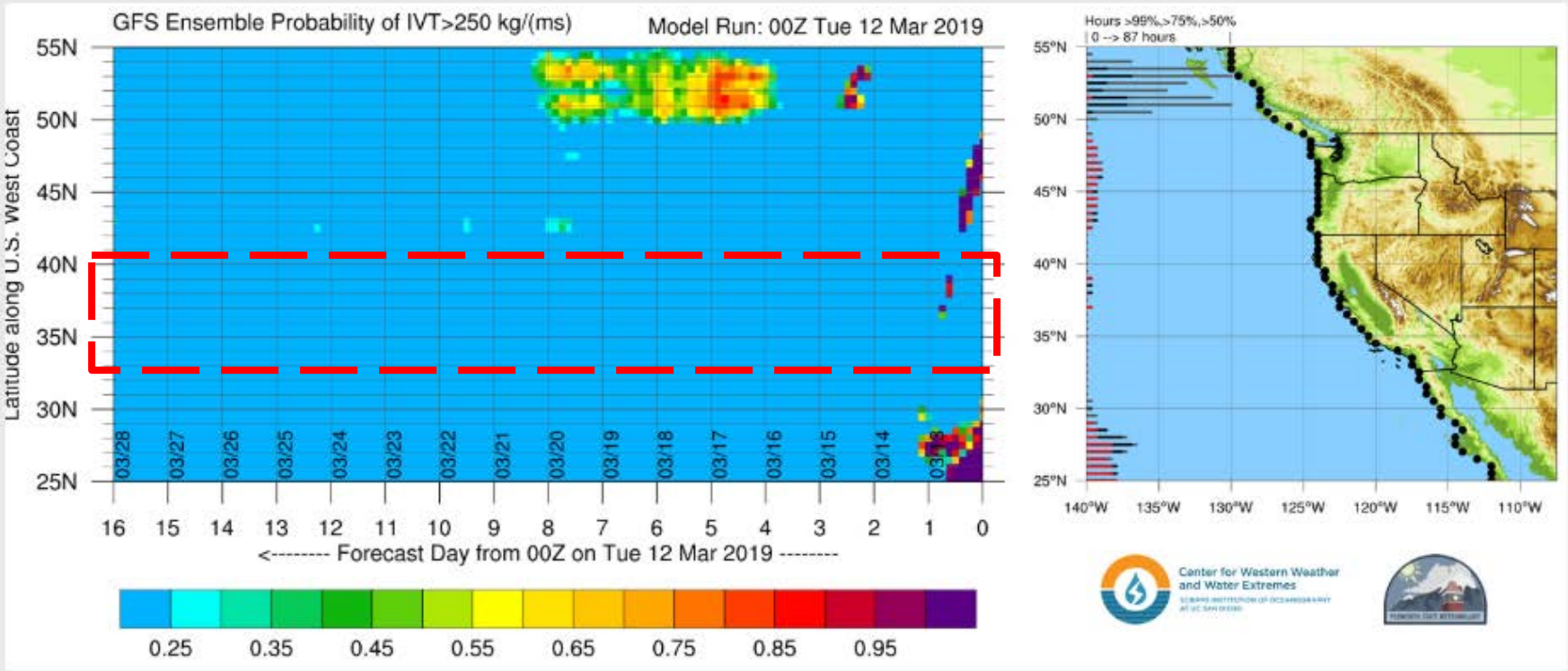
NWS Reno Weather, Water & Spring Flood Outlook

Mark.Faucette@noaa.gov - Weather
Tim.Bardsley@noaa.gov - Water
March 12, 2019


Photo Credit: Joe Curtis
Storey County

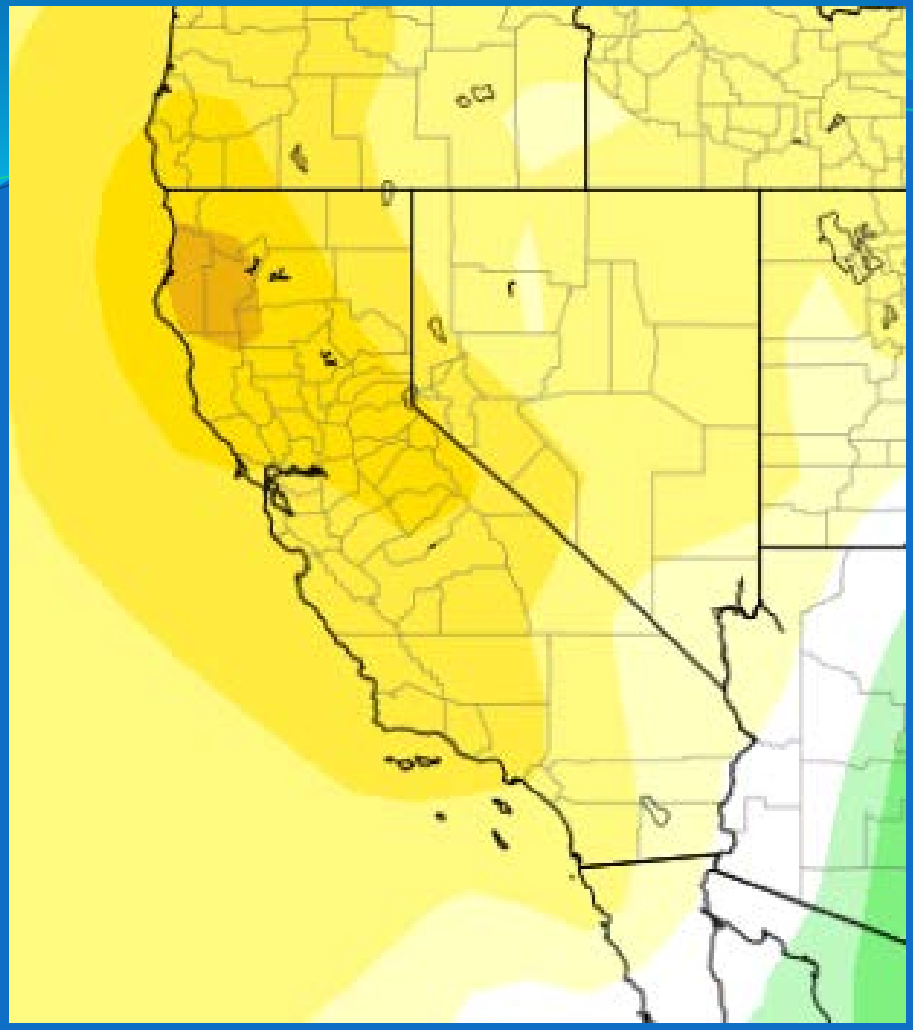
Reno National Weather Service
Forecasting for the Sierra and western Nevada since 1905



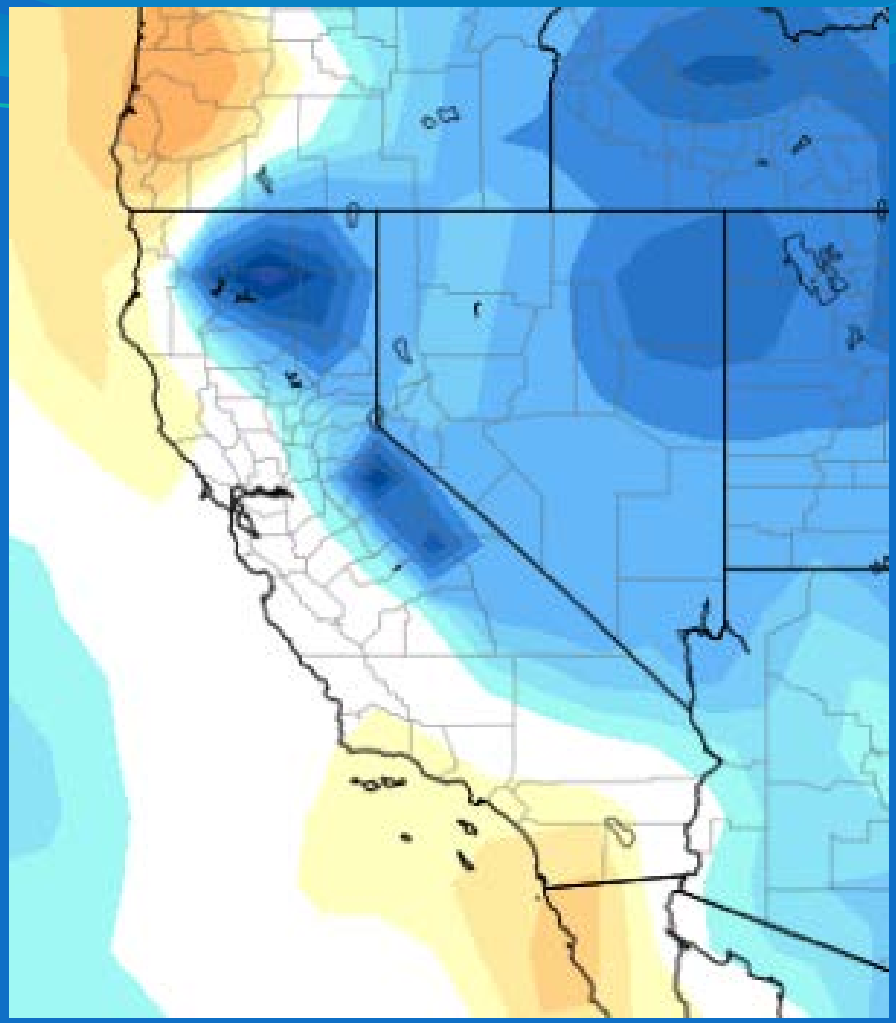
The Next Two Weeks – AR Potential

- GFS Ensemble – 21 forecast simulations each with slightly different initial conditions meant to mimic chaos/uncertainty in atmosphere
- Higher the number = more simulations showing AR landfall.
- Generally that means higher confidence, but not always.
- Little, if any, potential forlandfalling AR in the next two weeks.

