

Spring Water Supply and Weather Outlook

How about that near Miracle March?

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NWS Reno 4.10.18



Out the Window

March and early April have been Boom not Bust

Key Points Up Front

- ★ Wet and Cool March was second only to March 1991 for water supply recovery.
- ★ High soil moisture, and recent high flows will aid in efficient runoff.
- ★ Next 1-2 weeks cool and unsettled weather will add some new snow and delay major melt. Melt likely to kick up towards end of the month.
- ★ May into early summer - wildcard. No clear picture on weather scenarios. "Look out the window forecasts".
- ★ Flood potential from any large, warm atmospheric river rain events is still present, but probability getting lower. Snowmelt flood risk is low. Fire season could be quite busy again. Hydrologic impacts for flash flooding.



Buckland Station Ft. Churchill 4/9/17

Weather Outlook

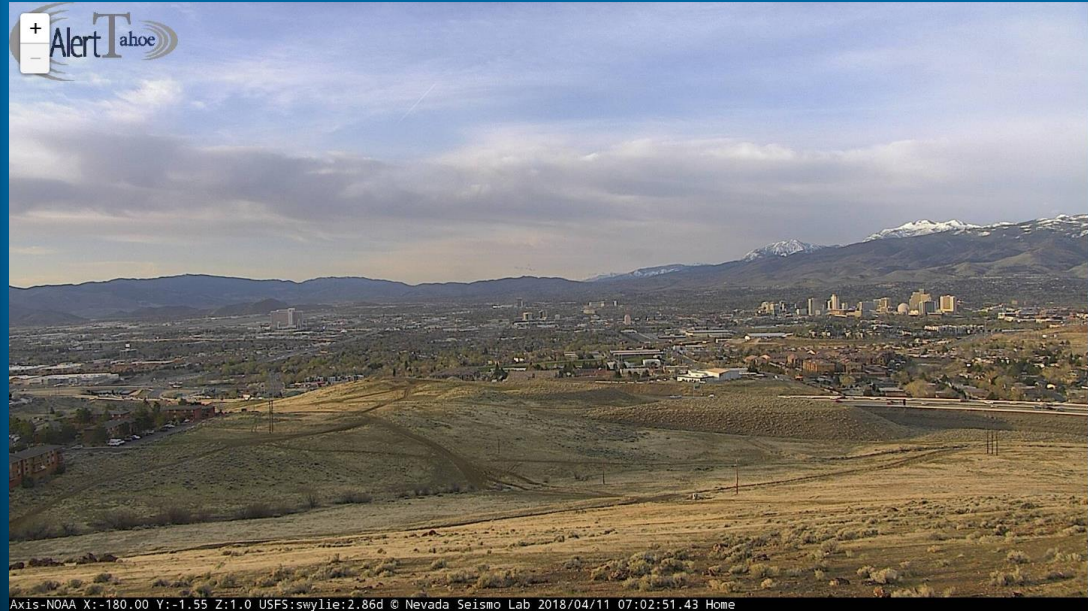


Out the Window

Gusty Winds Today with rain & snow

Highlights for April 11

- ★ **Strong Winds Continue Today:** Gusts 40-60 mph. Confidence is high.
- ★ **This evening and early Thursday AM:** Snow over the Sierra passes and rain/snow for northeast CA, with travel impacts. Snow possible down to the western NV valley floors, but accumulations look limited to trace amounts.
- ★ **Chilly Thursday:** Cold post spring storm day with temperatures 30s & 40s.
- ★ **Warm and Dry Fri - Sat**
- ★ **Cold System Sun - Mon:** Windy Sunday afternoon, rain and snow Sun PM into Mon.



Situational Awareness - When Should I Freakout?

Chris' 7-Day Regional Freakout Forecast for the Sierra and western Nevada

	Wed 4/11	Thu 4/12	Fri 4/13	Sat 4/14	Sun 4/15	Mon 4/16	Tue 4/17	W2 4/18-24
Wind (travel, rec, property impacts)	SW gusts 40-60 mph. Peak speeds during PM hours	Chilly NW winds. Gusts to 40 mph.	Light winds		Windy again PM	Decreasing winds	Light for now	No heavy precipitation signals, but another spring system possible April 18-19. Remain vigilant for flood, snow, wind hazards.
Snow (travel, rec, property impacts)	Wed PM to Thu AM. Accumulations in the Sierra and northeast CA with travel impacts. Very light accumulations not out of the question for western NV				Sierra snow and rain/snow western NV and northeast CA late Sunday PM and early Monday. Could be a slow commute.			
Flooding (of any kind)	High flows, some flooding along Truckee River due to Tahoe releases.		High flows to continue, but with low snow levels new flooding unlikely.					
Thunderstorms (lightning, strong outflow winds, hail)	None		Can't rule out a lightning strike or two	No chance		Very low probability		
Unusual Cold or Heat	Warm and windy	Shock to the system. 30s and 40s	Seasonable			Cooling down again 40s/50s		On the cool side.
Fire Weather	Nothing of note. Lots of small grass and flower growth out there already!							Green-up
Air Quality	Very good to excellent mixing each day.							Nada.

What Does This Mean?

Integrates impacts and confidence

No worries



Low freakoutness



Moderate freakoutness



High freakoutness



Really bad

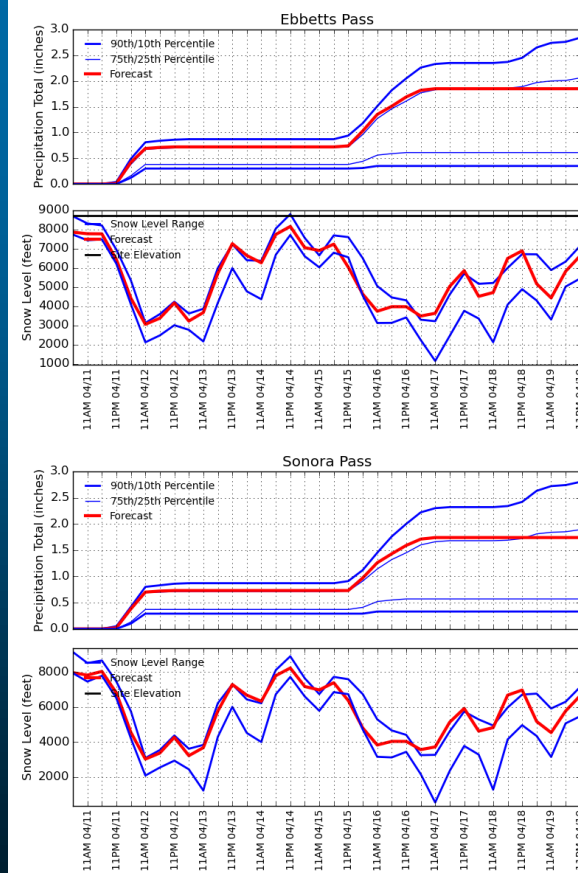
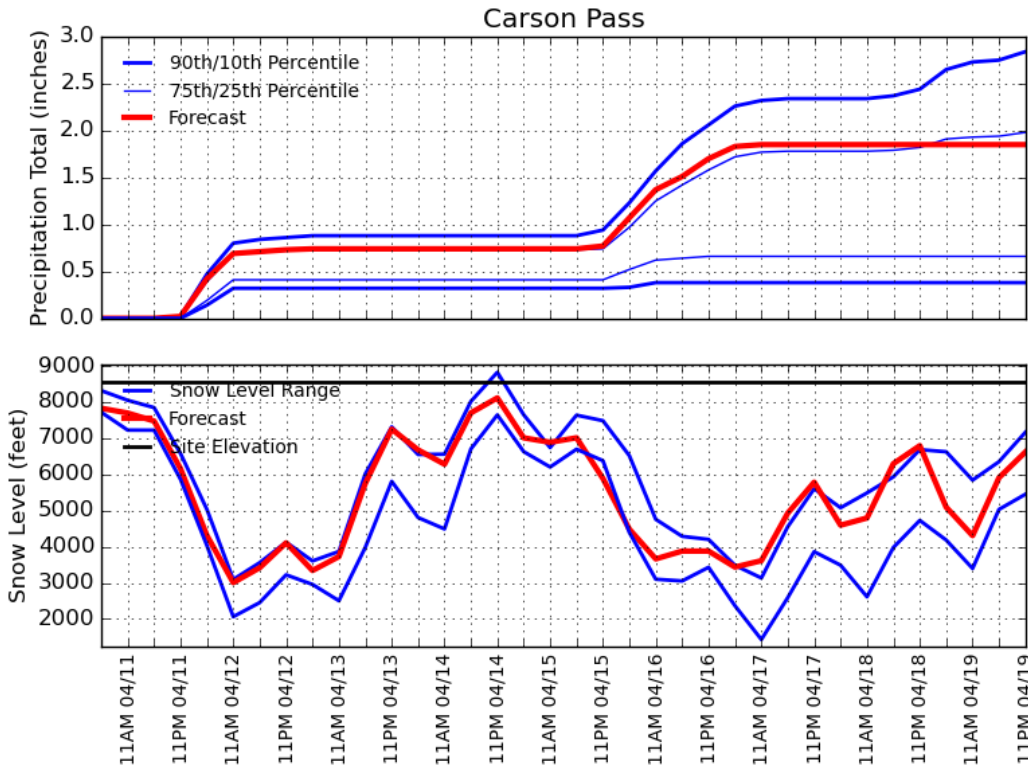


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Forecasting for the Sierra and western Nevada since 1905



10 Day Scenarios Trending Cold Mid Week, Lots of Variability!

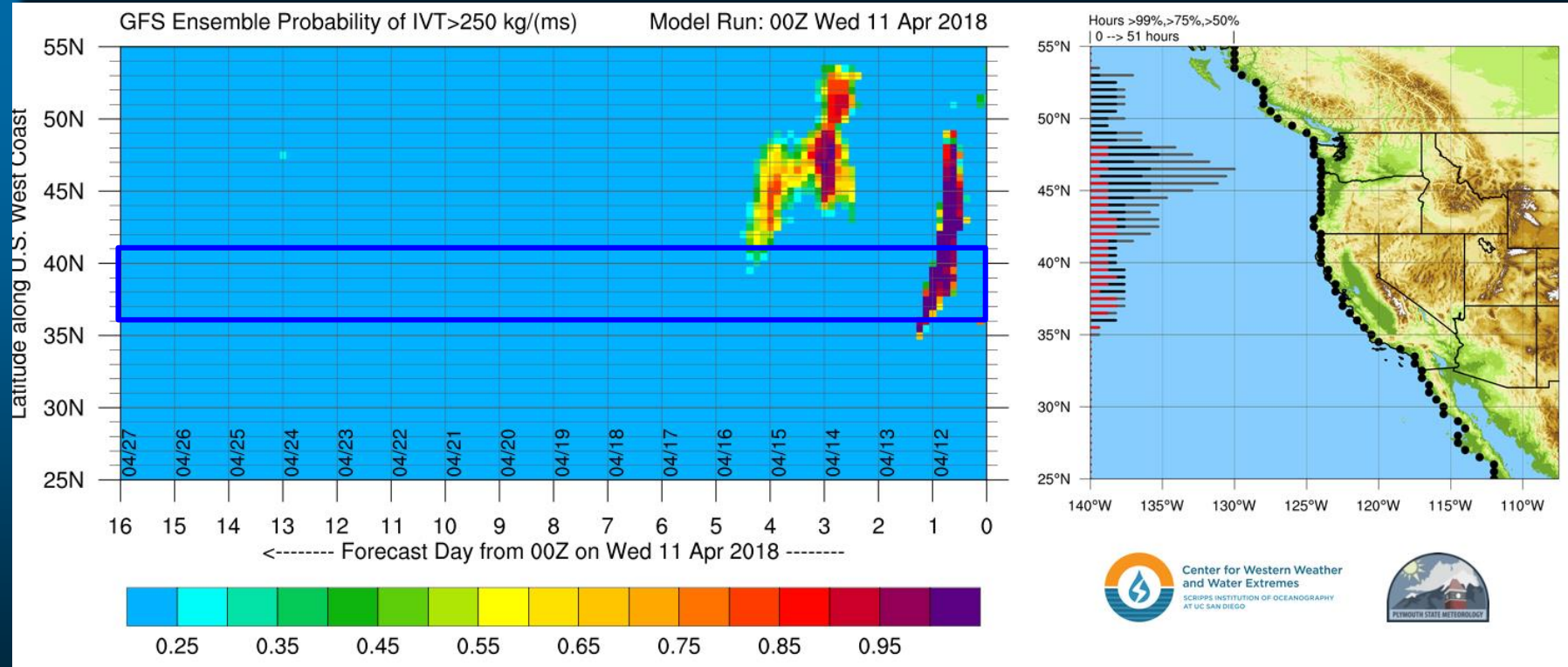


Scenarios - Graphs compare NWS operational forecast (red) with recent model simulation scenarios in blue. Greater spread between the lines - means less forecast certainty.

