% of median, compared to 62% last year. Precipitation in February was much below average at 61%, which brings the seasonal accumulation (Oct-Feb) to 129% of average. Soil moisture is 63% compared to 58% last year. The forecast streamflow volume for Salmon Falls Creek is 125% of average.



Snake River Basin Streamflow Forecasts - March 1, 2016

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

Snake River Basin	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Salmon Falls Ck nr San Jacinto	MAR-JUL	68	87	101	125%	116	141	81
	MAR-SEP	71	90	105	124%	121	146	85

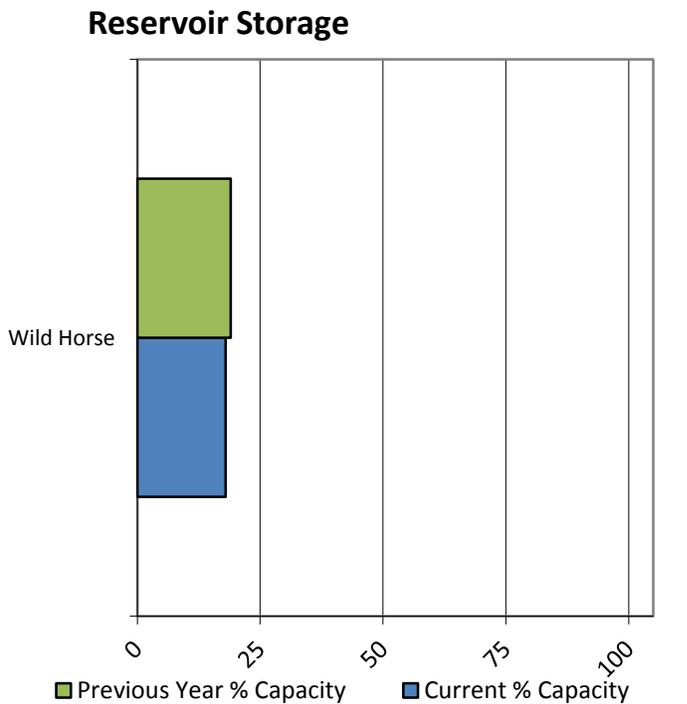
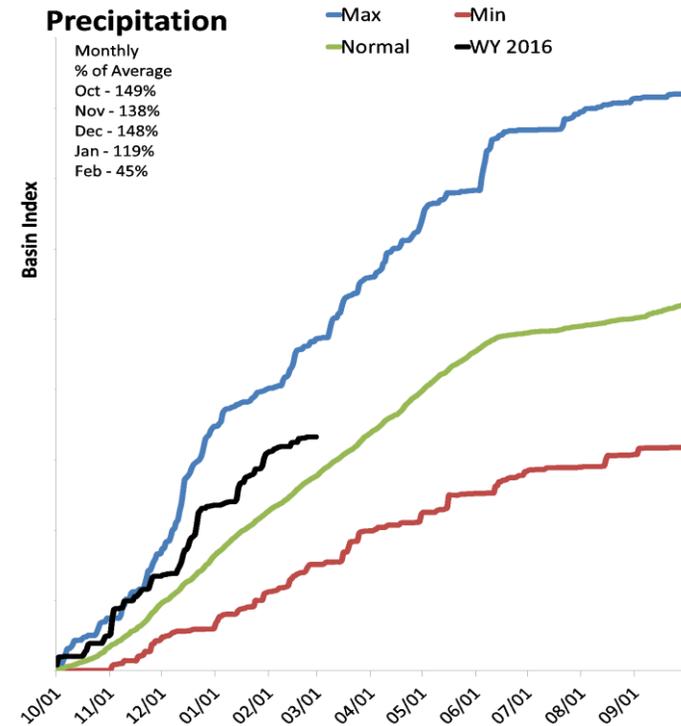
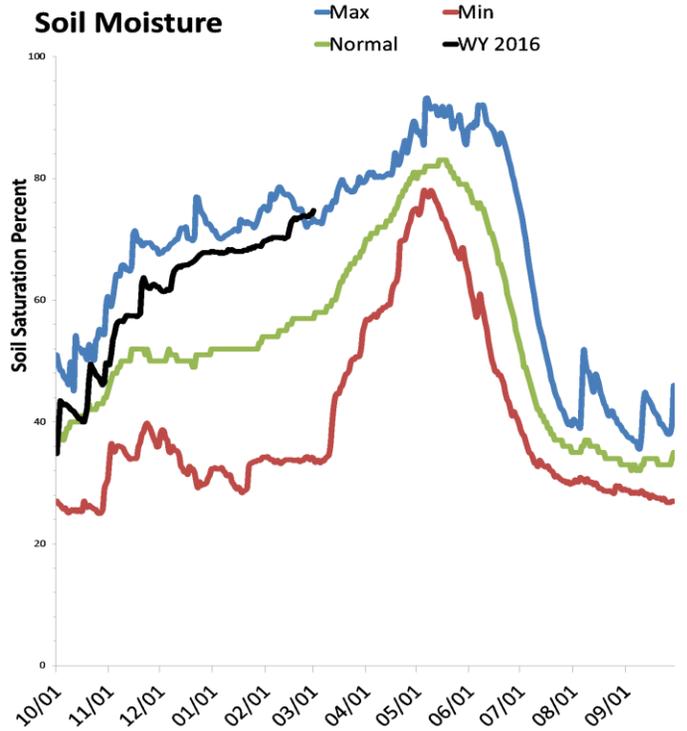
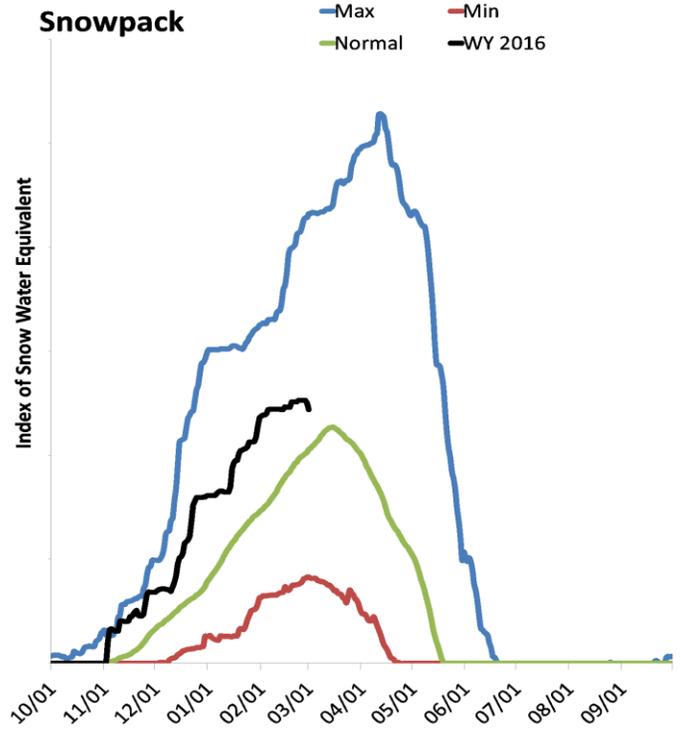
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Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
Snake River Basin	13	123%	62%
Bruneau River	8	122%	58%
Jarbidge River	3	123%	78%
Salmon Falls Creek	8	127%	74%