http://cw3e.ucsd.edu/iwv-and-ivt-forecasts/



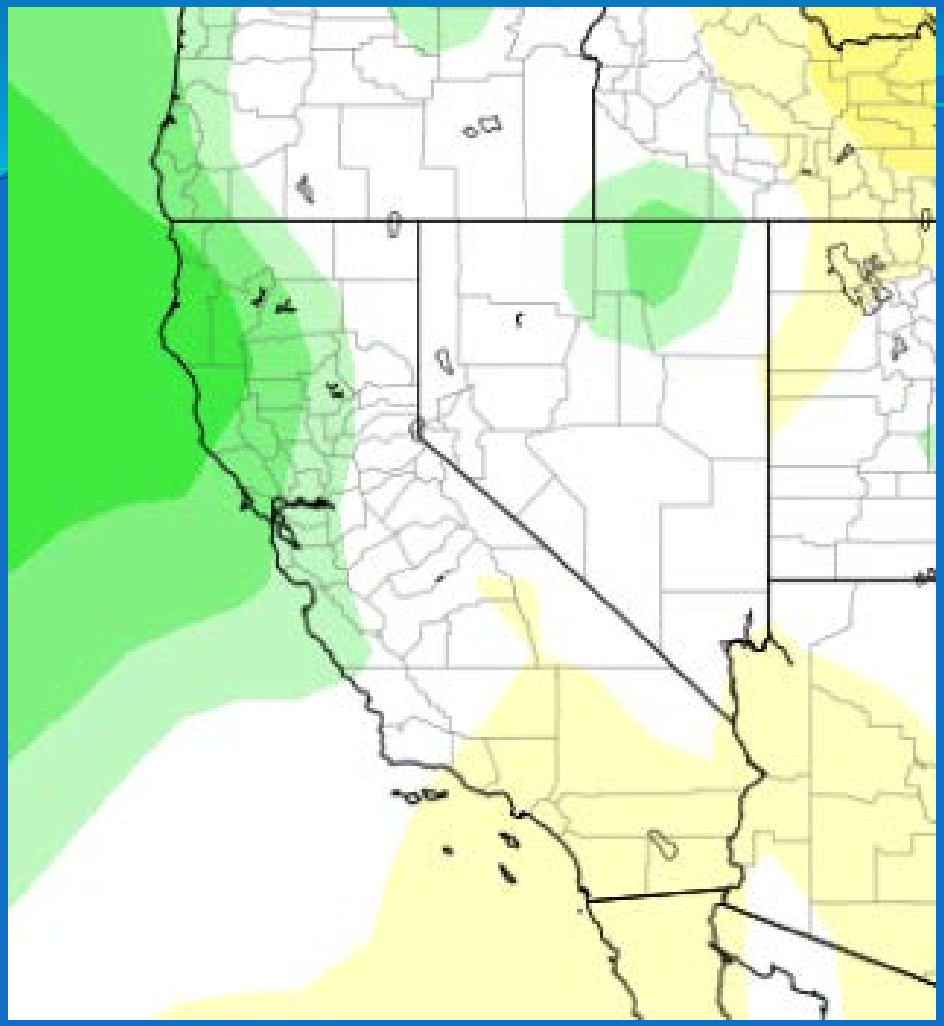
Precipitation Anomaly



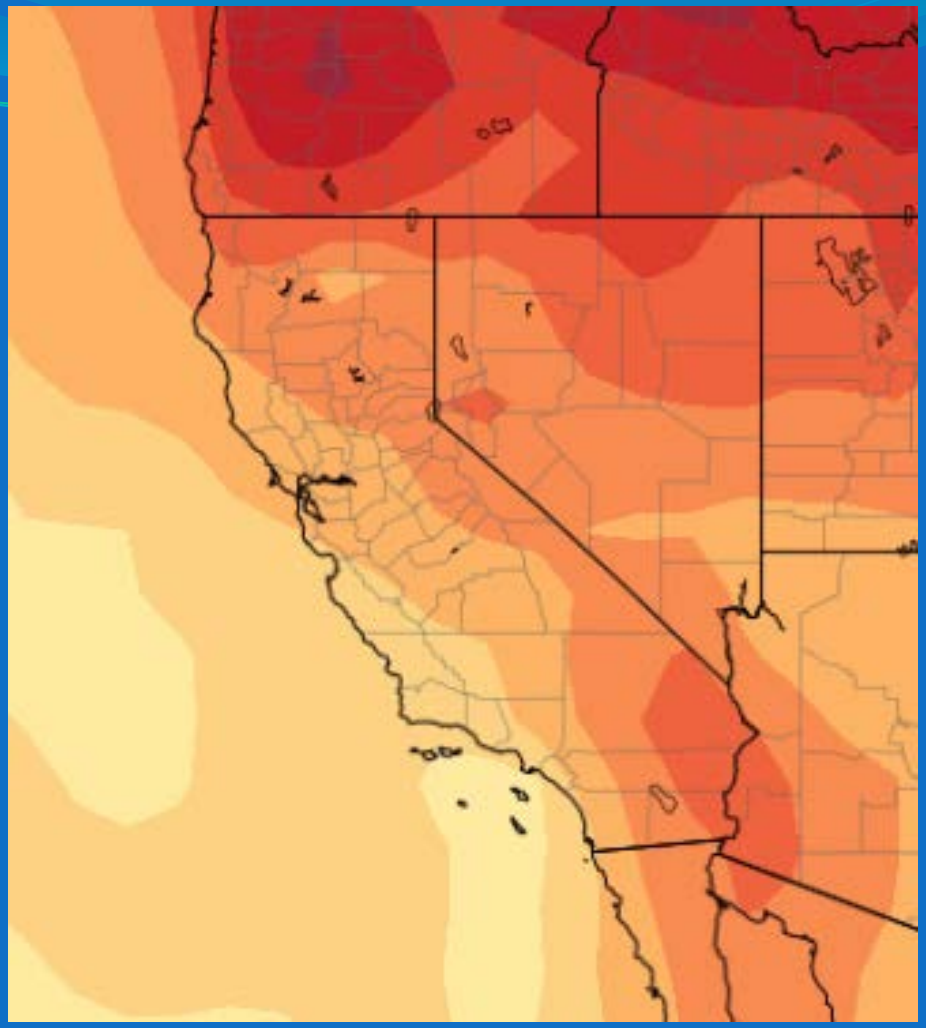
Temperature Anomaly

Mar 12 – 19

- A drier period favored – Orange shading to Brown
- Much cooler than normal – Blue to almost Purple shading