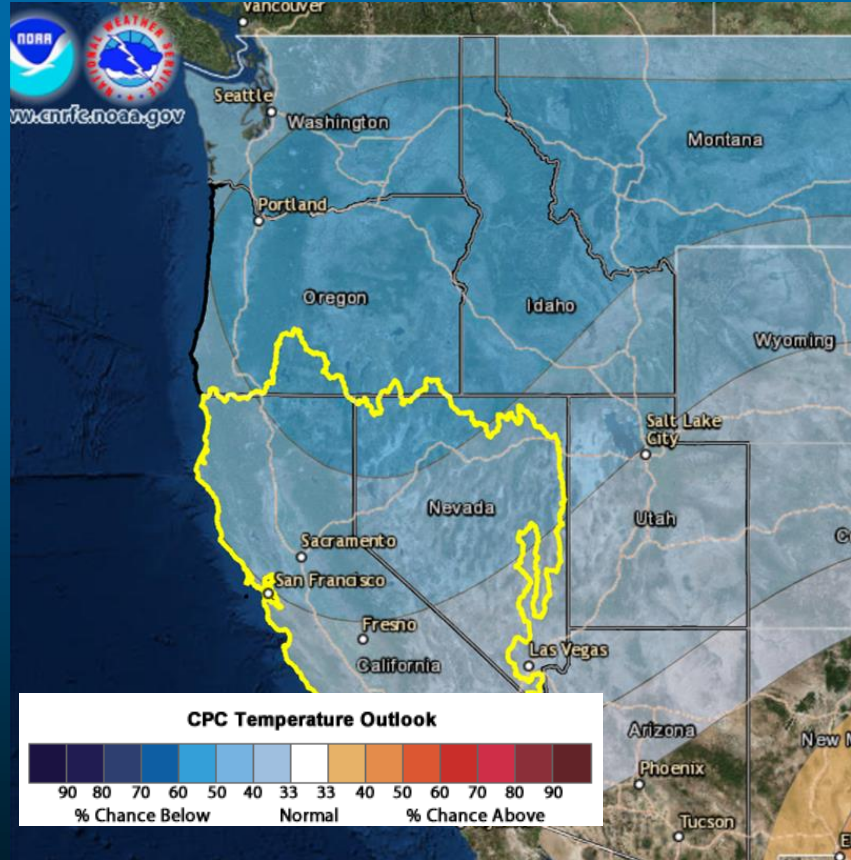
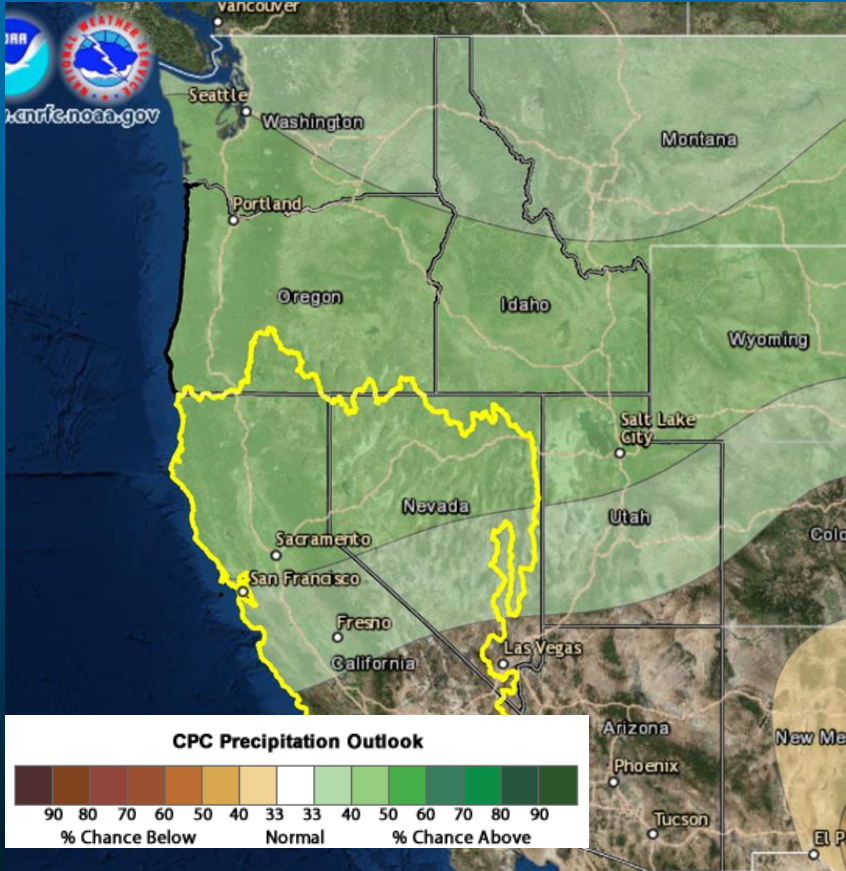
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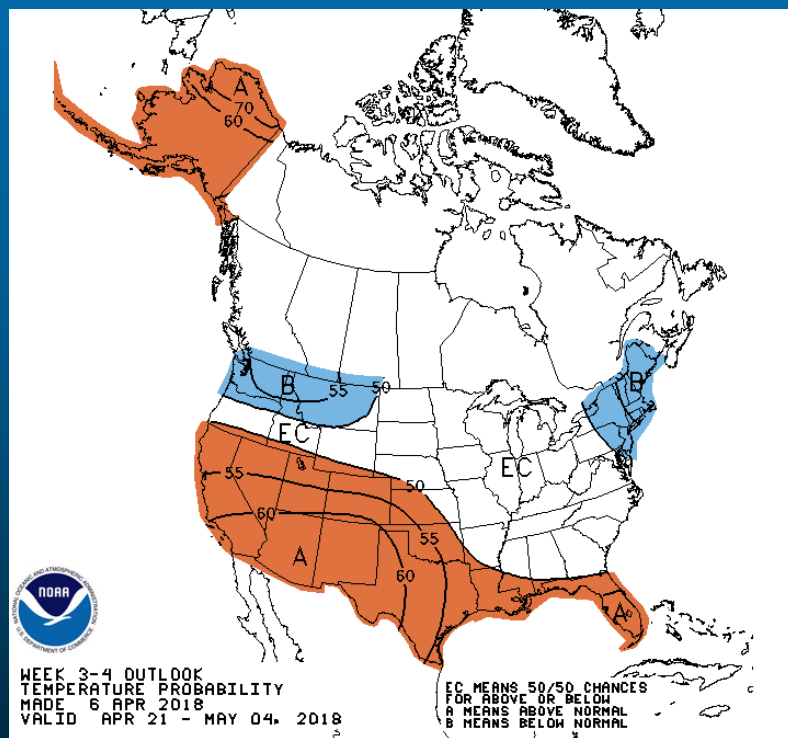
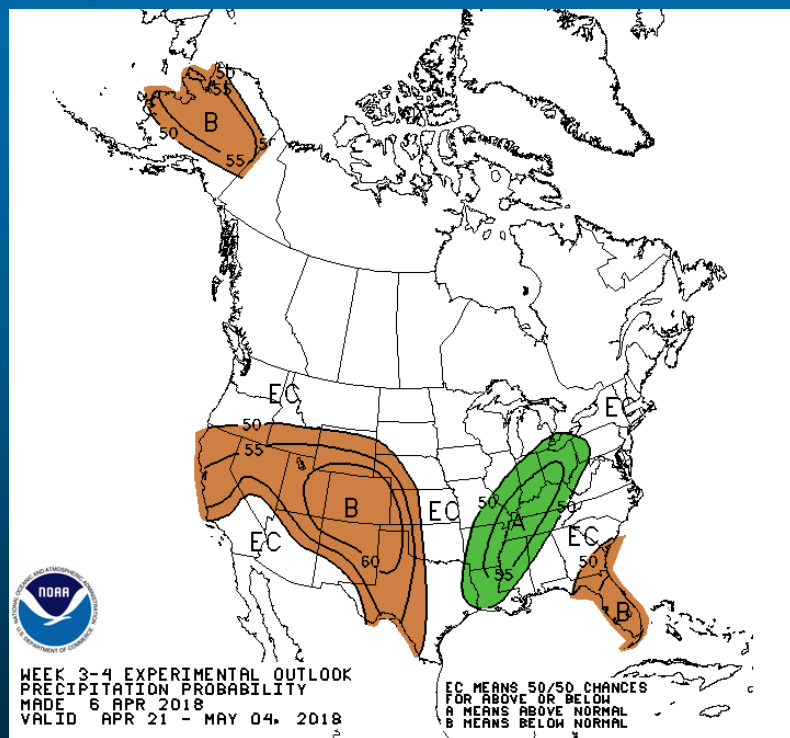
AR Landfall Outlook quick short term, then no signals.



Leaning towards Cold, maybe Wet

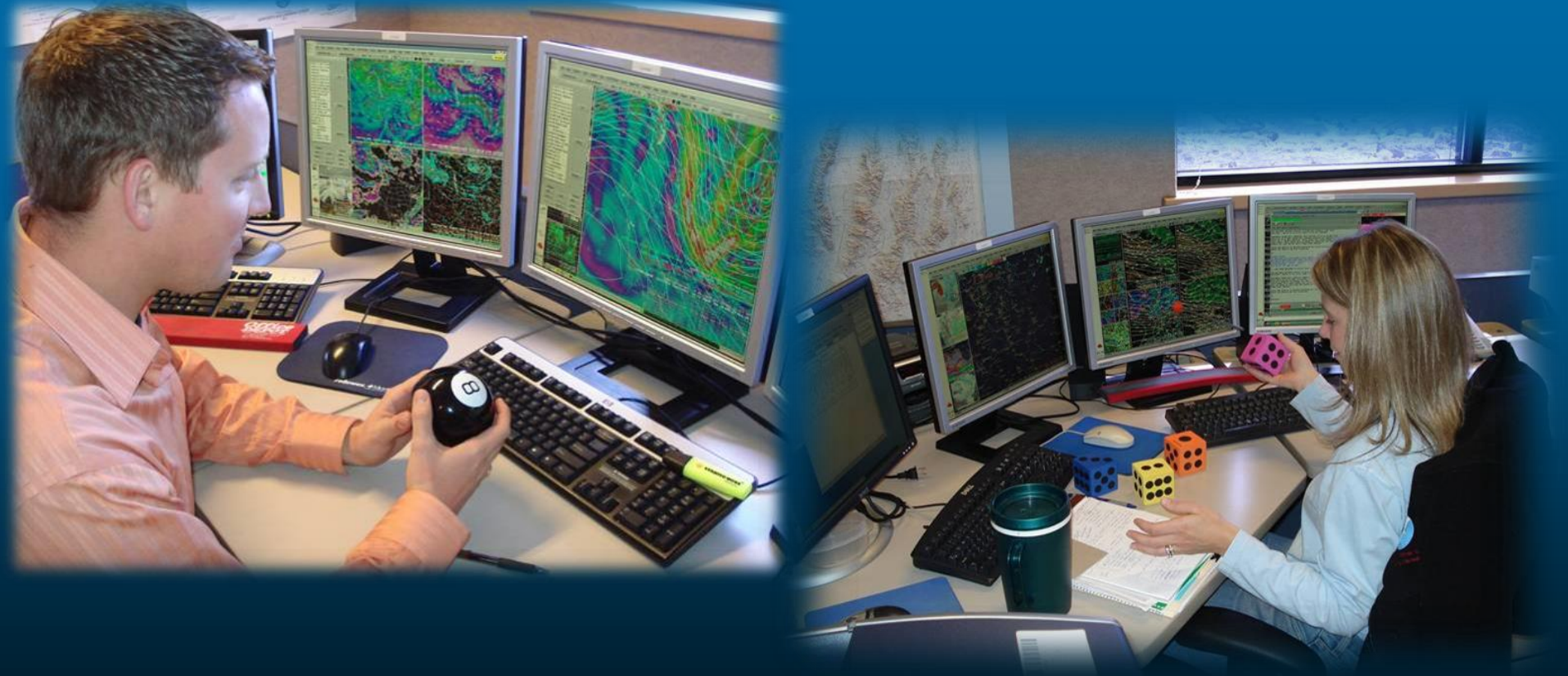


So, How About Weeks 3-4?