Owyhee River Basin

3/1/2016

Snowpack in the Owyhee River headwaters is near normal at 109% of median, compared to 32% last year. Precipitation in February was much below average at 45%, which brings the seasonal accumulation (Oct-Feb) to 120% of average. Soil moisture is 73% compared to 71% last year. Storage in Wildhorse Reservoir is 18% of capacity, compared to 19% last year. The forecast streamflow volume for the Owyhee River near Gold Creek is 139% of average.



Owyhee River Basin Streamflow Forecasts - March 1, 2016

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

Owyhee River Basin	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Owyhee R nr Gold Ck ²	MAR-JUL	23	32	39	139%	47	60	28
	MAR-SEP	23	30	36	133%	43	54	27
	APR-JUL	12.8	22	31	141%	42	62	22

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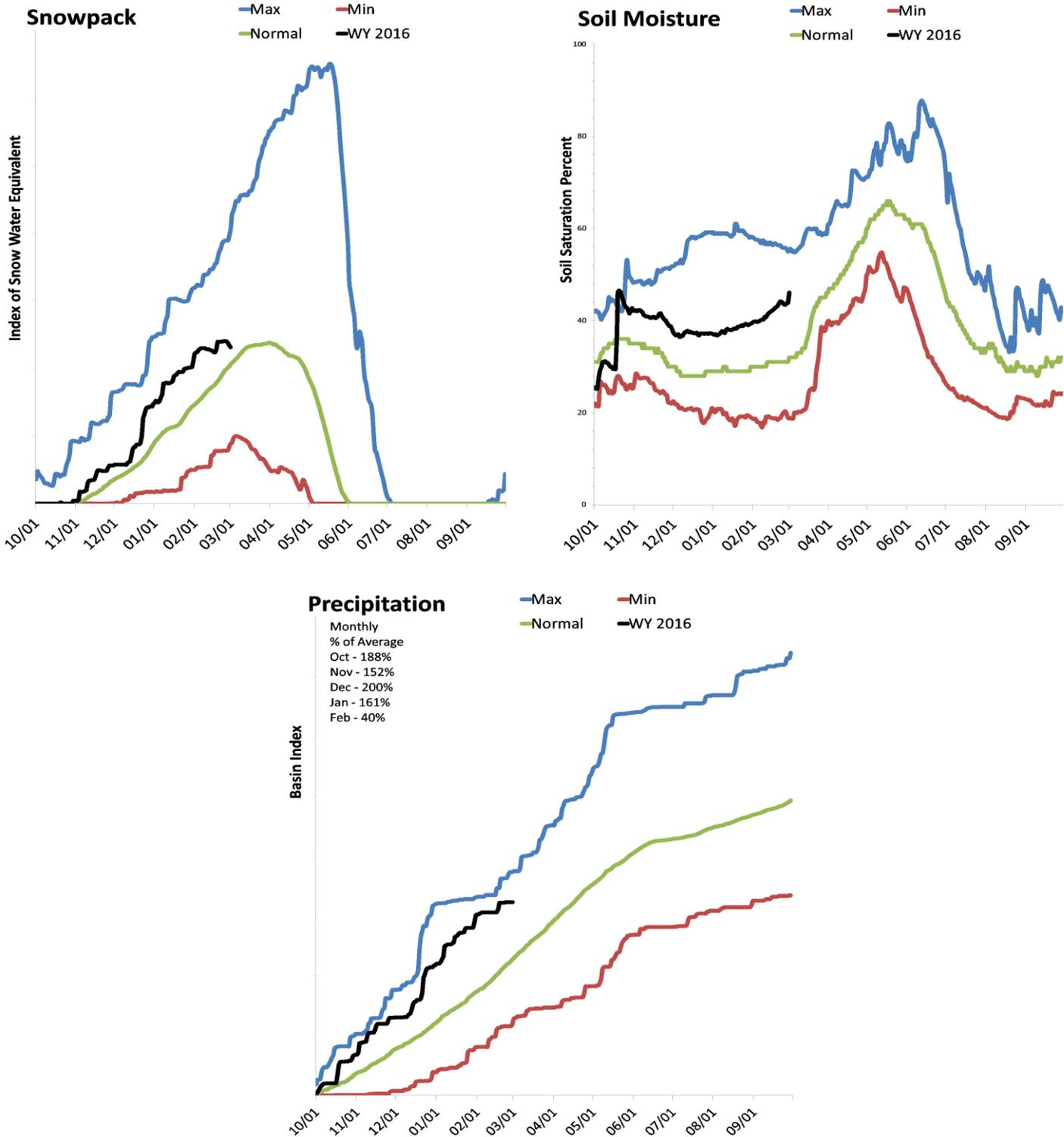
Reservoir Storage End of February, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Wild Horse Reservoir	12.9	13.5	34.5	71.5
Basin-wide Total	12.9	13.5	34.5	71.5
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
Owyhee River Basin	10	109%	32%
Owyhee River above Owyhee	8	108%	35%
Owyhee River above Gold Creek	4	111%	39%
South Fork Owyhee River	3	113%	37%

Eastern Nevada

3/1/2016

Snowpack in Eastern Nevada is above normal at 110% of median, compared to 39% last year. Precipitation in February was much below average at 40%, which brings the seasonal accumulation (Oct-Feb) to 142% of average. Soil moisture is 48% compared to 29% last year. Forecast streamflow volumes range from 114% to 120% of average.