Precipitation Anomaly

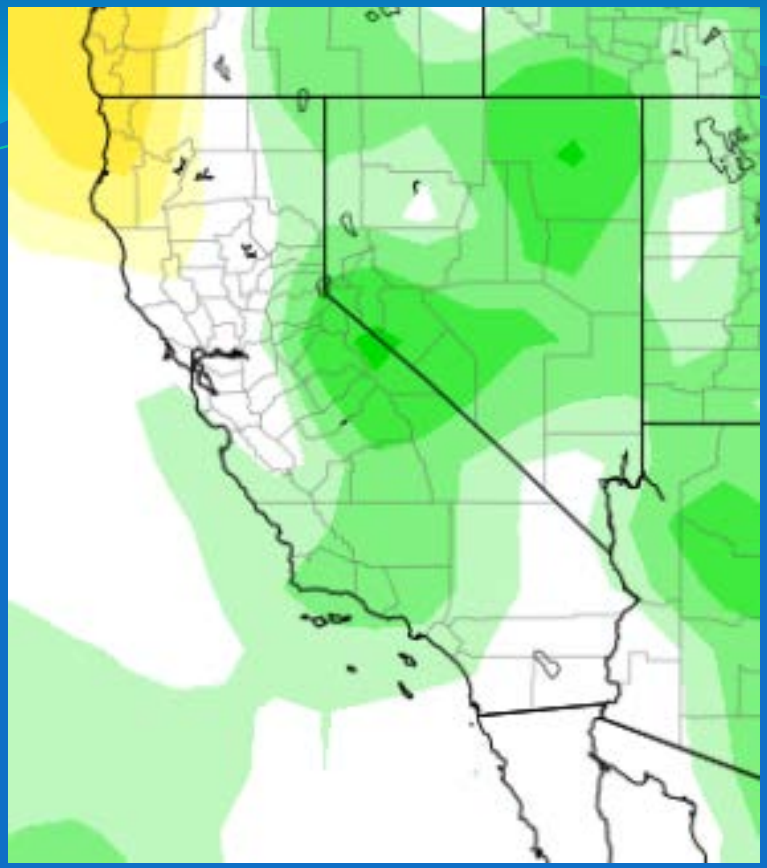


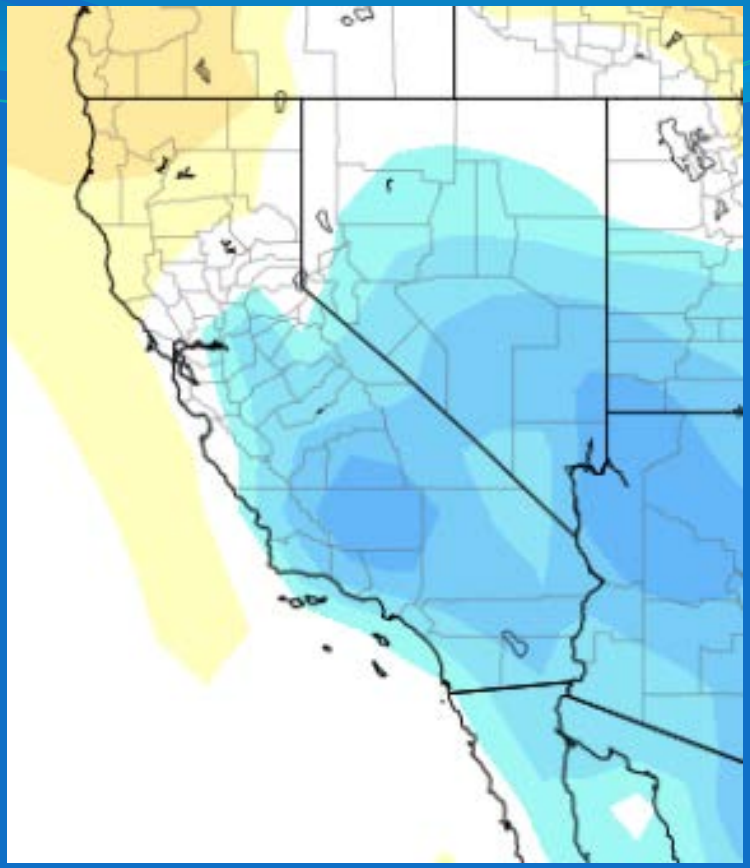
Temperature Anomaly

Mar 19 – 26

- No favored precipitation outcome
- Much warmer than normal

http://www.tropicaltidbits.com/



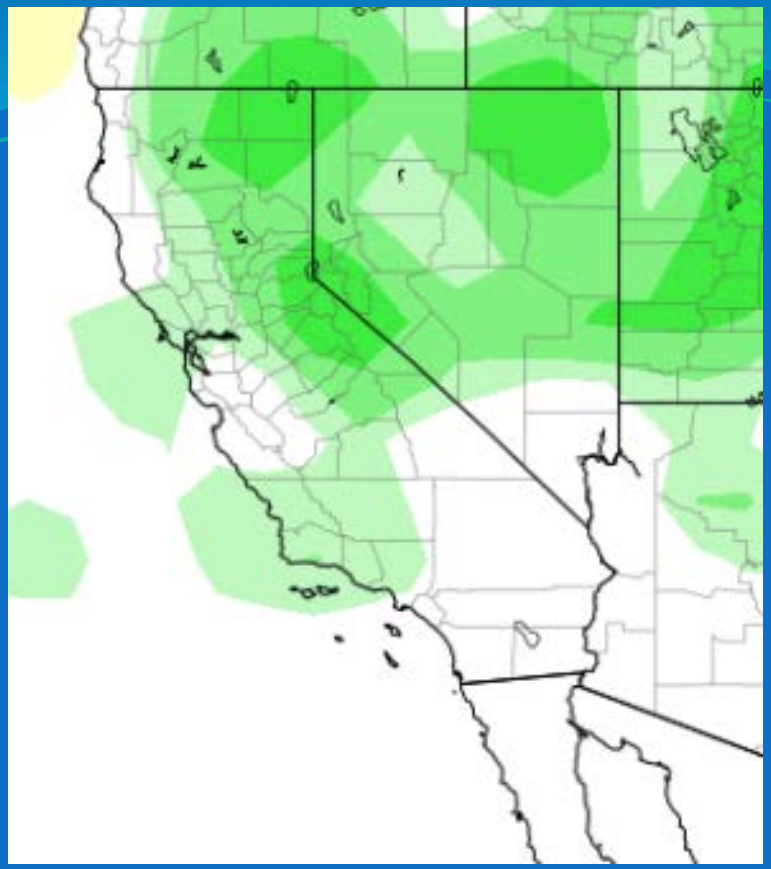


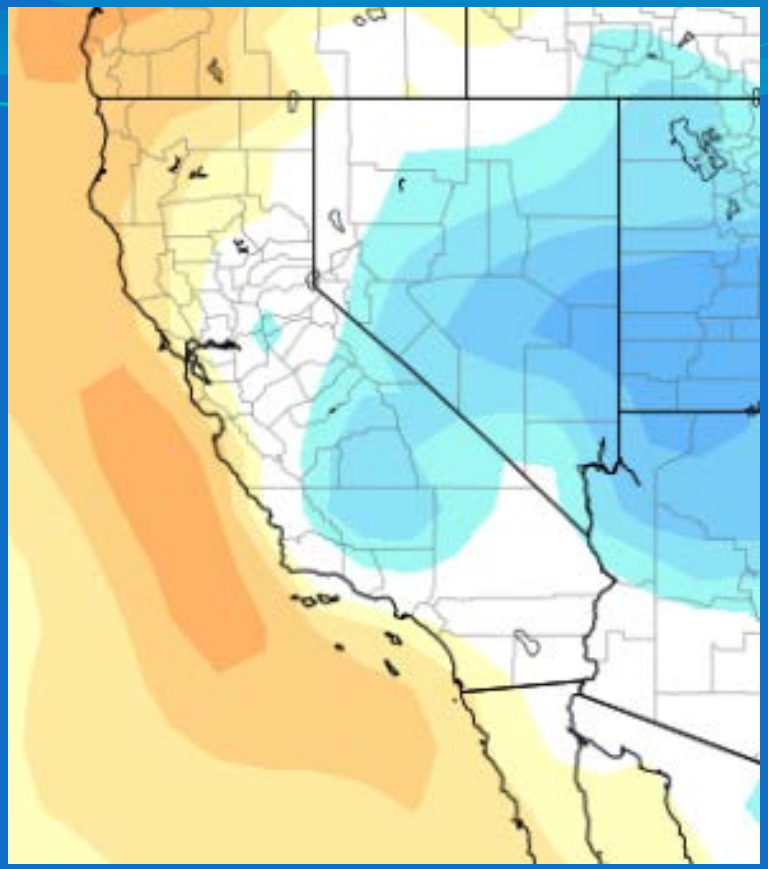
Greens *– Wetter than normal (left)*
Blues/Oranges *– A range of temperature possibilities (right)*
Darker shading *– increased confidence*

Monthly CFS Simulations – Apr 2019

- Starting to favor a wetter than normal Spring
- Temperature forecast is highly variable; near normal north, below normal south

http://www.tropicaltidbits.com/





Greens *– favor much wetter than normal (left)*
Blues *– favor cooler than normal (right)*
Darker shading *– increased confidence*

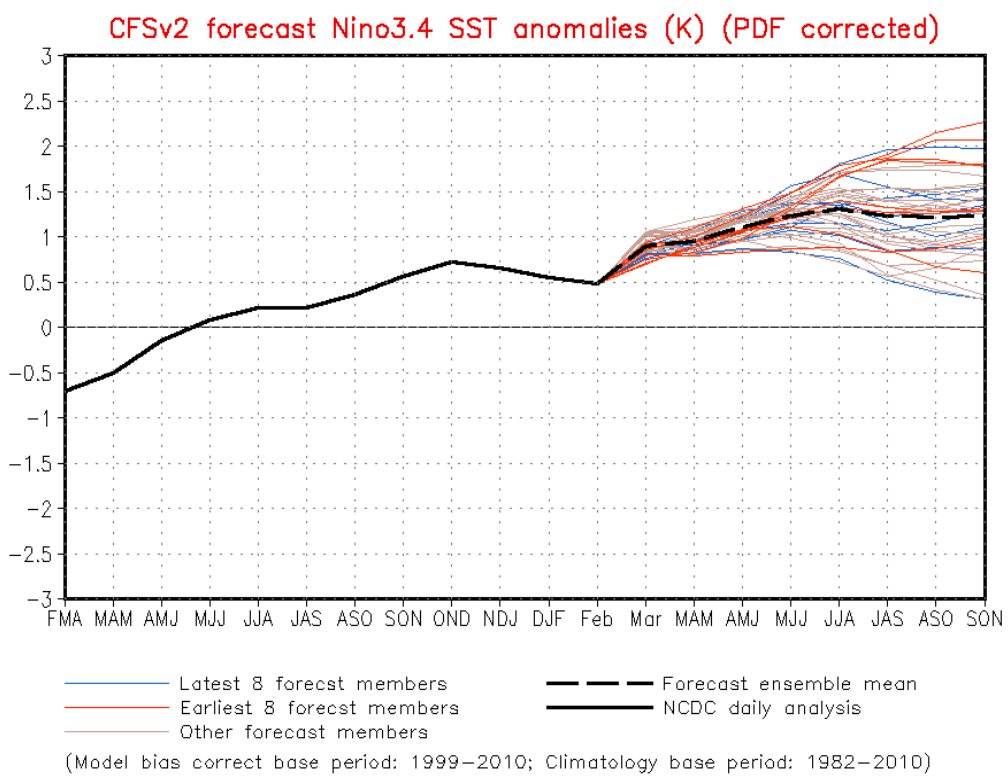
Monthly CFS Simulations – May 2019

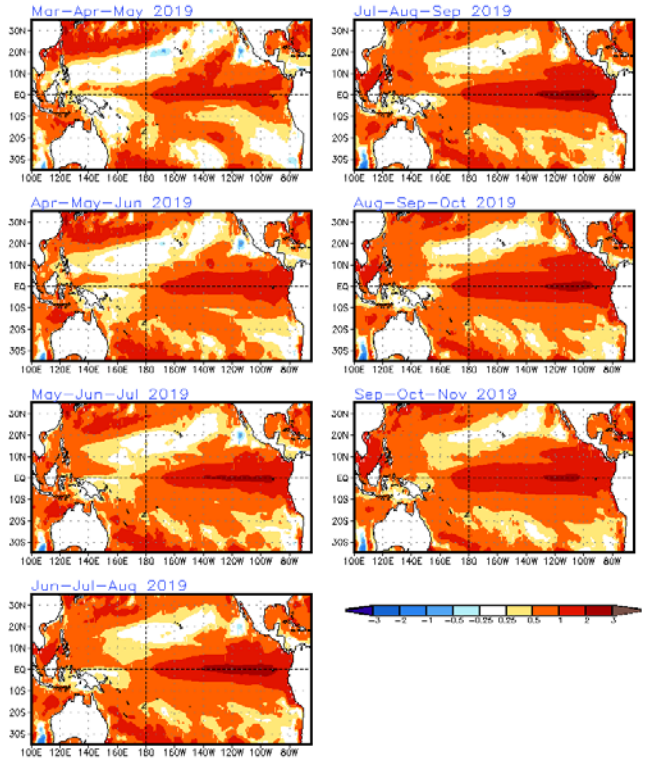
- Higher probabilities of above normal precipitation.
- Increasing chances of below normal temperatures.
- Except near normal northern Sierra

SST Outlook: NCEP CFS.v2 Forecast

Issued: 11 March 2019

The CFS.v2 ensemble mean (black dashed line) predicts El Niño into the Northern Hemisphere fall 2019.





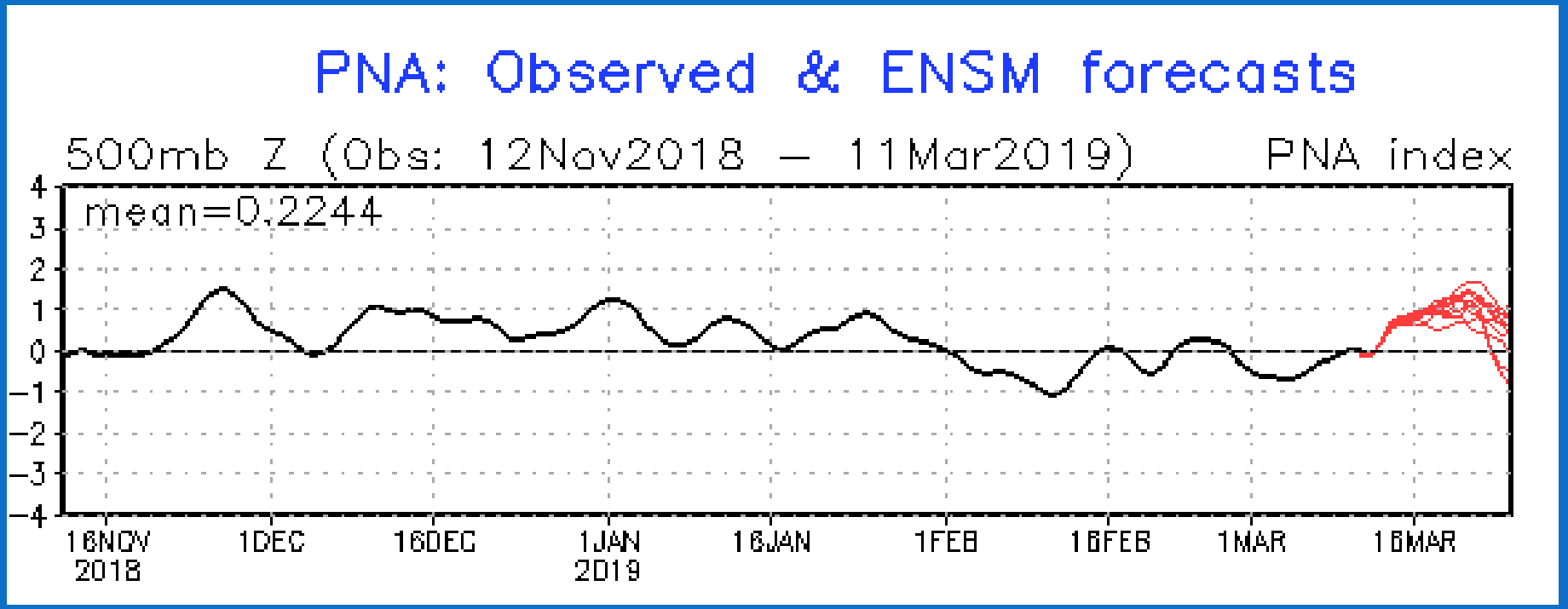
Weak El Niño has little influence on our climate during the spring and summer

https://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/enso.shtml

Pacific/North American Pattern (PNA)

- One of the most prominent modes of low-frequency variability in the Northern Hemisphere extratropics.
- The positive phase of the PNA pattern features above-average heights in the vicinity of Hawaii and over the intermountain region of North America
- **The positive phase of the PNA pattern is associated with above-average temperatures over western Canada and the extreme western United States**
- The associated precipitation anomalies include above-average totals in the Gulf of Alaska extending into the Pacific Northwestern United States
- **No significant impact to precipitation for our region**

PNA Observed and Forecast (from NOAA/CPC)