3-4 Week Forecasts - When global weather patterns allow these can provide useful guidance of big pattern shifts. Look for 55-60% or higher - have the best reliability. For late April/early May – leaning dry and warm with slightly higher confidence on warmth..

Rest of Spring, Into Summer?



Freakout?

Chris & Tim's Seasonal Regional Freakout Forecast for the Sierra and western Nevada

	April	May	June	July	August
Flooding (from snowmelt)	No big worries with current somewhat below normal snowpack	Below normal snowpack yields only minimal flood risk, even in sudden heatwaves (with the exception of late spring, widespread snows). Peak flows likely in May. Much of the snowpack could be melted off by Father's Day in June!		Snow just about gone.	Snow is gone.
Flooding (from atmospheric rivers, thunderstorms)	Still a risk due to near-above normal soil moisture, high flows, and ripe snowpack. Takes strong or prolonged warm AR landfall to get flooding.	A little late for flood producing AR events	Localized flash flooding from thunderstorms, especially in urban areas, steep terrain, and recent high intensity burns. No particular signal to indicate summer will see above or below numbers of thunderstorm days.		
Wildland Fire	Wind driven grass fires possible lower elevations after prolonged dry spells. Large amounts of fuel left after 2017.	Probably ramping up fire activity in lower elevations, depending on spring rains	Enhanced risk of large wildfires due to 1) tons of carryover low elevations vegetation from 2017 - new growth from wet March and early April 2018, 2) more limited snowpack may open up mid-higher elevations + timber to increased fire risk. Could start in May but June-Sept. Likely prim season. Wet Summer would mitigate fire risk, but not predictable		
					

What Does This Mean?
Integrates impacts and confidence

No worries

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Moderate freakoutness

High freakoutness

Really bad

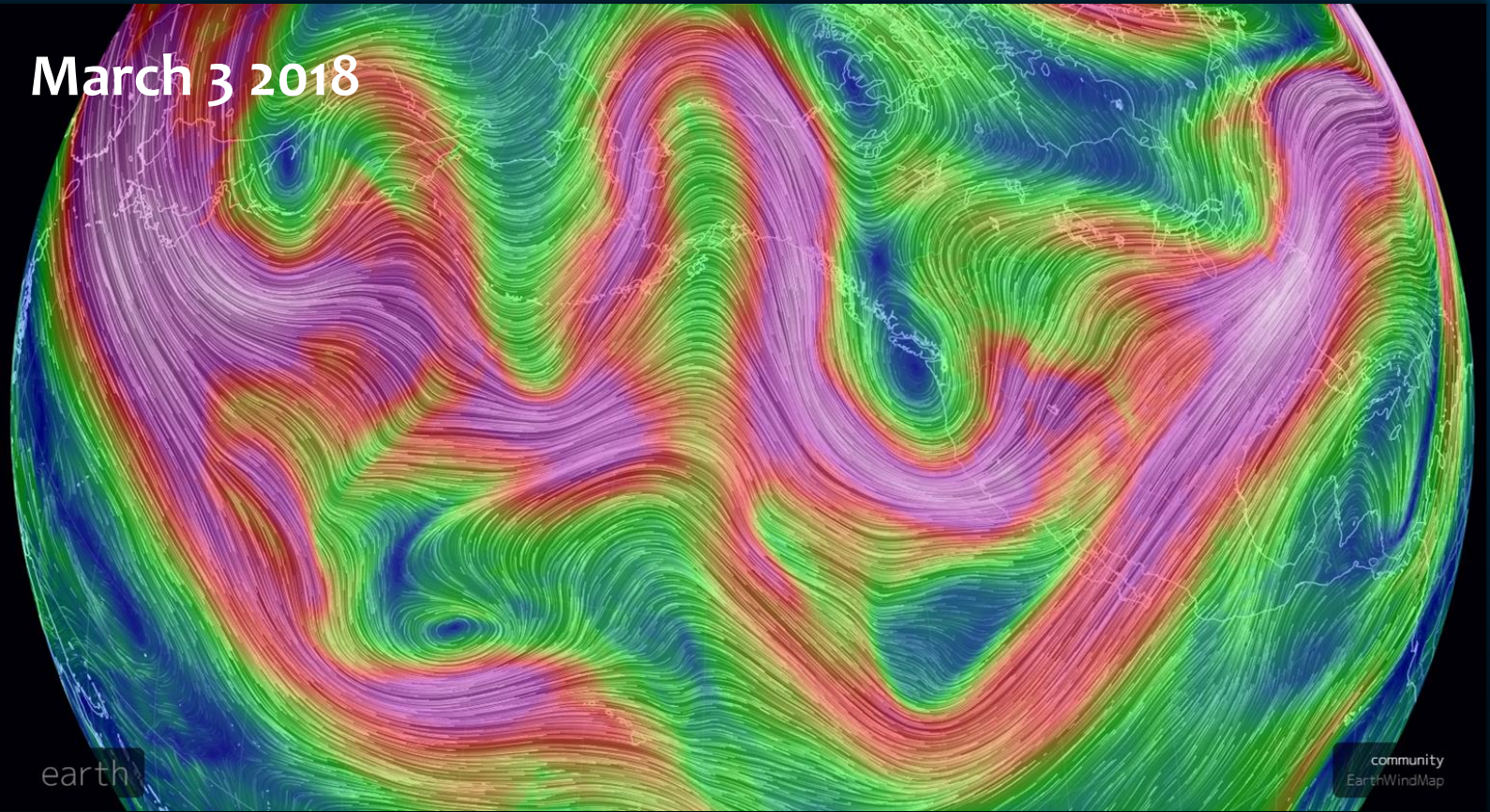
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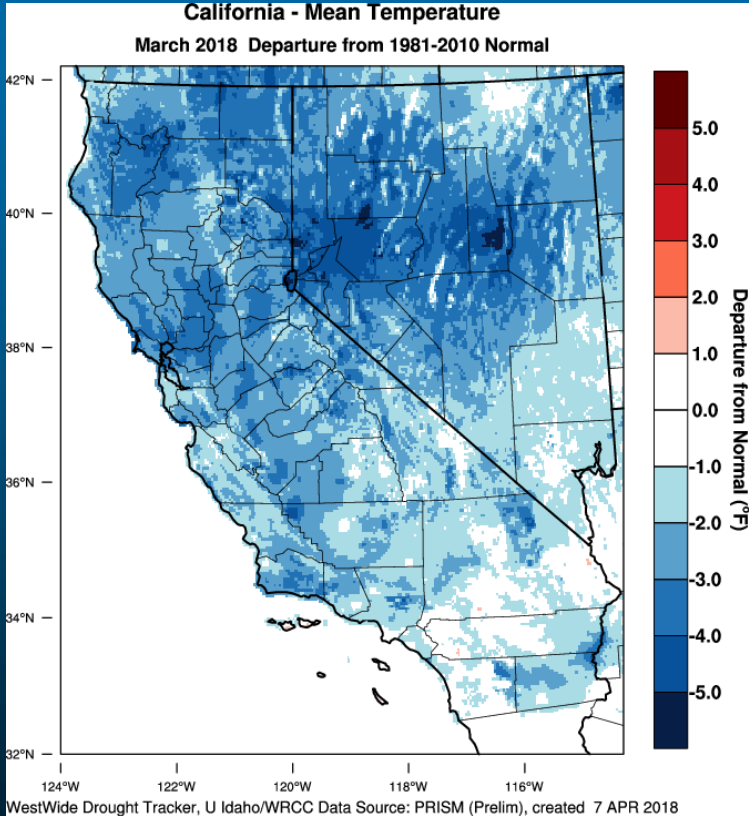
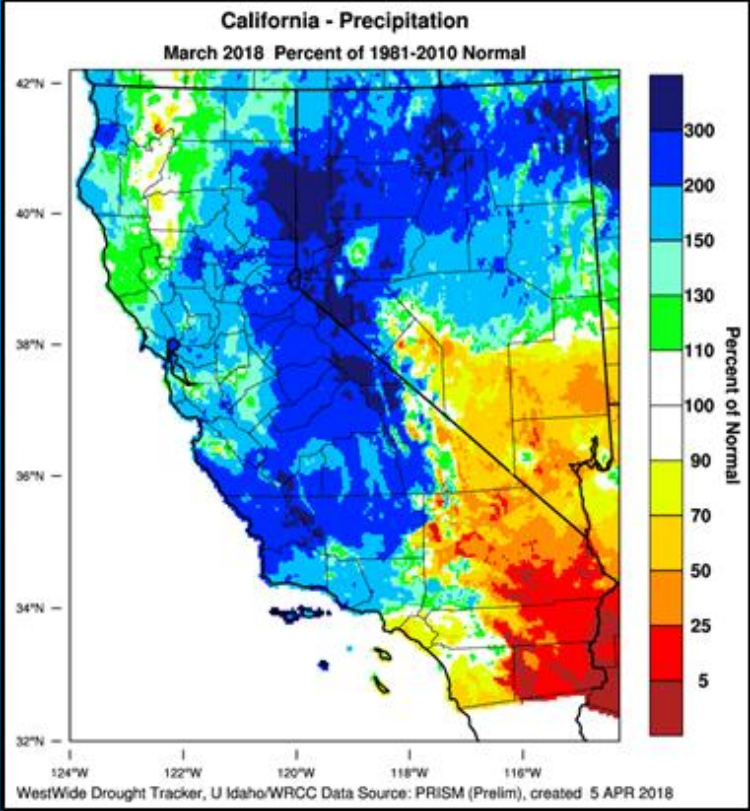