**Eastern Nevada
Streamflow Forecasts - March 1, 2016**

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

Eastern Nevada	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Kingston Ck nr Austin	APR-JUL	0.22	2.5	4.2	117%	5.9	8.5	3.6
Steptoe Ck nr Ely	APR-JUL	1.91	2.7	3.2	119%	3.7	4.5	2.7
Cleve Ck nr Ely	APR-JUL	2.6	4.2	5.3	120%	6.4	8	4.41
Lehman Ck nr Baker	APR-JUL	1.05	2.3	3.1	114%	3.9	5.1	2.72

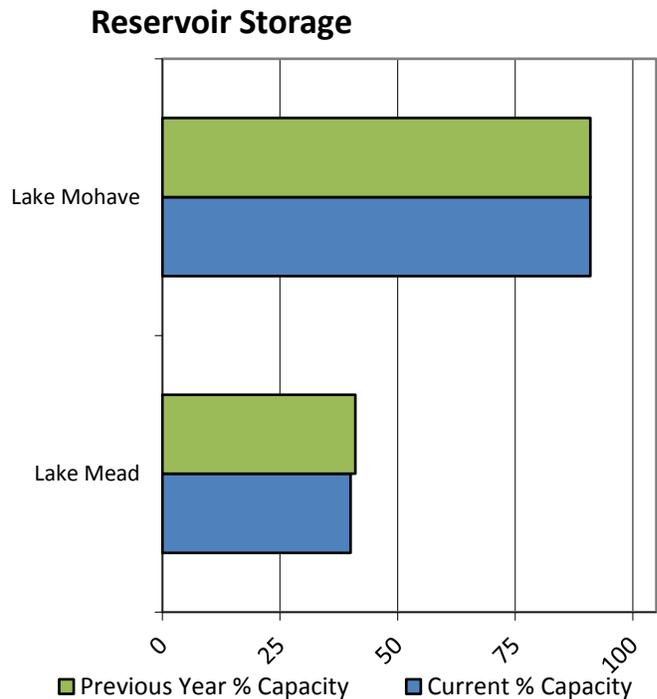
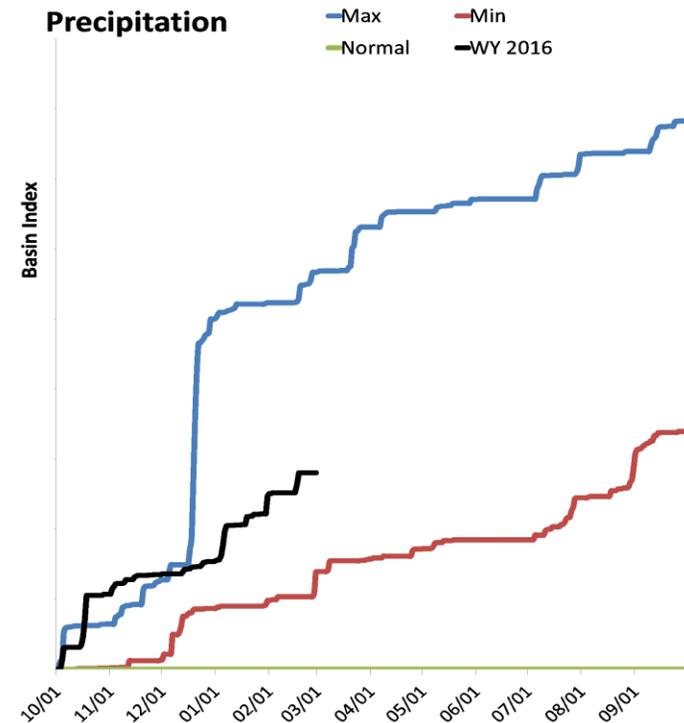
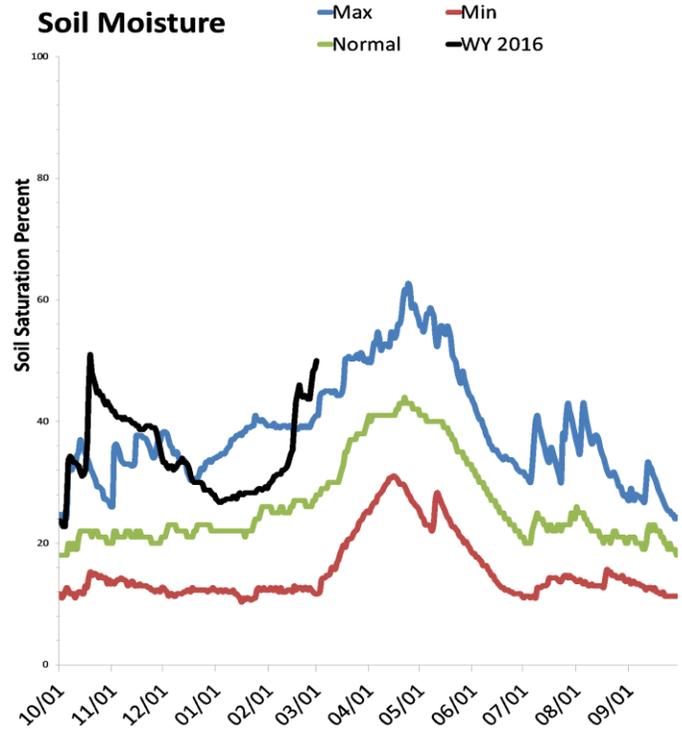
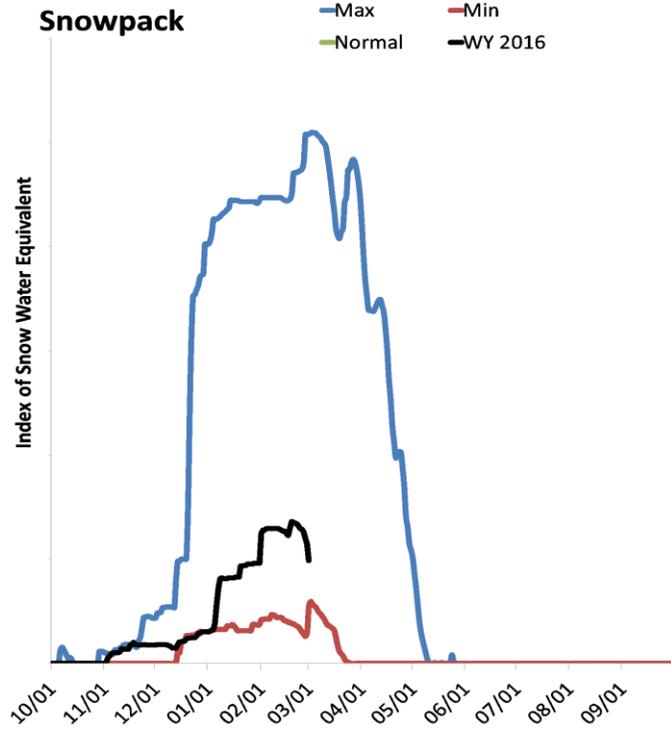
- 1) 90% and 10% exceedance probabilities are actually 95% and 5%
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Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
Eastern Nevada	13	110%	39%
Kingston Creek	1	133%	50%
Steptoe Valley	5	113%	43%
Baker & Lehman Creeks	3	94%	43%