- Trend is increasingly positive the next week or so
- Higher temperatures more likely
- Precipitation forecast is far less certain

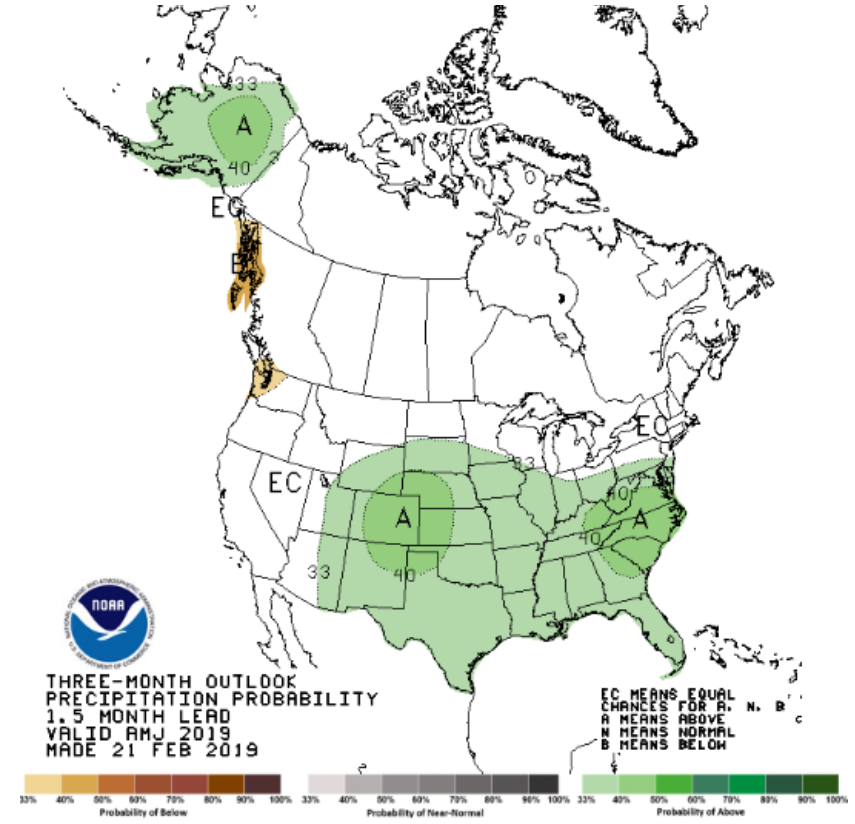
https://www.cpc.ncep.noaa.gov/products/precip/CWlink/pna/pna.shtml

U. S. Seasonal Outlooks

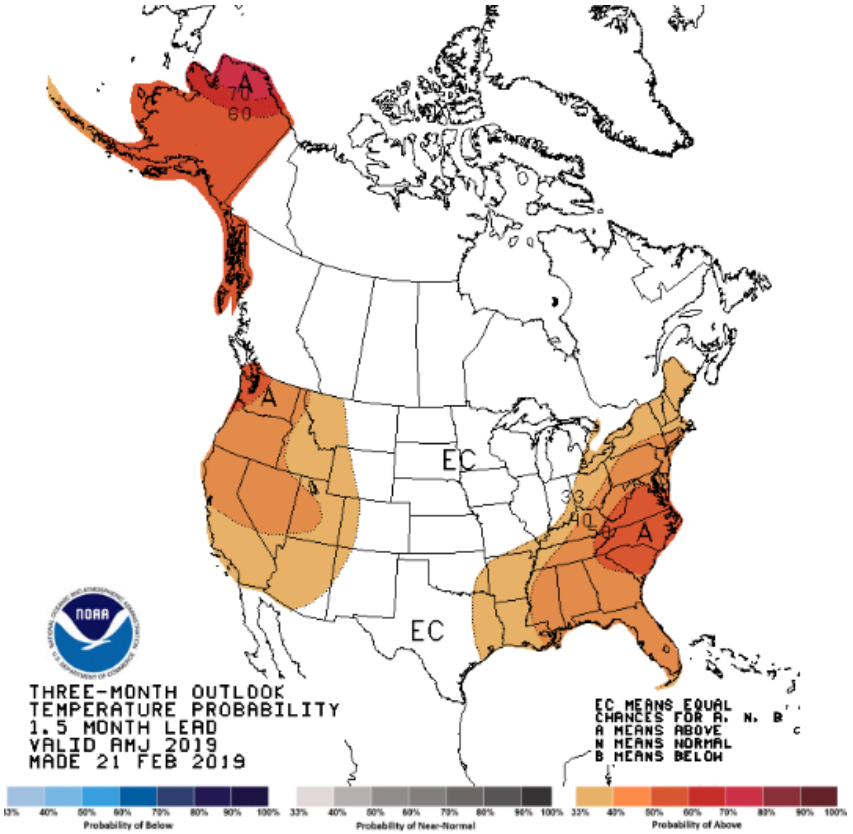
April- June 2019

The seasonal outlooks combine the effects of long-term trends, soil moisture, and, when appropriate, ENSO.

Precipitation



Temperature



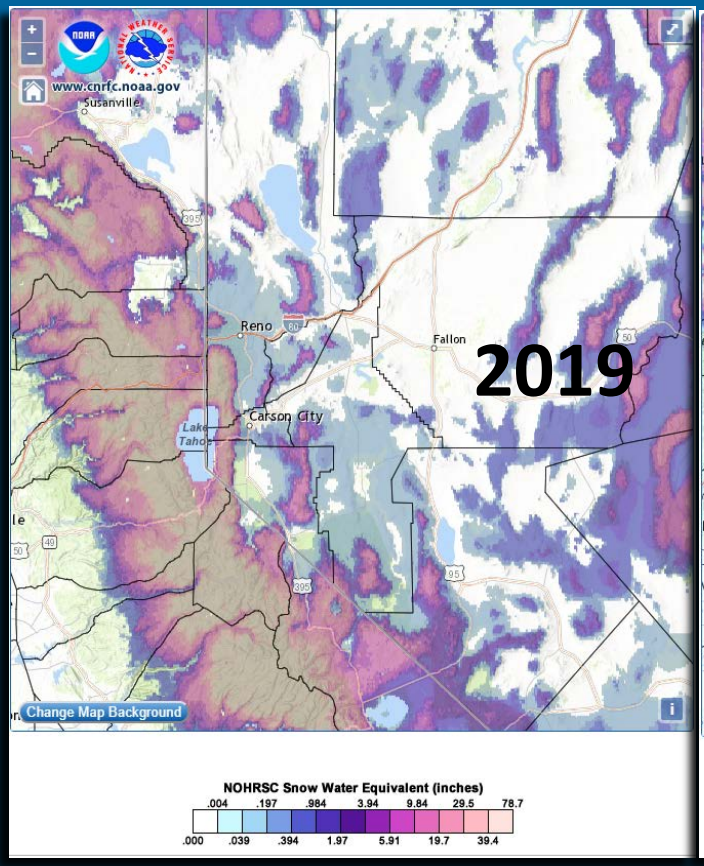
https://www.cpc.ncep.noaa.gov/

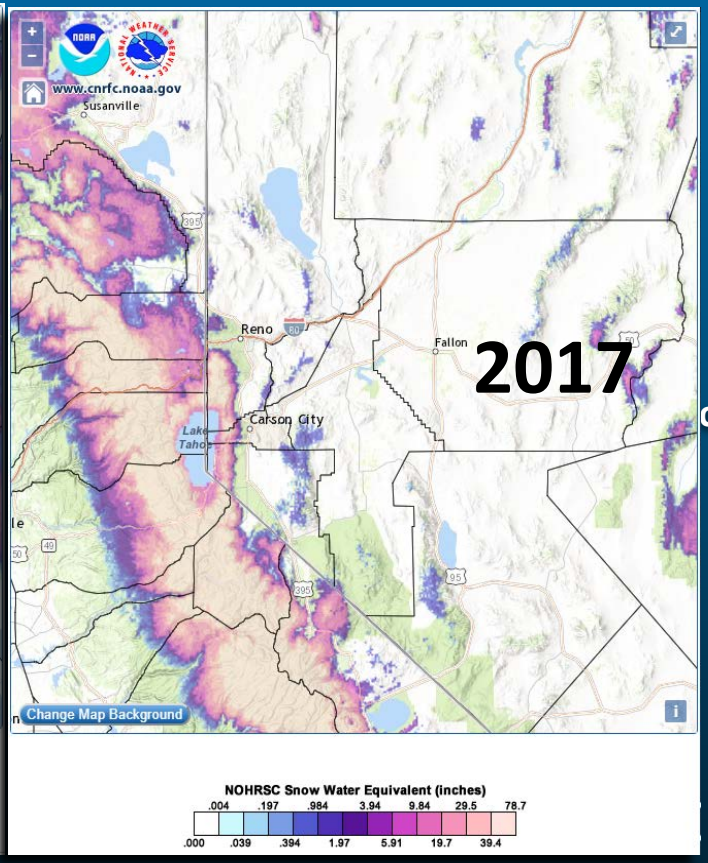
To Sum it Up

- Weak El Niño and slightly Positive PNA.
- Warmer temperatures are slightly more favored with positive PNA
- Positive PNA phase doesn’t really affect precipitation chances.
- Weak El Niño doesn’t affect our area much as we head into spring.
- Very low potential for storms with a significant Atmospheric River component over the next two weeks.
- Shorter range outlooks (CFS) point to a higher probability for a wet April/May period.
- Shorter range outlooks (CFS) point to a higher probability for a cooler May.
- Official outlook for April to June is warmer with no favored precipitation outcome, but this outlook is from Feb 21st.