2016-17 vs 2017-18 – Storm Track

March 3 2018



Wet and cool March was a game changer for snowpack and water supply

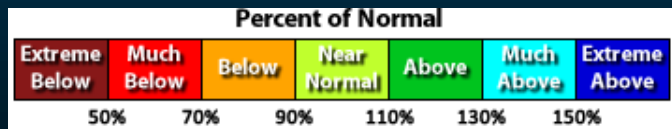
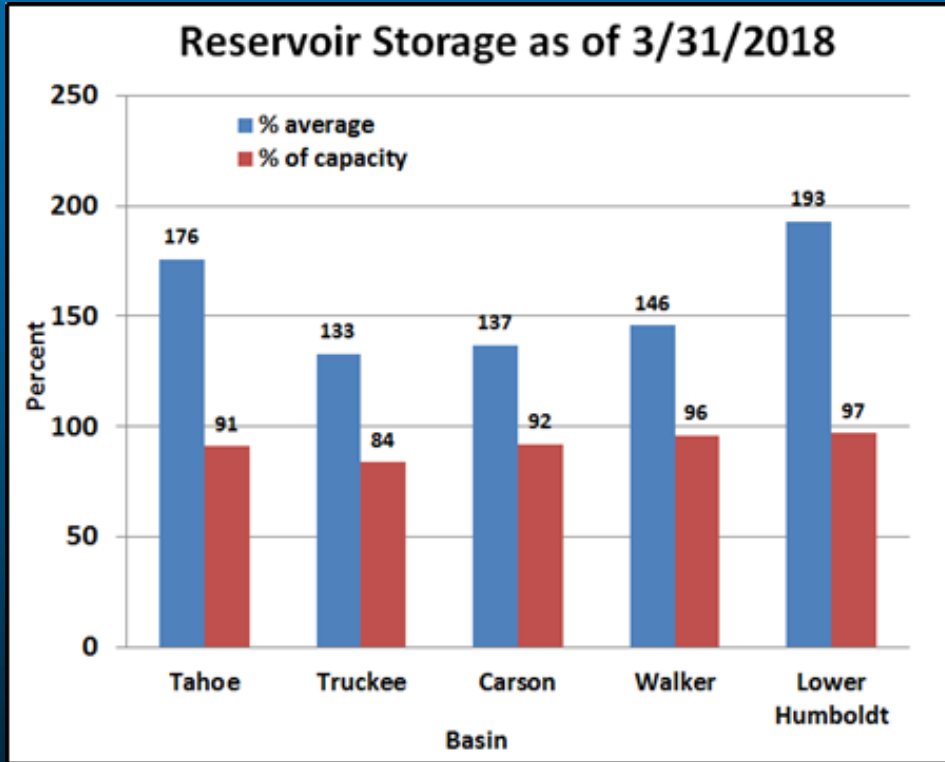
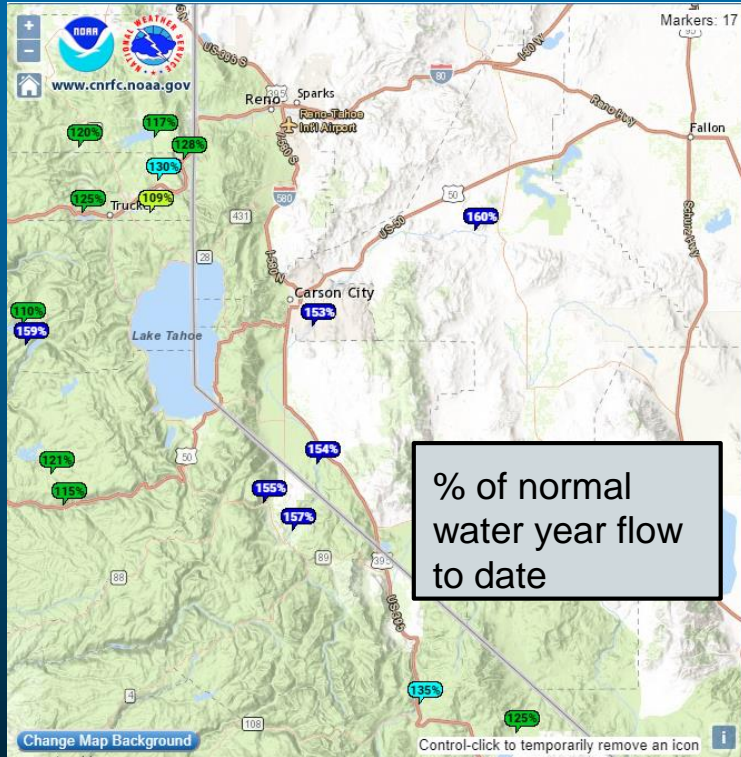


Hydrologic Status

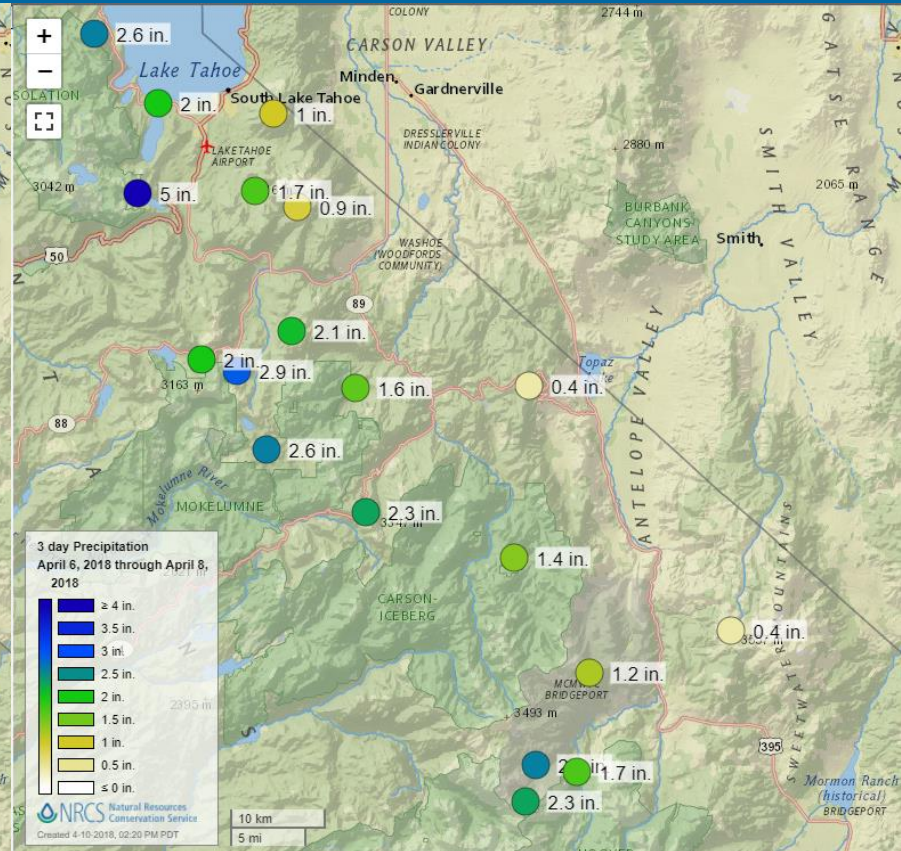
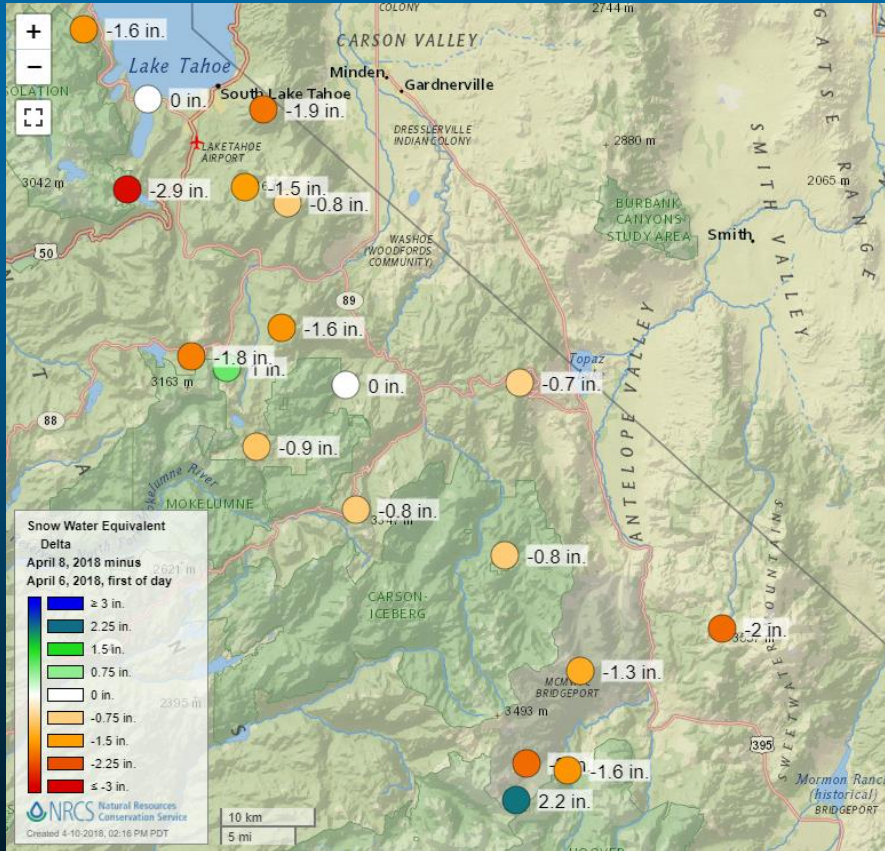


Near Incline Peak 3/4/17

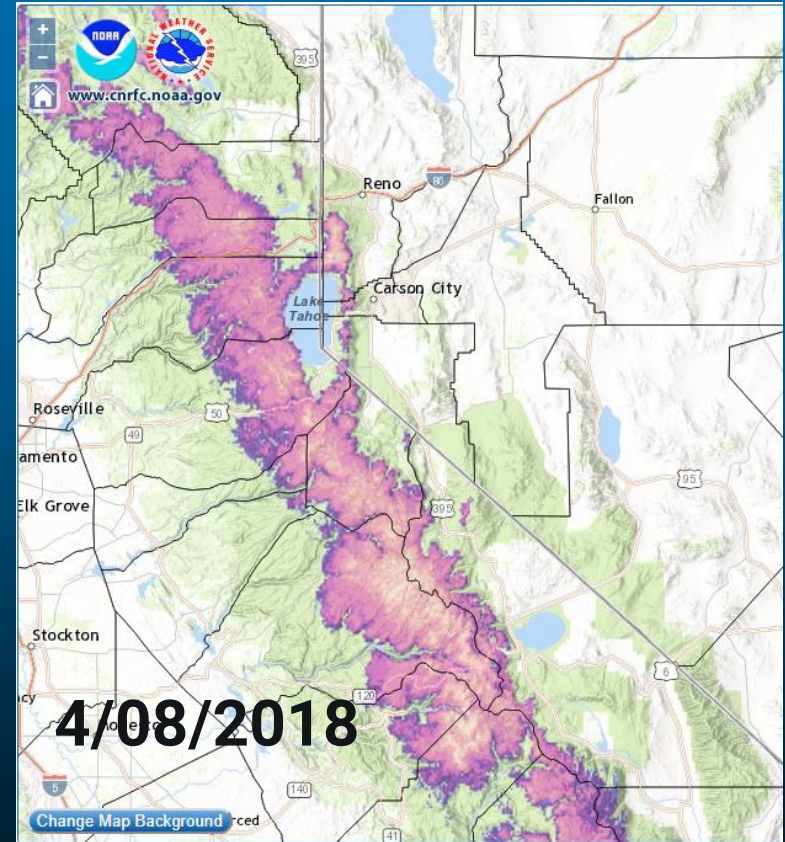
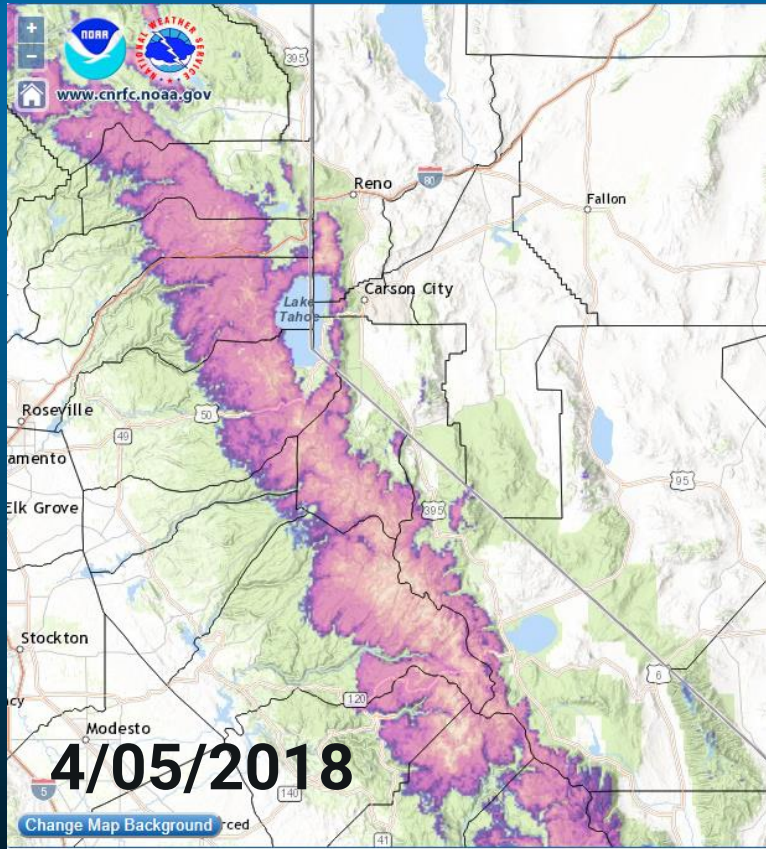
Where Are We At? Streamflow and reservoir status