Spring Mountains & Southern Nevada

3/1/2016

The snowpack in the Spring Mountains is much below normal at 54% of median, compared to 19% last year. The average snow water content at SNOTEL sites in the Spring Mountains is 4.9 inches. Precipitation in February averaged 1.7 in, which brings the seasonal accumulation (Oct-Feb) to 14in. Soil moisture is 50% compared to 37% last year. Storage in Lake Mead is 40% of capacity, compared to 41% last year, while Lake Mohave storage is 91% of capacity, compared to 91% last year. Streamflow forecasts range from 77% to 92% of average for the Virgin River and Lake Powell inflow.



**SNOTEL sites in the Spring Mtns were installed in June 2008. Due to the short record snowpack and precipitation normals are not presented. Max and Min lines are based on water years 2009-2015, same goes for the soil moisture normal line.

Spring Mountains & Southern Nevada Streamflow Forecasts - March 1, 2016

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

Spring Mountains & Southern Nevada	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Virgin R nr Hurricane	APR-JUL	22	40	56	89%	74	106	63
Virgin R at Littlefield	APR-JUL	21	42	60	92%	81	118	65
Lake Powell Inflow ²	APR-JUL	3210	4500	5500	77%	6600	8410	7160

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Reservoir Storage End of February, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Mead	10360.0	10768.0	20575.0	26159.0
Lake Mohave	1647.0	1655.0	1673.0	1810.0
Basin-wide Total	12007.0	12423.0	22248.0	27969.0
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
Spring Mountains	2	54%	19%
White River	4	109%	39%
Virgin River	8	88%	57%
Colorado R above Glen Canyon Dam	105	96%	82%



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NRCS National Water and Climate Center

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