Hydrology Outlook

Snowpack Status vs 2017 - March 11th





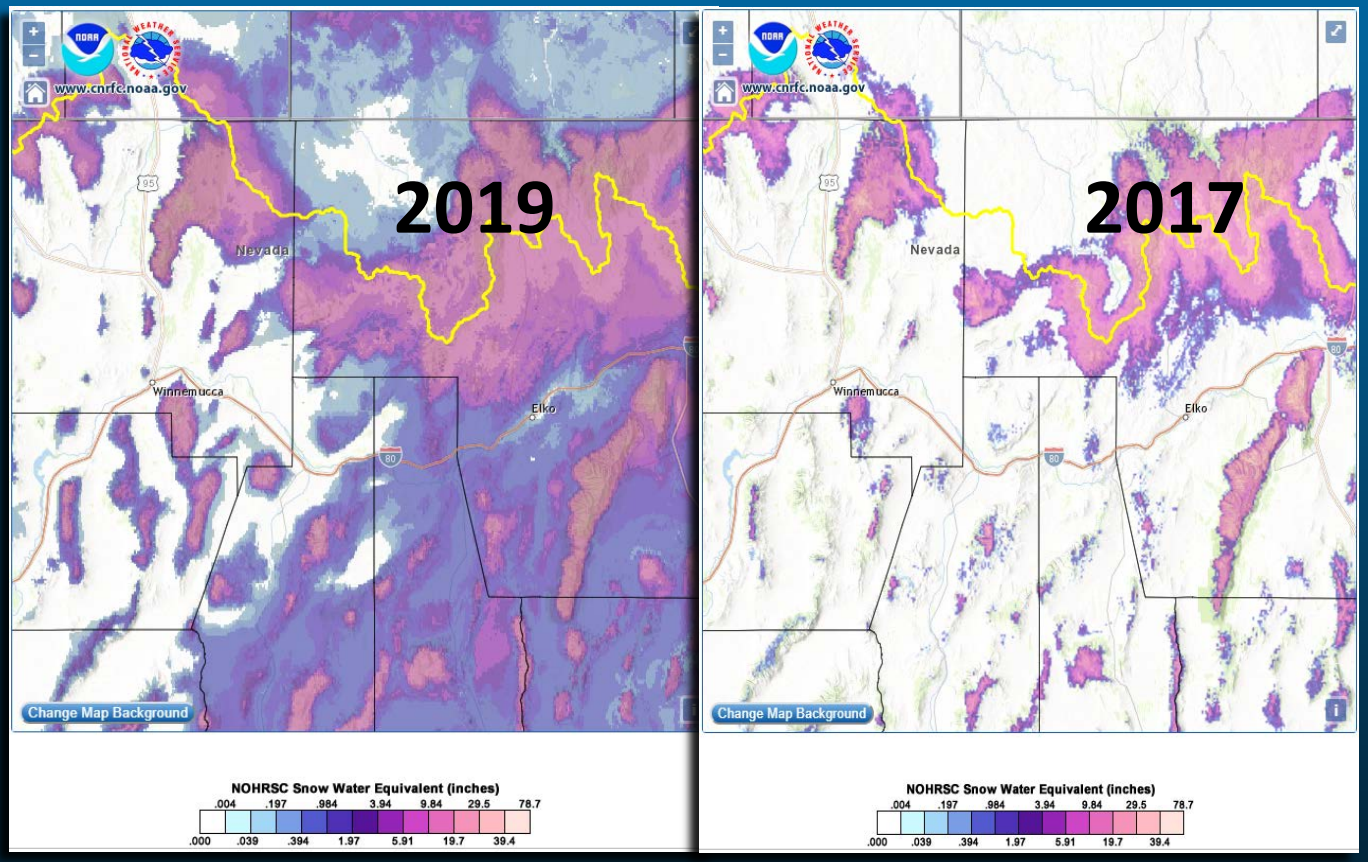
Modeled SWE NOAA NOHRSC

Greater spatial extent of snow in 2019, especially lower-mid elevations.

Less extreme peak water content in higher elevations vs 2017.

Huge vertical gradient in snowpack in 2017 across Eastern Sierra, Tahoe

Snowpack Status vs 2017 - March 11th



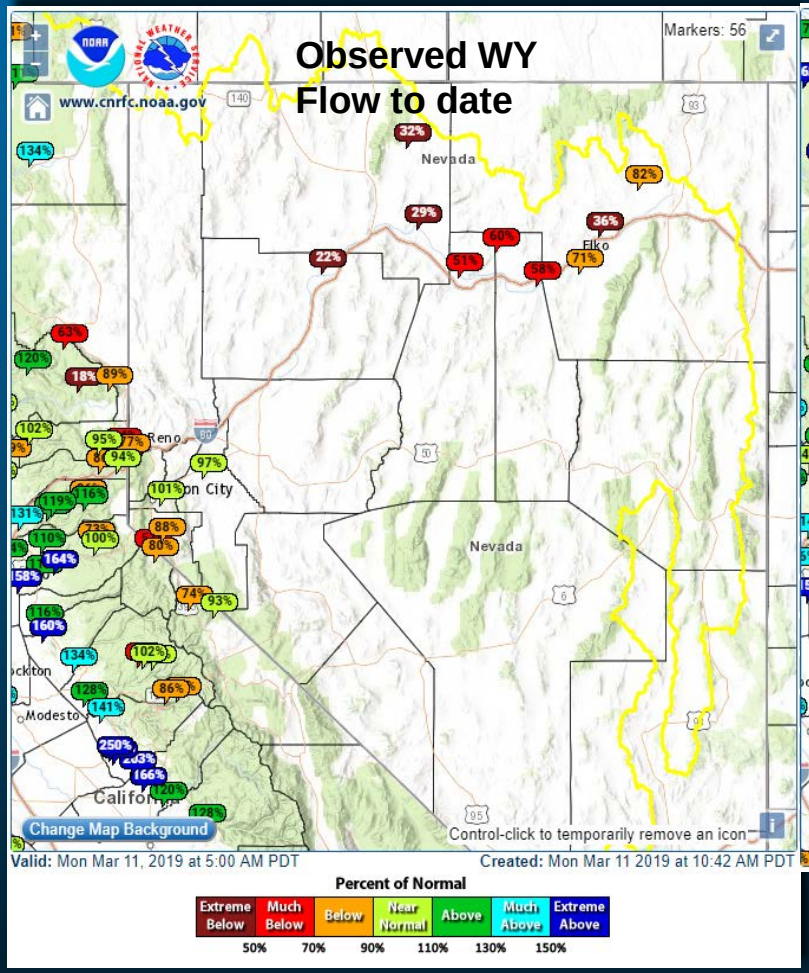
Modeled SWE NOAA NOHRSC

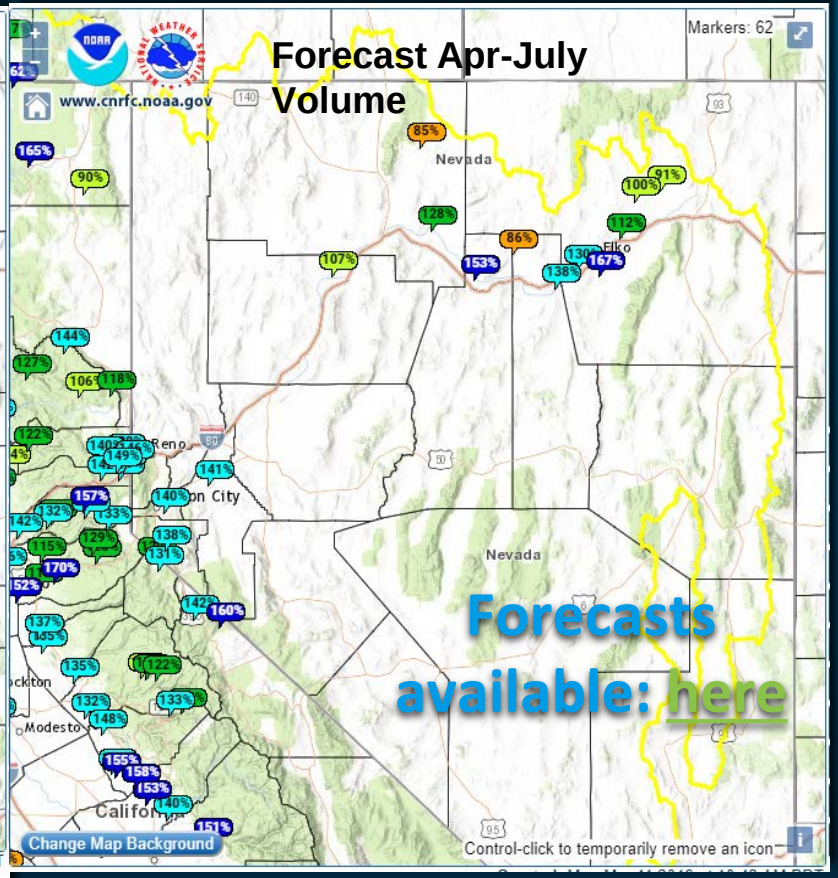
Much greater spatial extent of snow in 2019, especially lower-mid elevations.

Less extreme peak snow water content in higher elevations vs 2017.

Very dynamic low elevation snow with large changes in only a few days

Water Supply & Flood Outlook





5-Day Peaks | 10-Day Traces | 10-Day Probability | 10-Day Accum Vol | 4x5-Day Probability
Monthly Probability | Seasonal Trend Plot | WY Trend Plot | WY Accum Vol | Multi WY Accum Vol
Historical Flows | Verification | Build Your Own

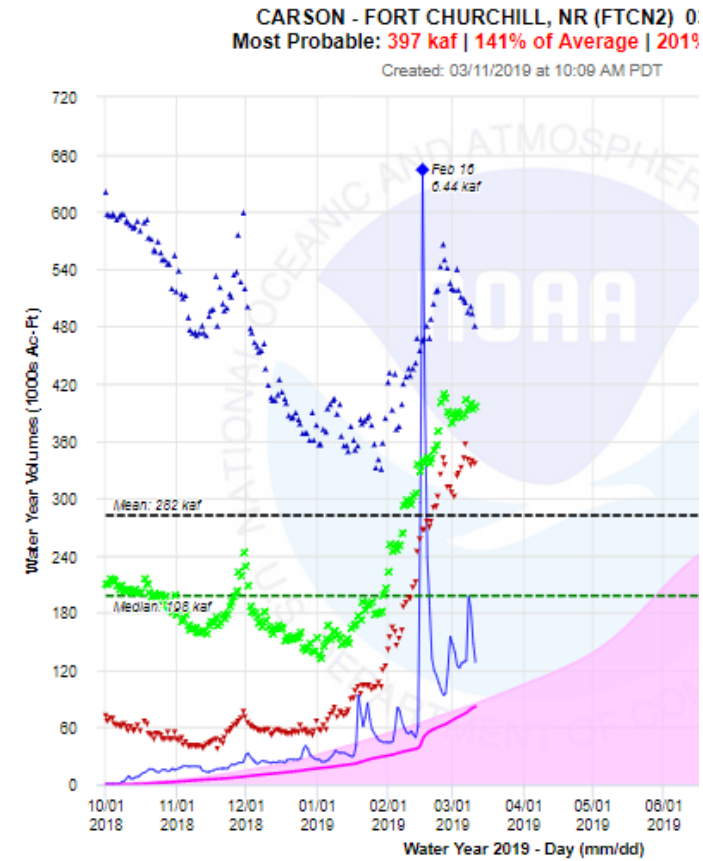
Back to Ensemble Products Map <<< Previous Ensemble Loca

CARSON RIVER - FORT CHURCHILL (FTCN2)

Latitude: 39.29° N Longitude: 119.31° W
Location: Lyon County in Nevada
Issuance Time: Mar 11 2019 at 10:09 AM PDT