April 6th-7th AR SWE and Precip

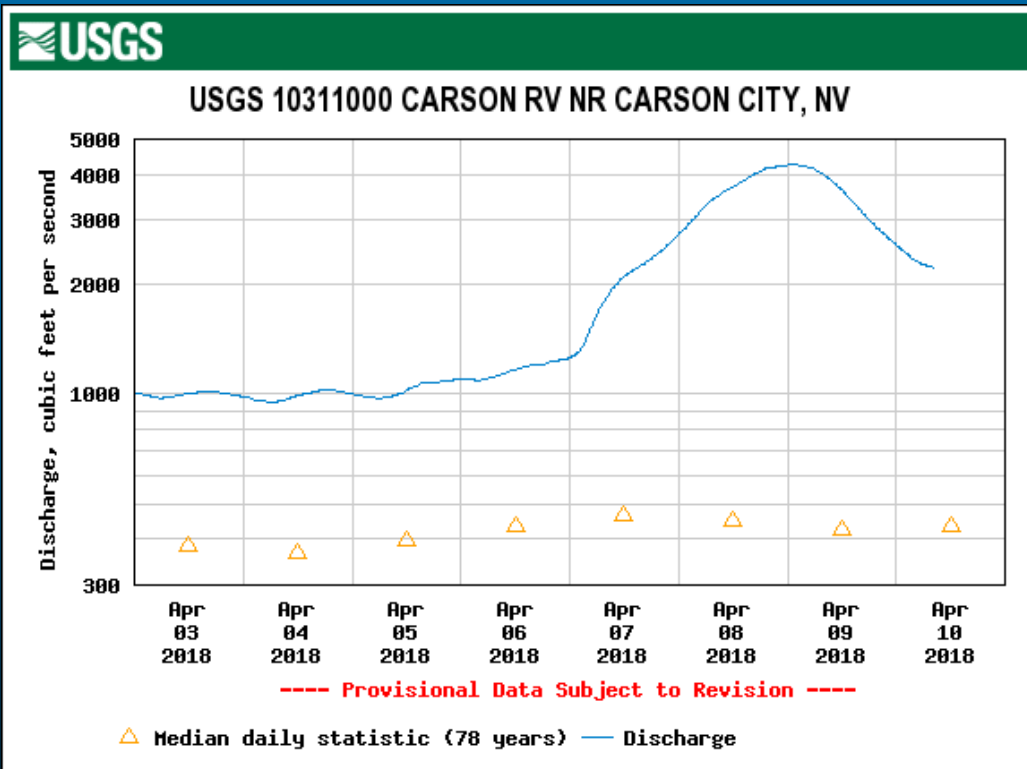
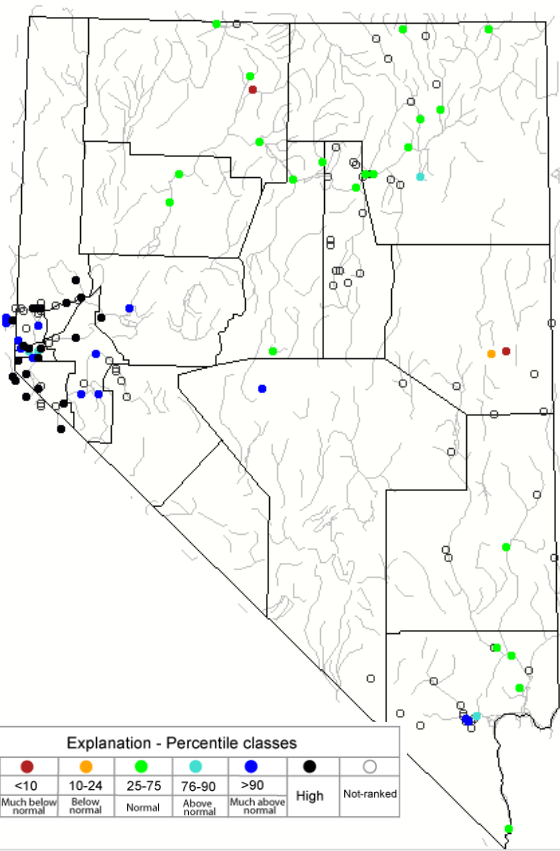


Spatial Snowpack Comparison



Recent Streamflow

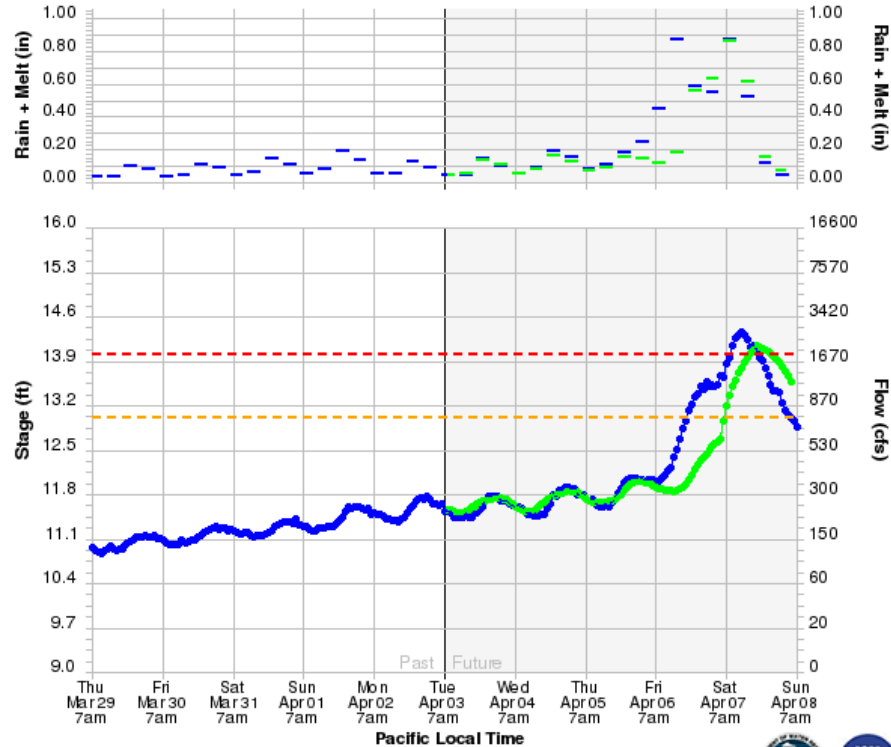
Monday, April 09, 2018



Recent Streamflow

WOOC1 - WF CARSON - WOODFORDS (MS: 13.0 / FS: 14.0)

Forecast Issuance: April 03, 2018 at 07:46 AM PDT

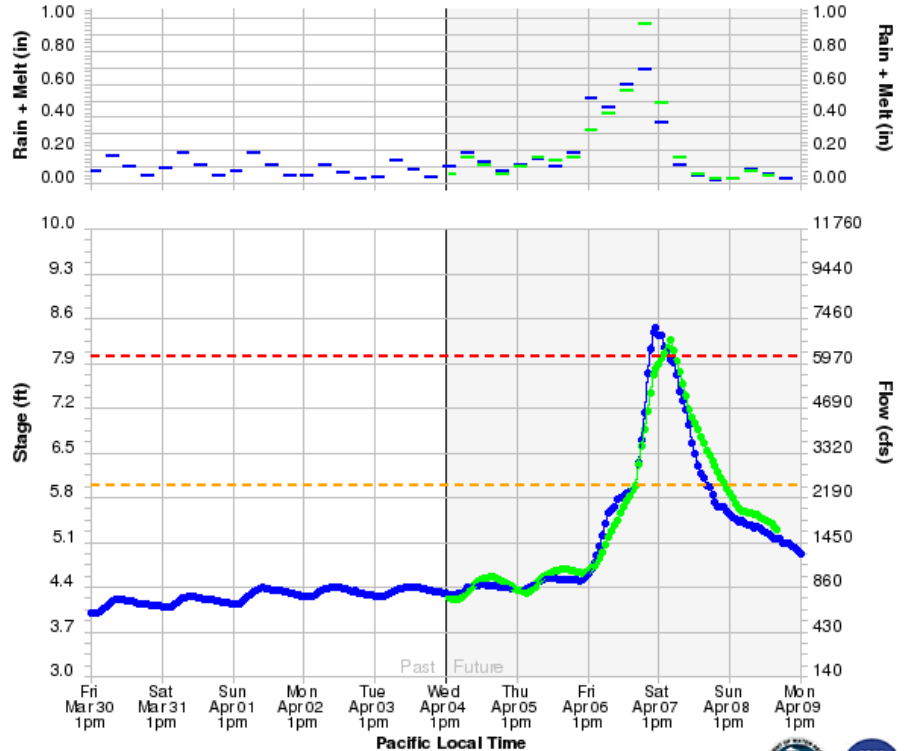


Observed ● Forecast ● Monitor — Flood —
 FC Time: 1446 Z ID: WOOC1
 Created: 04/09/2018 at 2:01 AM PDT (Source = C) NOAA / NWS / California Nevada River Forecast Center



CEMC1 - EF CARSON - MARKLEEVILLE, NR (MS: 6.0 / FS: 8.0)

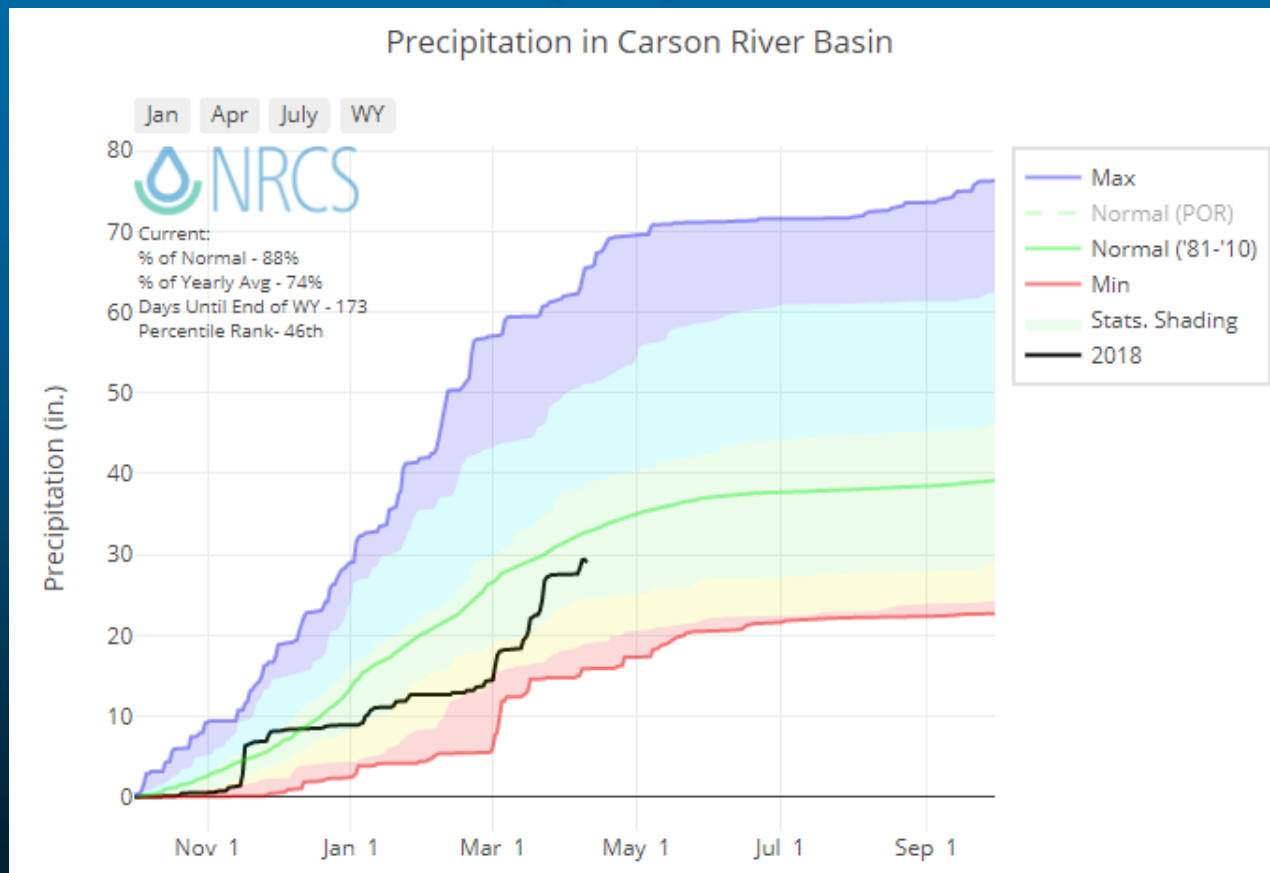
Forecast Issuance: April 04, 2018 at 01:31 PM PDT



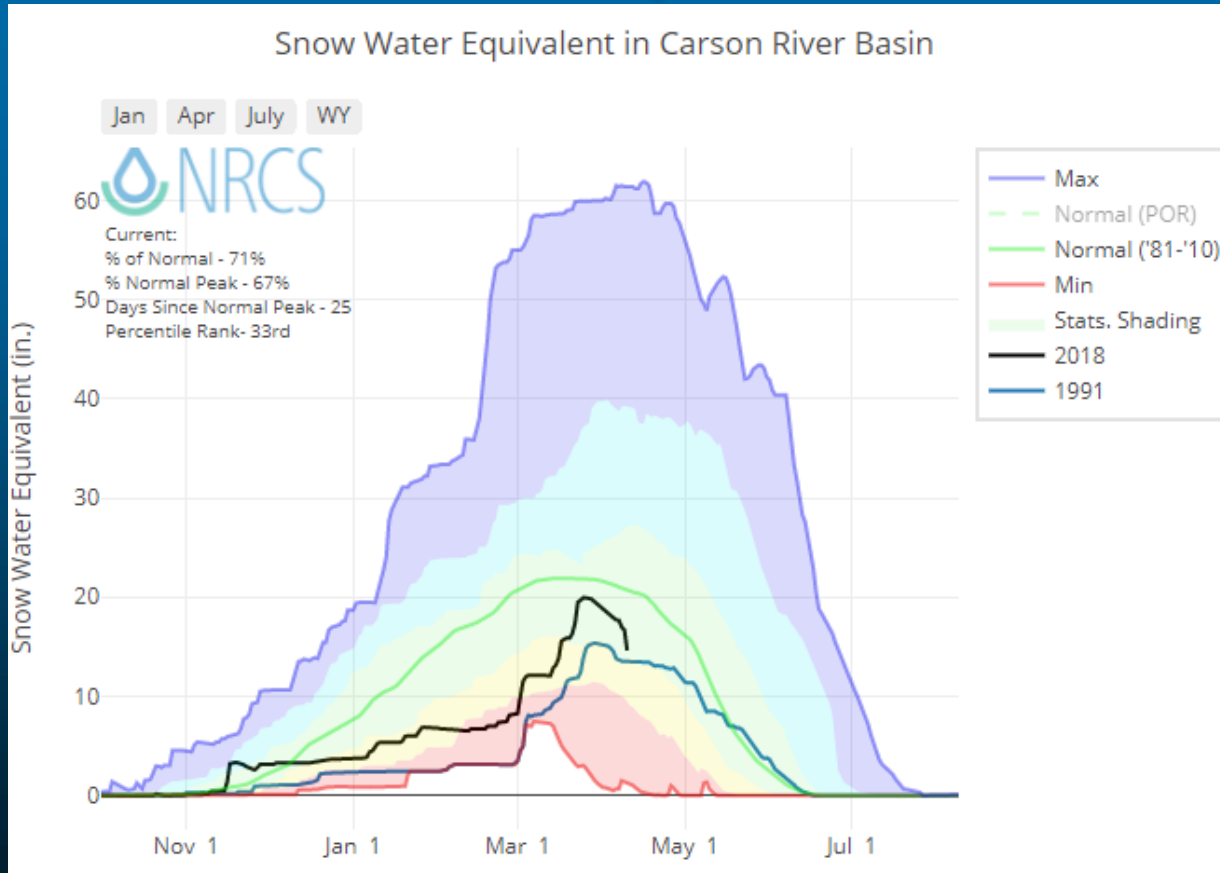
Observed ● Forecast ● Monitor — Flood —
 FC Time: 2031 Z ID: CEMC1
 Created: 04/10/2018 at 2:04 AM PDT (Source = C) NOAA / NWS / California Nevada River Forecast Center