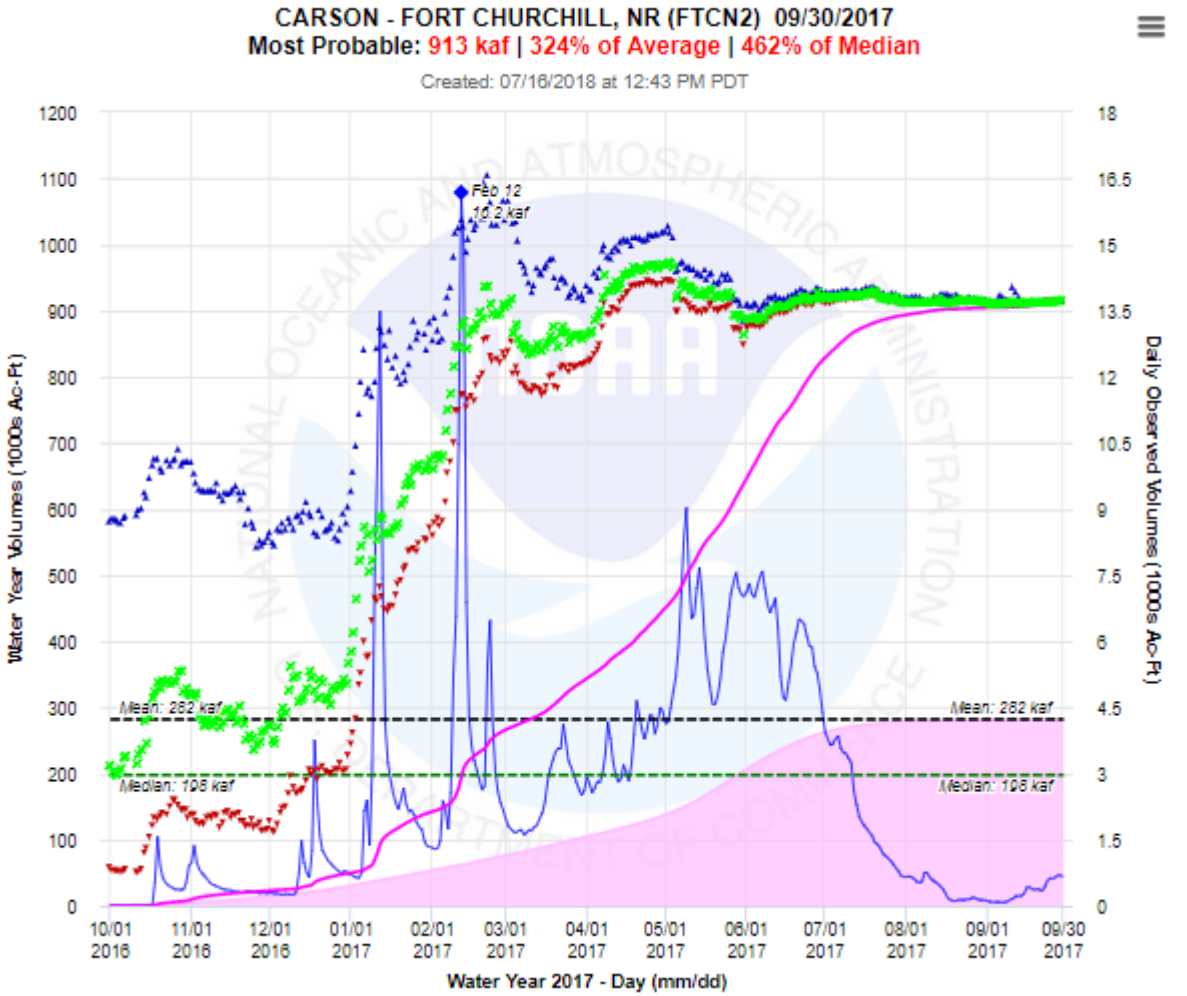
2019 Water Year Trend Plot

Tabular View | Select



2017 Water Year Trend Plot

Tabular View | Select a Different Water Year: 2017



Observed to Date Percent of Average: 97% (81.9 kaf) Water Year to Date Average: 84.5 kaf
Historical Water Year Vol Max: 914 kaf in 2017 Historical Water Year Vol Min: 26.3 kaf in 1977

WY Volume Average | WY Volume Median | WY to Date Obs | WY to Date Avg | Daily Obs
Obs Peak | ESP WY Vol Fcst 10% | ESP WY Vol Fcst 25% | ESP WY Vol Fcst 50% | ESP WY Vol Fcst 75%
ESP WY Vol Fcst 90%

WEST WALKER RIVER - HWY 395 BELOW LITTLE WALKER (WWBC1)

Latitude: 38.38° N Longitude: 119.45° W Elevation: 6501 Feet
Location: Mono County in California

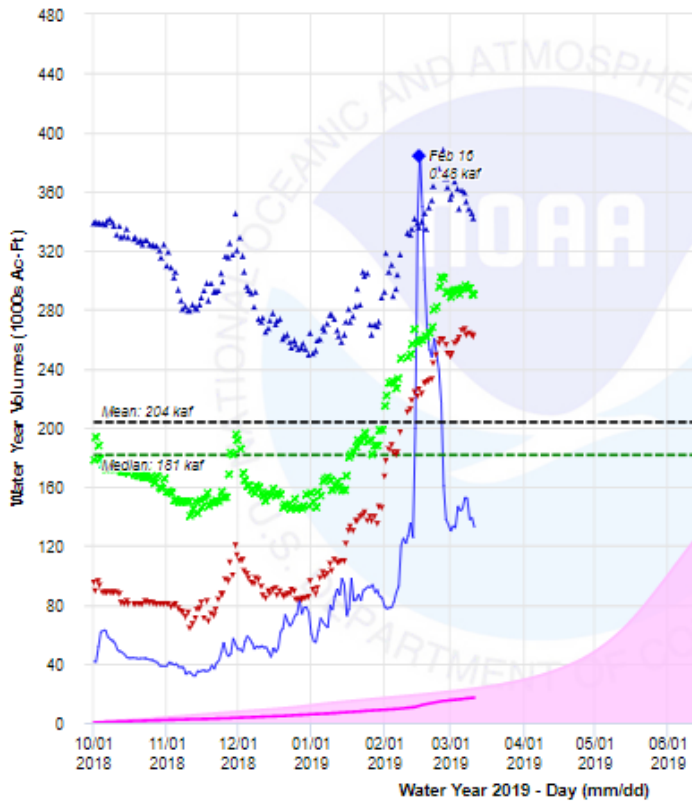
Issuance Time: Mar 11 2019 at 10:09 AM PDT

2019 Water Year Trend Plot

Tabular View | Sele

WEST WALKER - LTL WALKER, BLO, COLEVILLE, NR
Most Probable: 290 kaf | 142% of Average | 16

Created: 03/11/2019 at 10:09 AM PDT

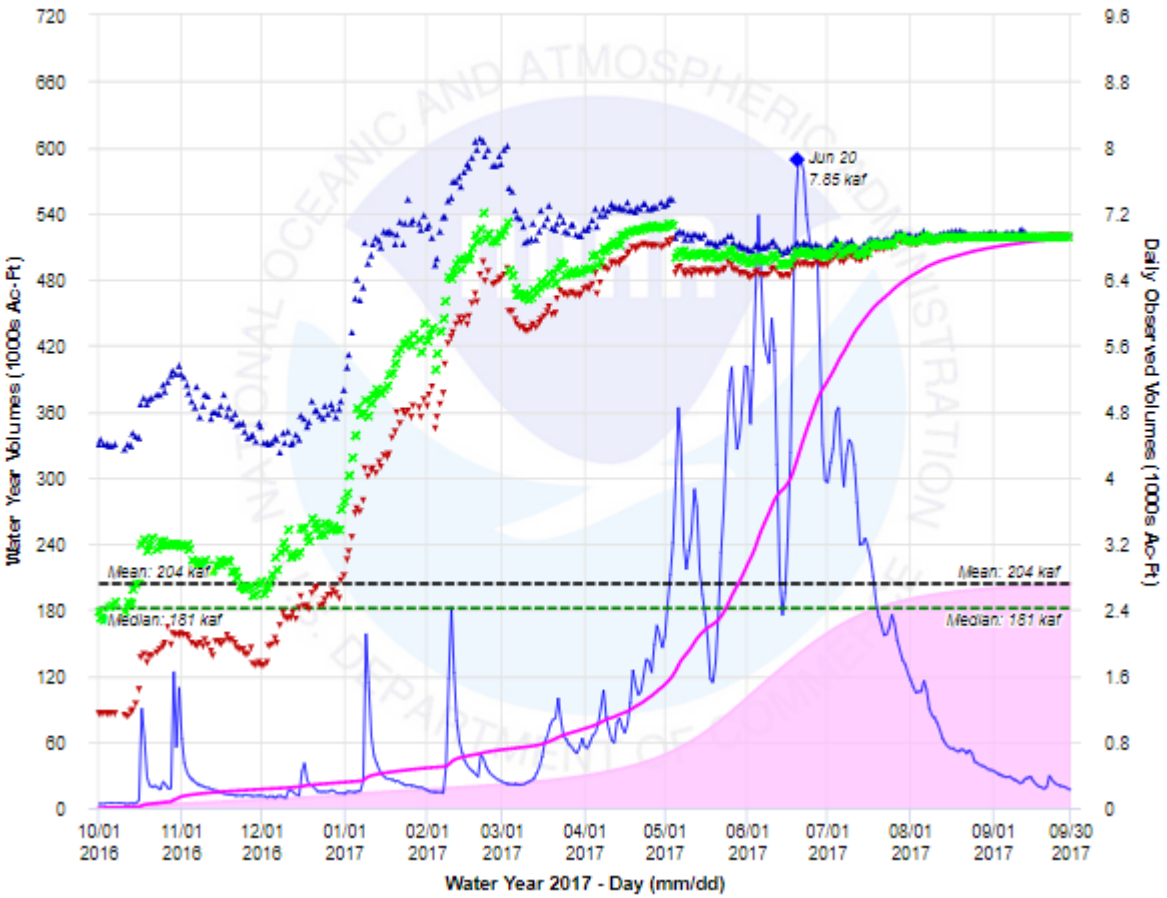


2017 Water Year Trend Plot

Tabular View | Select a Different Water Year: 2017

WEST WALKER - LTL WALKER, BLO, COLEVILLE, NR (WWBC1) 09/30/2017
Most Probable: 518 kaf | 254% of Average | 286% of Median

Created: 07/16/2018 at 12:43 PM PDT



Observed to Date Percent of Average: 74% (17.0 kaf) Water Year to Date Average: 23.1 kaf
Historical Water Year Vol Max: 519 kaf in 2017 Historical Water Year Vol Min: 48.3 kaf in 1977

WY Volume Average | WY Volume Median | WY to Date Obs | WY to Date Avg | Daily Obs
Obs Peak | ESP WY Vol Fcst 10% | ESP WY Vol Fcst 25% | ESP WY Vol Fcst 50% | ESP WY Vol Fcst 75%
ESP WY Vol Fcst 90%