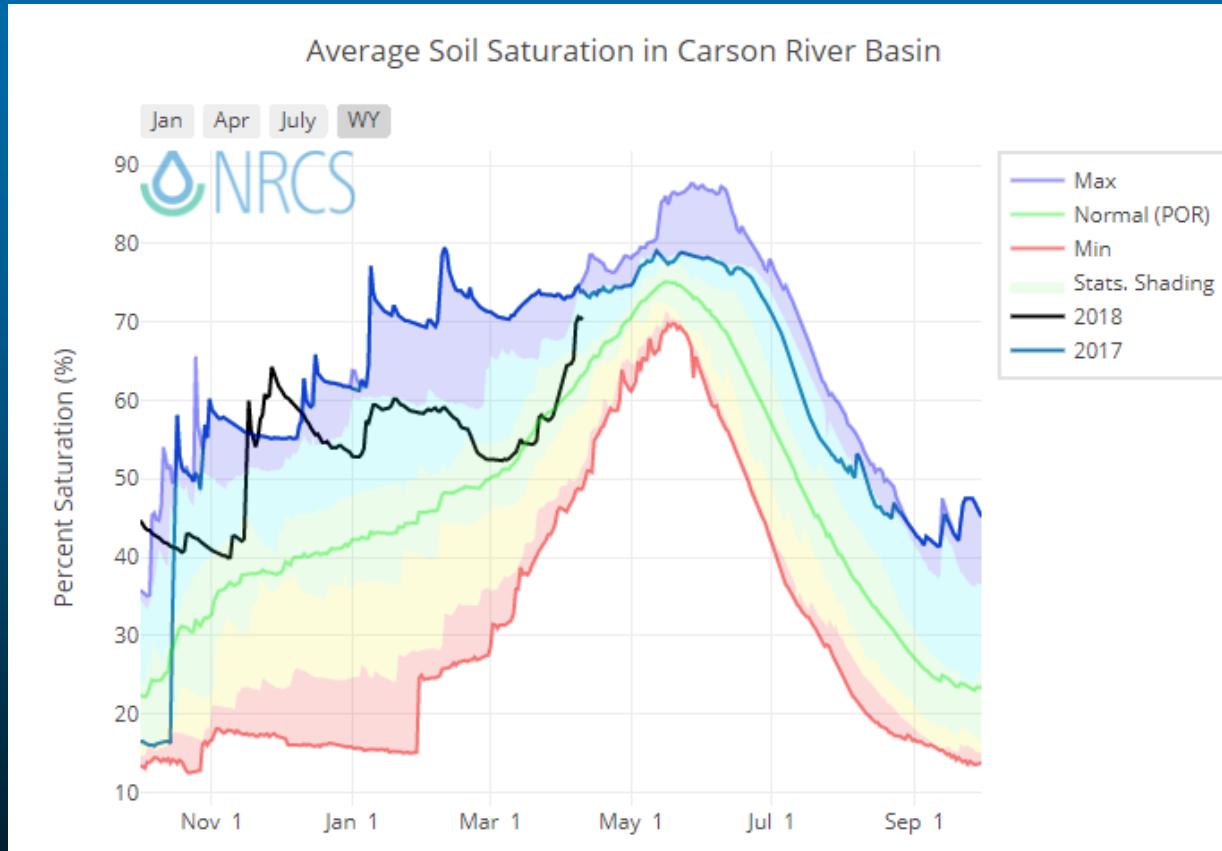
Where Are We At? precipitation



Where Are We At? Snowpack



Where Are We At? Soil moisture



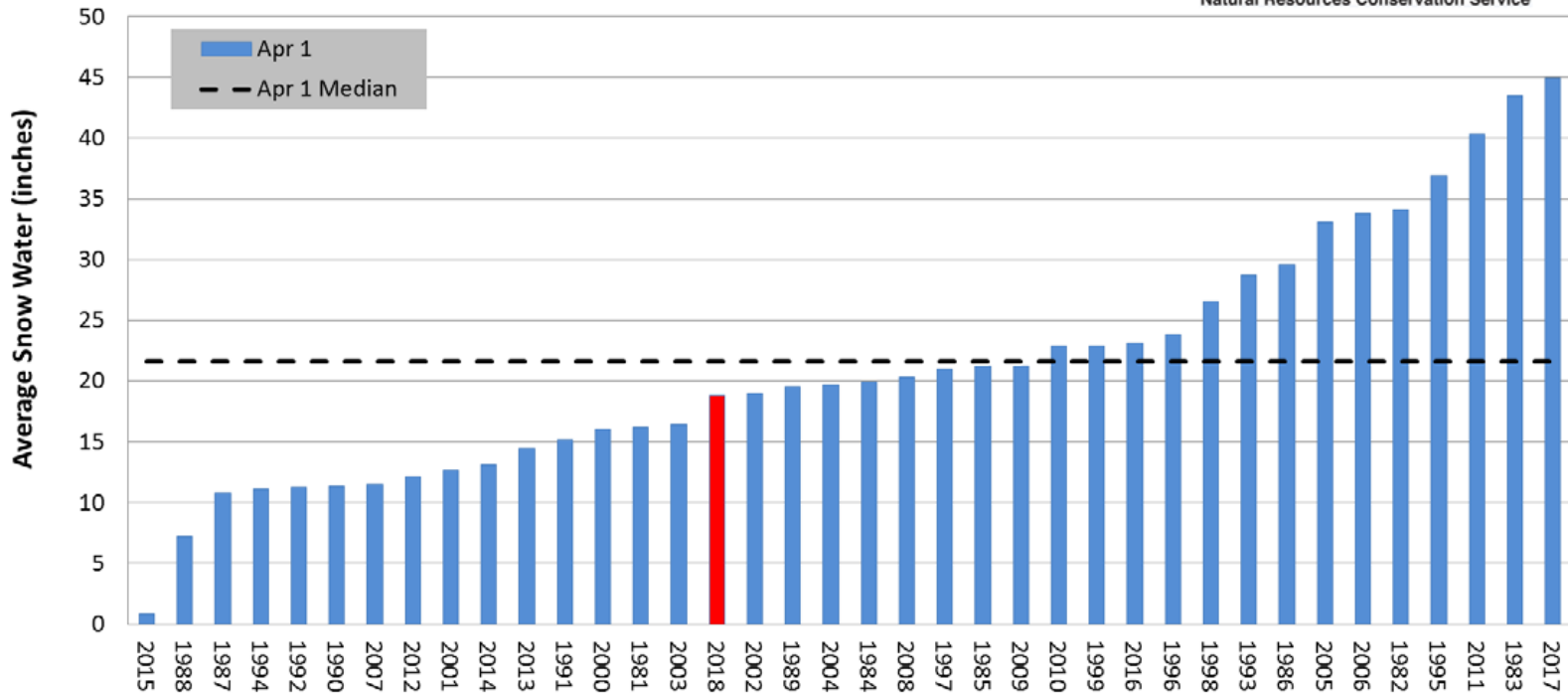
April 1st snowpack ranking

Average Snow Water in Carson Basin April 1
1981-present, sorted low to high



United States
Department of
Agriculture

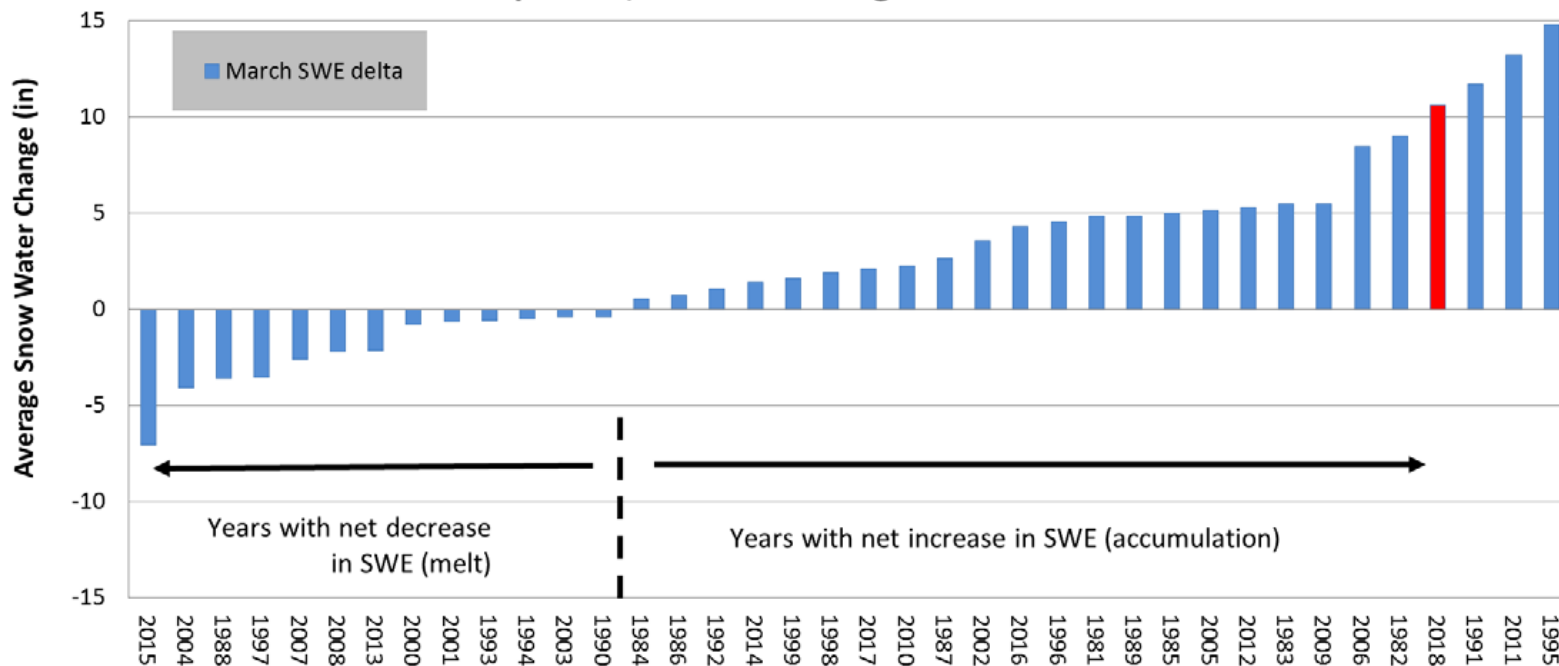
Natural Resources Conservation Service



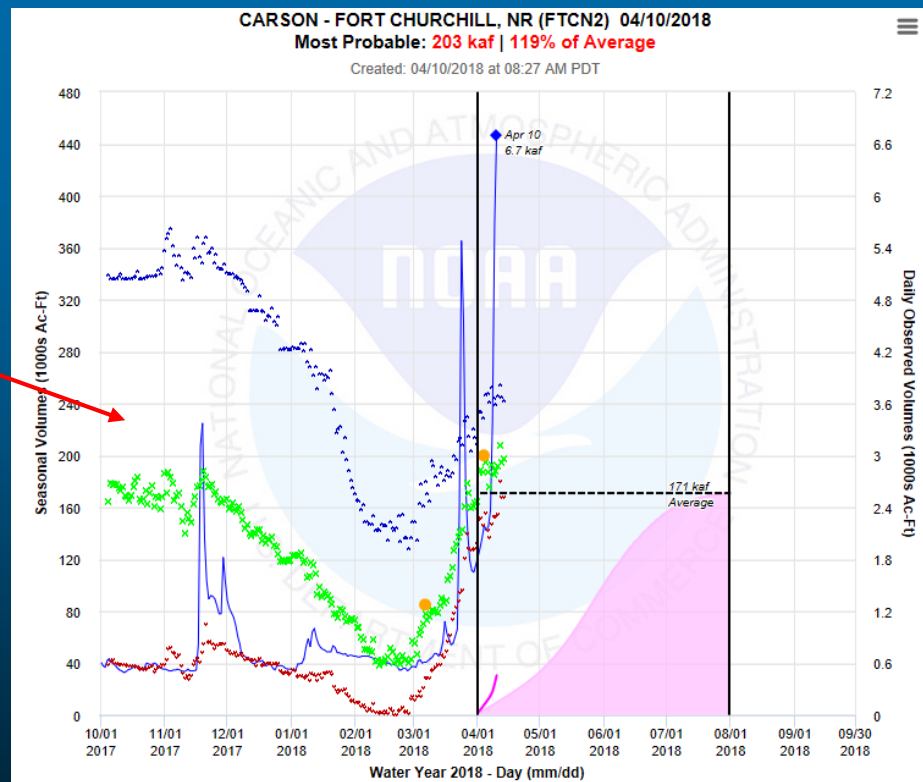
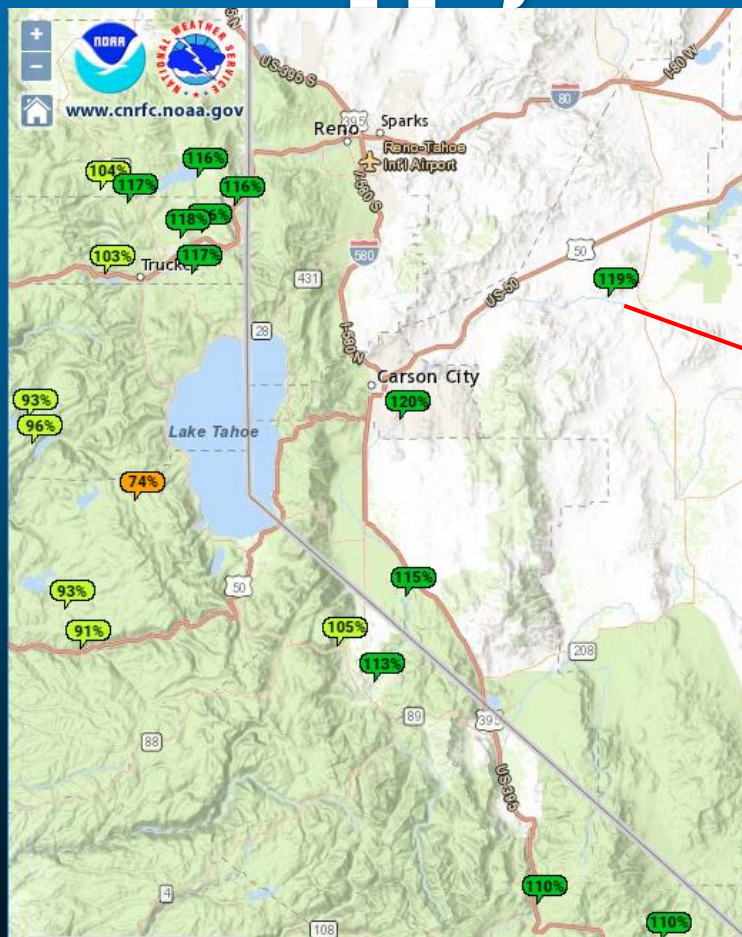
March Snowpack change

USDA United States Department of Agriculture
Natural Resources Conservation Service

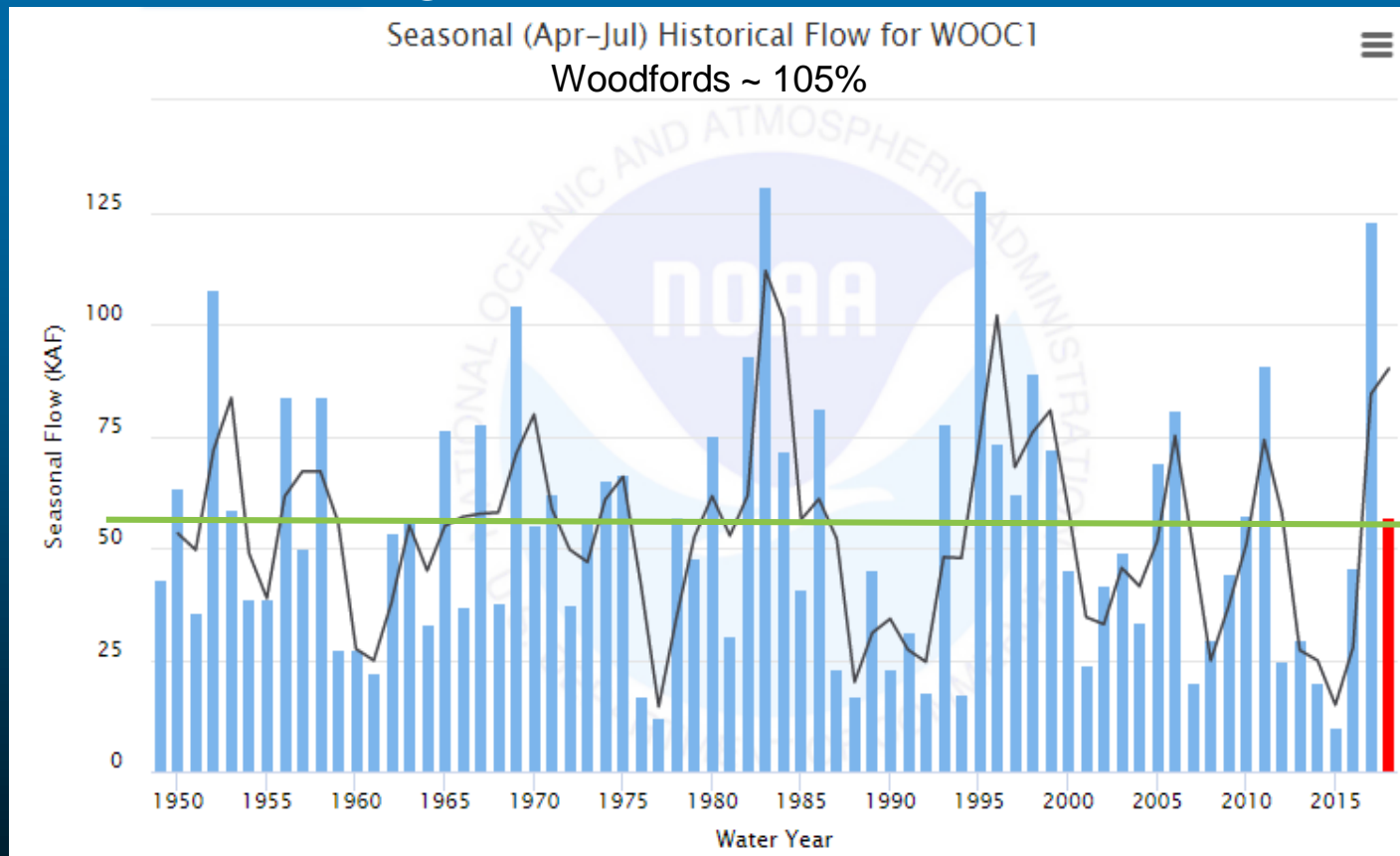
Average Snow Water Change between March 1 and April 1
in the Carson Basin
1981-present, sorted low to high



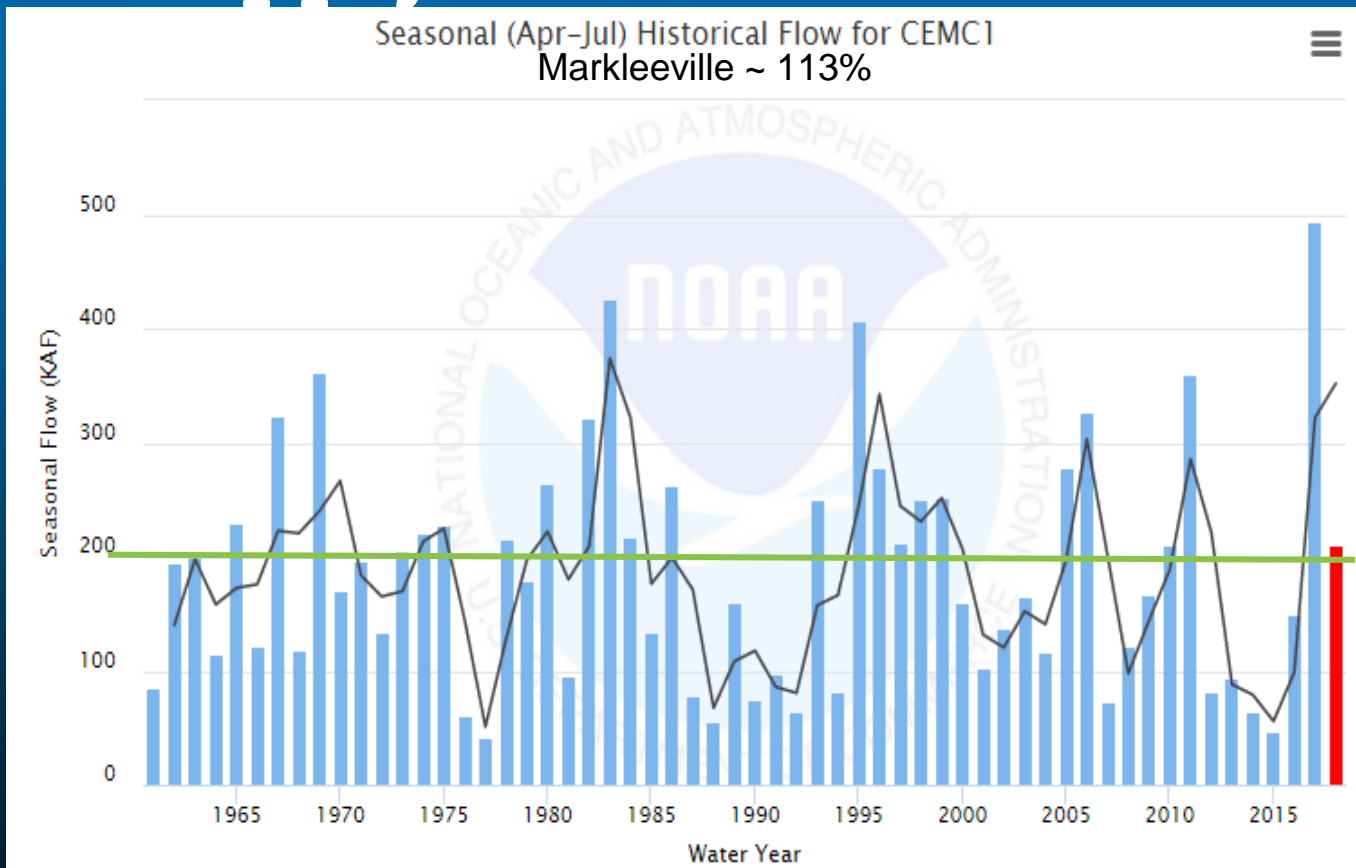
Water Supply Outlook



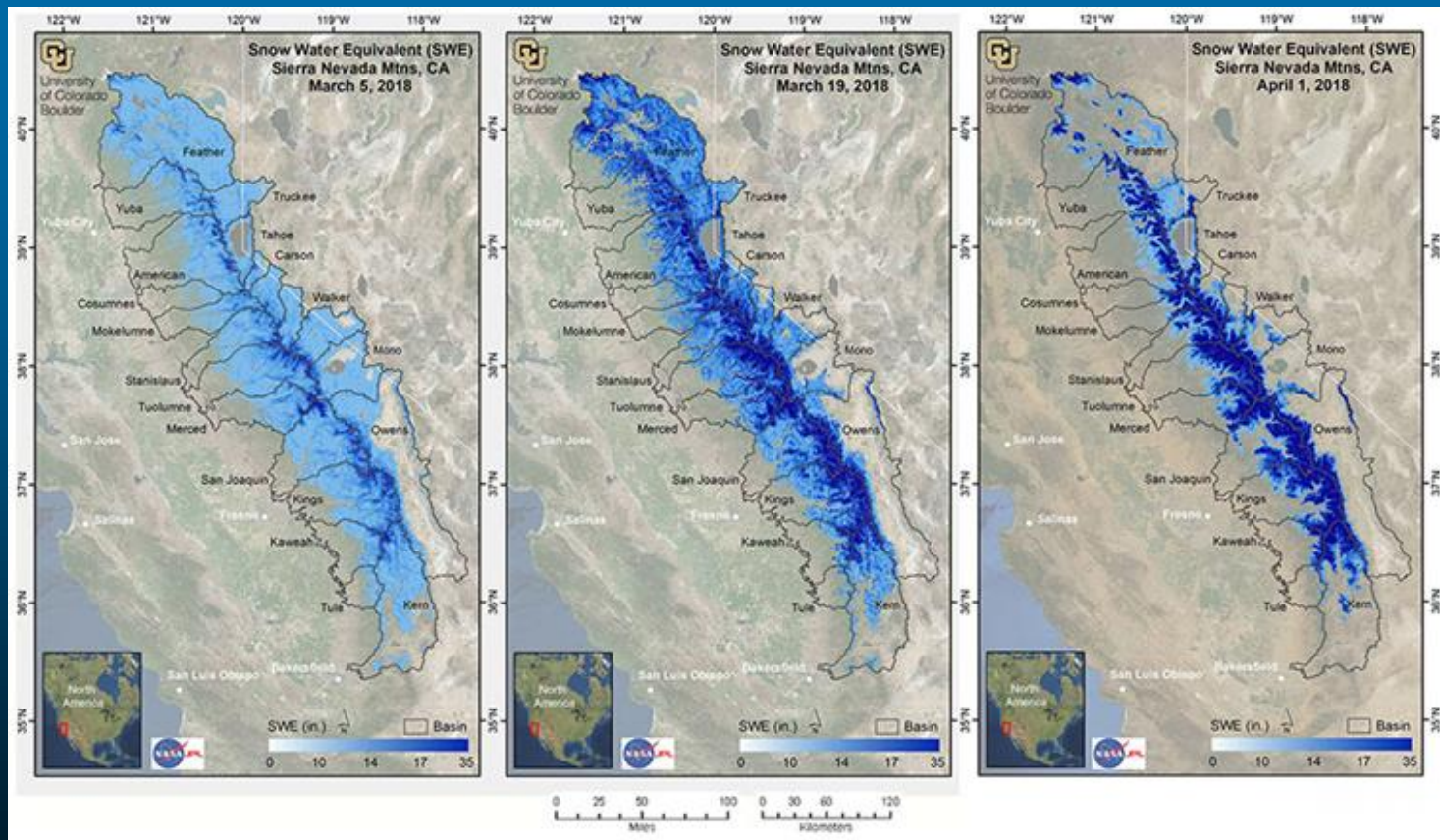
Water Supply Continued



Water Supply Continued



Cool new SWE Tools from CU/NASA JPL



Cool new SWE Tools from CU/NASA JPL

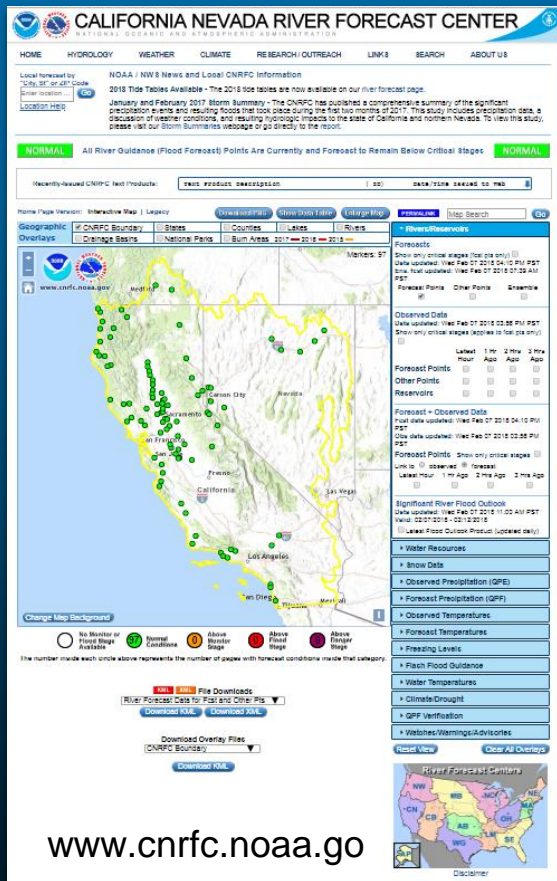
Basin	Elevation Band	3/19/18 % 3/19 Avg.	4/1/18 % 4/1 Avg.	4/1/18 SNODAS (in)	3/19/18 SWE (in)	4/1/18 SWE (in)	3/19 thru 4/1/18 Chg. in SWE (in)	Area Sq Mi
E. Carson	5000-6000'	-	2	0.0	9.5	0.0	-9.5	65.9
	6000-7000'	129	57	0.4	13.3	3.2	-10.0	90.7
	7000-8000'	71	73	6.2	14.2	11.7	-2.5	104.8
	8000-9000'	60	68	16.5	16.0	17.7	1.7	95.2
	9000-10,000'	64	73	24.8	19.1	22.3	3.2	33.8
	10,000-11,000'	65	76	29.1	20.6	24.8	4.2	10.3
	> 11,000'	59	72	22.4	21.1	27.5	6.5	0.3
W. Carson	5000-6000'	-	41	0.0	8.7	0.0	-8.7	24.9
	6000-7000'	135	63	0.9	12.3	2.0	-10.4	13.7
	7000-8000'	64	66	12.2	13.8	11.8	-2.0	39.2
	8000-9000'	59	71	17.9	15.7	17.3	1.6	33.2
	9000-10,000'	61	72	23.3	17.9	21.1	3.1	11.1
	10,000-11,000'	57	0	23.5	18.0	23.3	5.3	1.1
Mono	6000-7000'	16	18	0.0	0.4	0.1	-0.3	378.1
	7000-8000'	39	57	0.0	3.4	0.8	-2.5	396.2
	8000-9000'	56	76	0.9	9.7	7.2	-2.5	175.3
	9000-10,000'	63	72	10.7	14.8	16.9	2.1	63.0
	10,000-11,000'	62	73	18.6	20.3	24.7	4.4	45.8
	11,000-12,000'	62	74	13.4	21.9	27.3	5.3	25.8
	> 12,000'	60	0	8.8	21.7	28.1	6.4	4.5

Contact: leanne.lestak@colorado.edu to be added to email list
to receive detailed reports

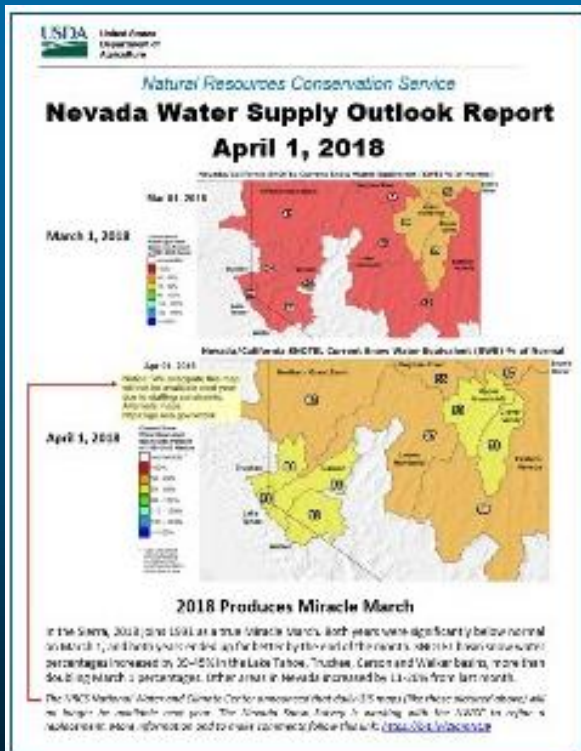
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More Snow and Water Resource info here



www.cnrfc.noaa.gov



www.nrcs.usda.gov/wps/portal/nrcs/main/nv/snow/

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Questions/Discussion?

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