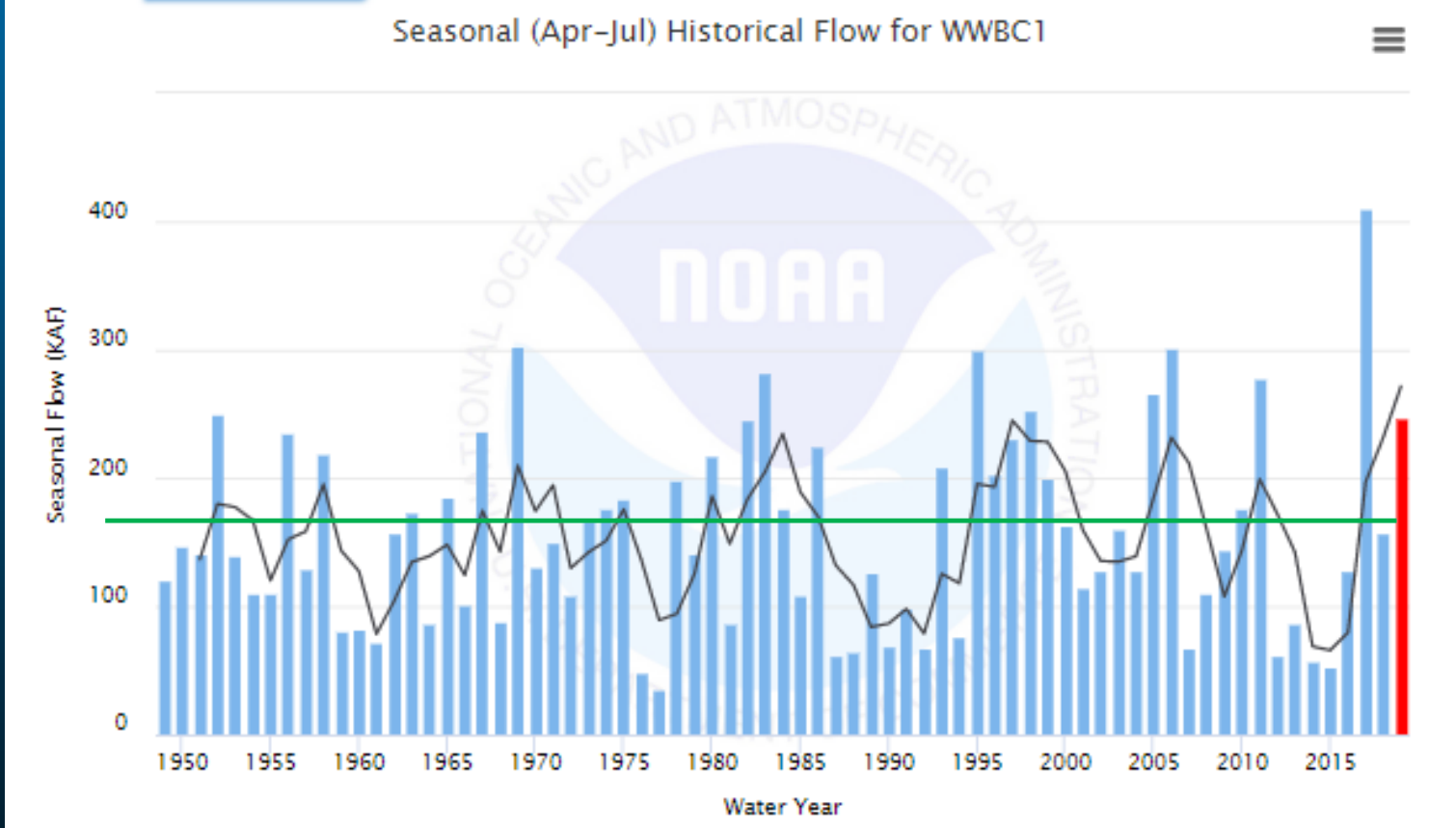
WEST WALKER RIVER - HWY 395 BELOW LITTLE WALKER (WWBC1)

Latitude: 38.38° N Longitude: 119.45° W Elevation: 6591 Feet
Location: Mono County in California River Group: Eastern Sierra

Issuance Time: Mar 11 2019 at 10:09 AM PDT

Historical Flows

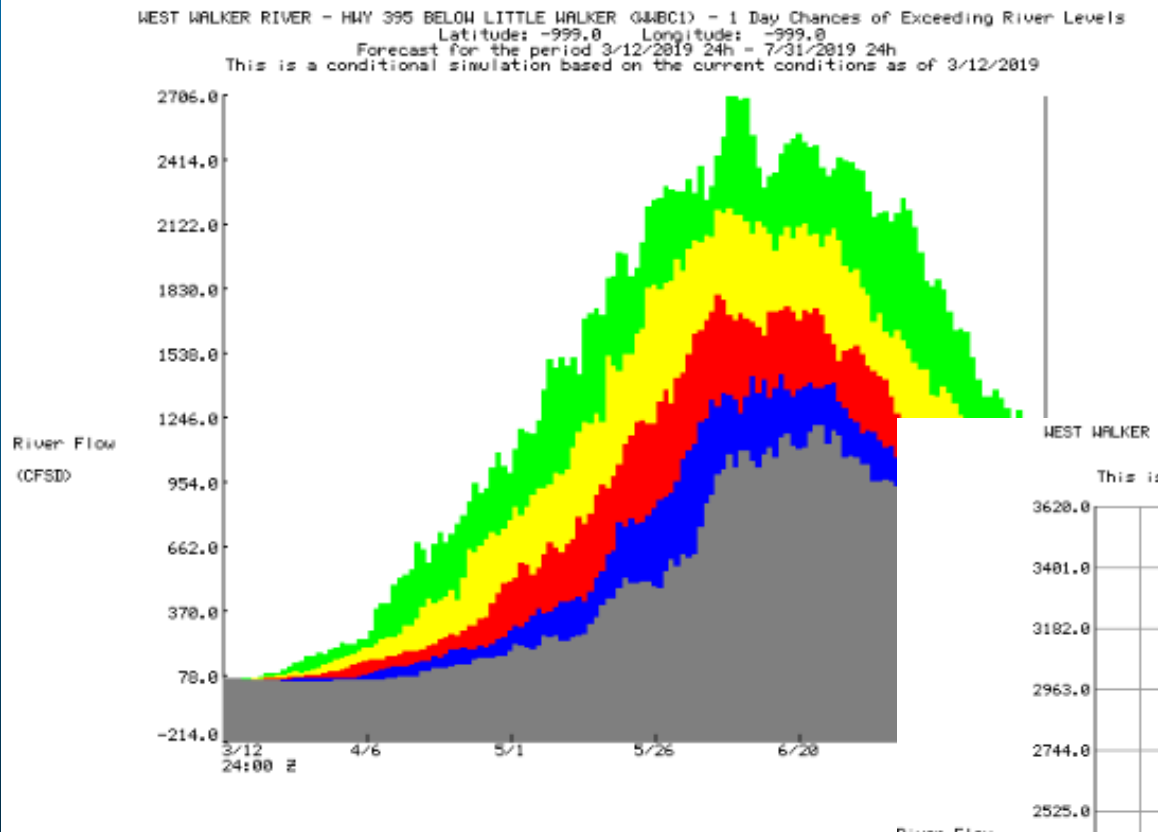
Water Year | **Seasonal (Apr-Jul)**

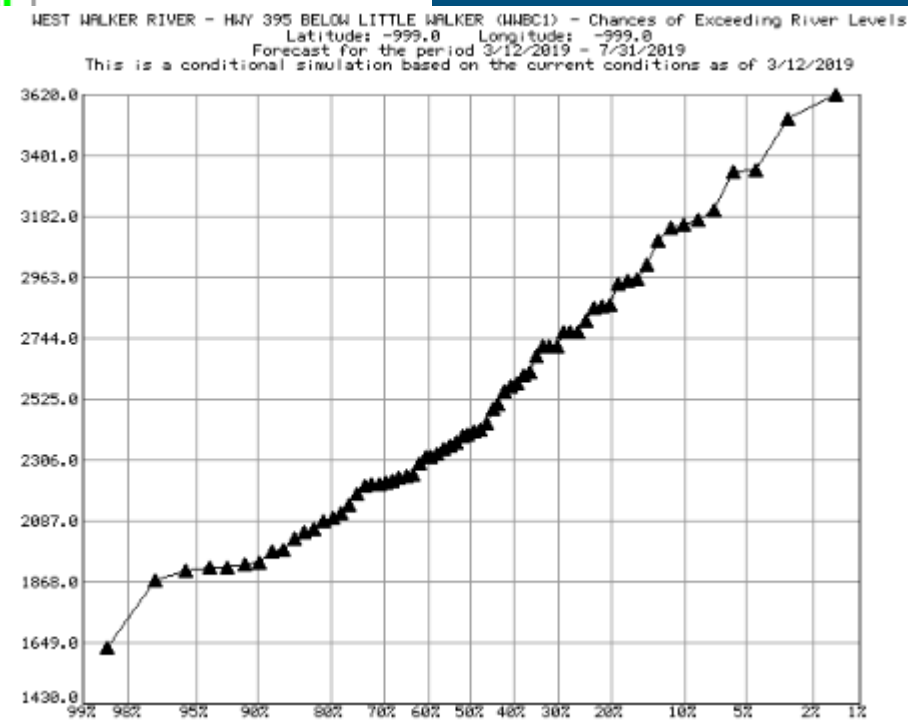


Build your own probability plots

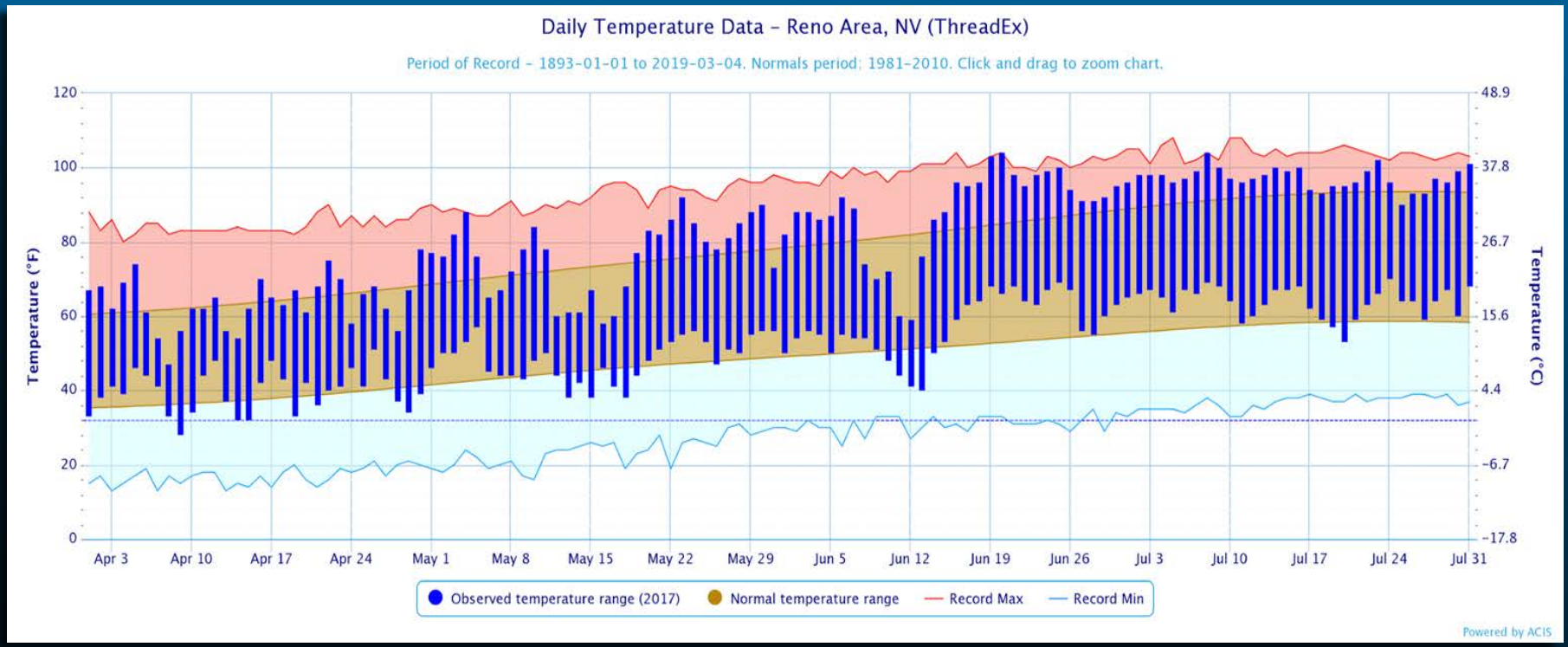
WEST WALKER RIVER - HWY 395 BELOW LITTLE WALKER (WWBC1)

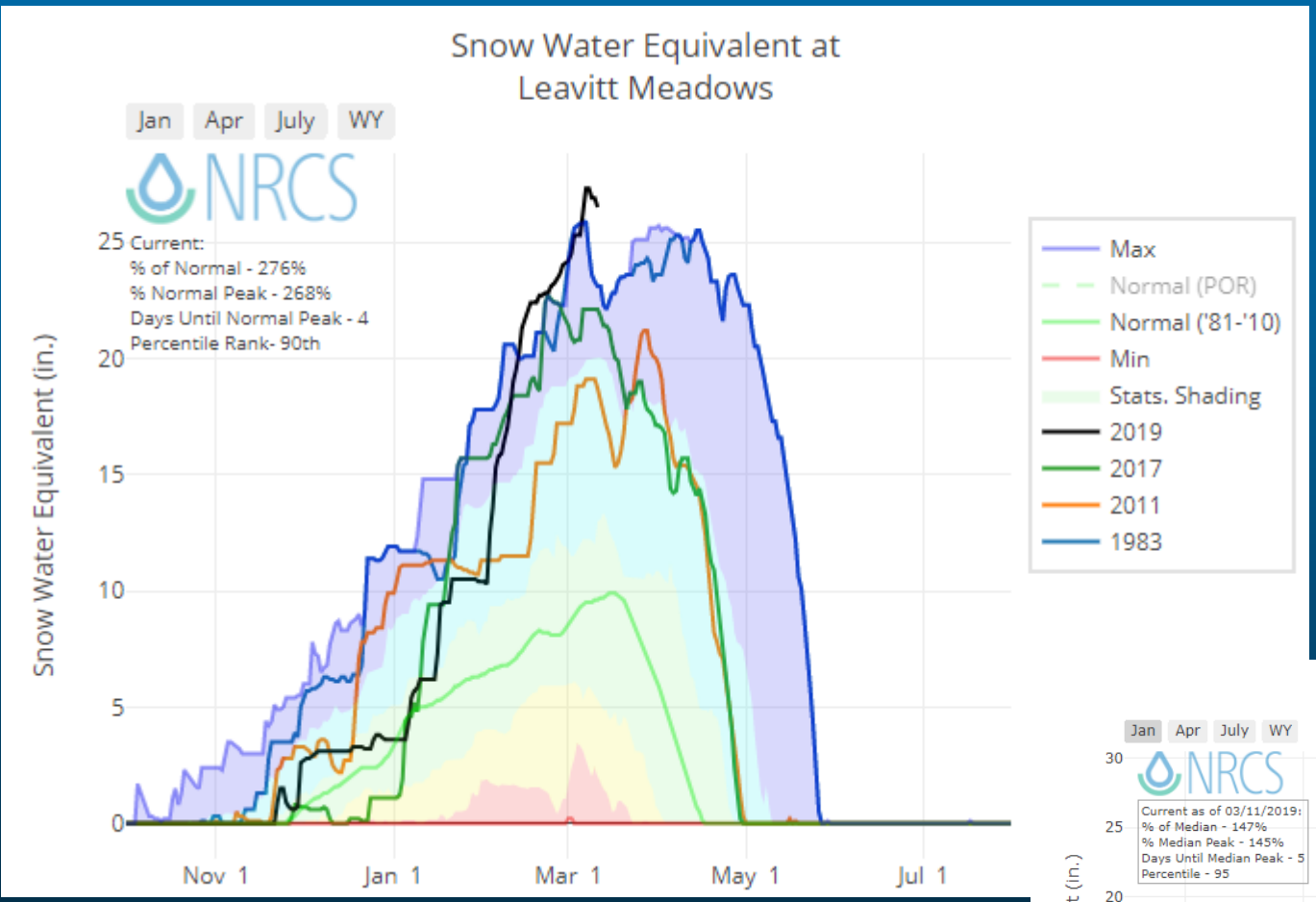
Latitude: 38.38° N Longitude: 119.45° W Elevation: 6591 Feet
Location: Mono County in California River Group: Eastern Sierra
1 Day Chances of Exceeding River Levels

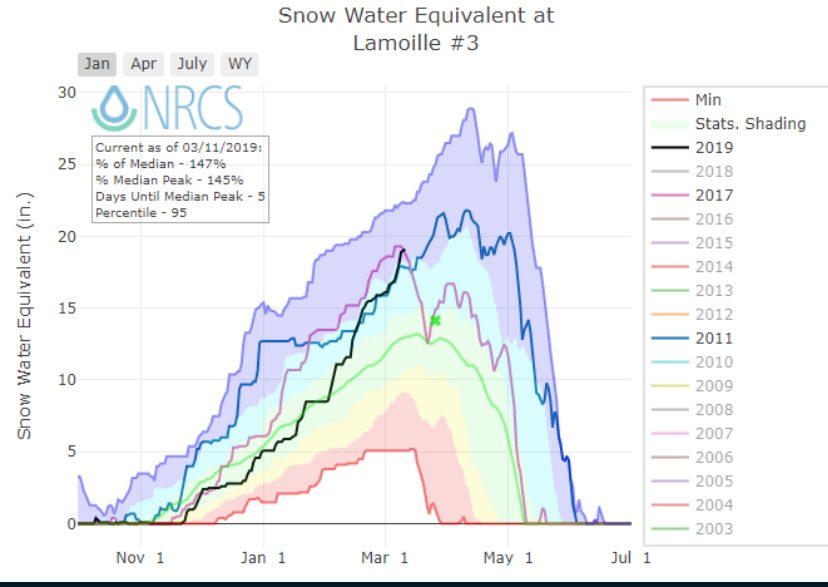




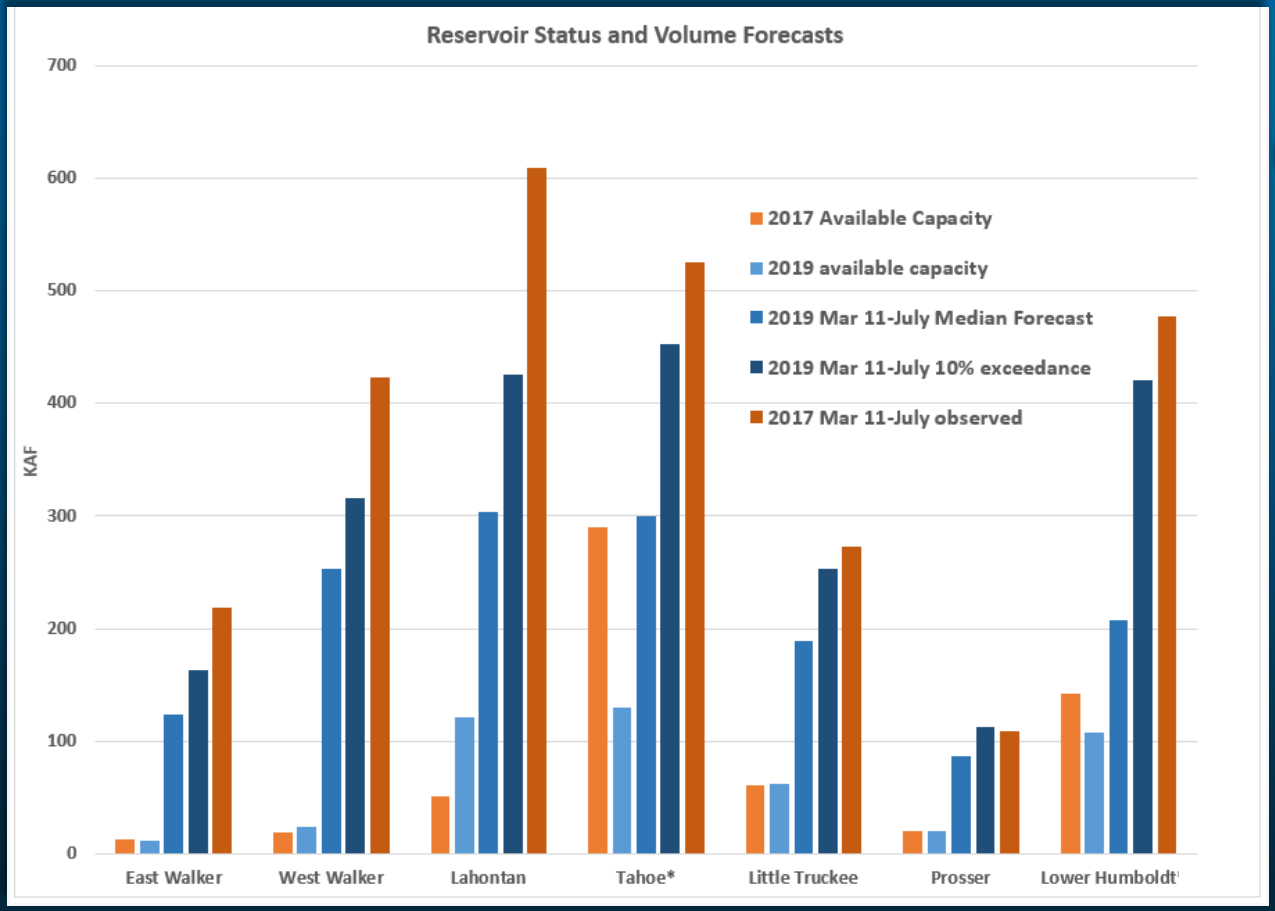
2017 temperature date – Snowmelt flooding could have been much worse




Snow Water Equivalent at
Leavitt Meadows
Jan
Apr
July
WY
NRCS
Current:
% of Normal - 276%
% Normal Peak - 268%
Days Until Normal Peak - 4
Percentile Rank- 90th
Snow Water Equivalent (in.)
25
20
15
10
5
0
Nov 1
Jan 1
Mar 1
May 1
Jul 1
Max
Normal (POR)
Normal ('81-'10)
Min
Stats. Shading
2019
2017
2011
1983


Snow Water Equivalent at
Lamoille #3
Jan
Apr
July
WY
NRCS
Current as of 03/11/2019:
% of Median - 147%
% Median Peak - 145%
Days Until Median Peak - 5
Percentile - 95
Snow Water Equivalent (in.)
30
25
20
15
10
5
0
Nov 1
Jan 1
Mar 1
May 1
Jul 1
Min
Stats. Shading
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
2004
2003

Reservoir Status & Space Remaining vs Inflow



While 2019 forecast volumes far exceed reservoir space, expected volumes (even the 10% exceedance) are significantly lower than 2017 observed

*Tahoe has simplified inflow estimate, and Rye Patch on Lower Humboldt estimated 3/11 storage

Snowmelt Flood Potential Matrix

Location	Action	Minor	Moderate	Major
Pit River nr Canby				
Susan R nr Susanville				
Middle Fork of the Feather nr Portola				
Truckee nr Truckee				
Truckee at Vista				
West Fork of Carson Woodfords				
East Fork of Carson Gardnerville				
Carson R nr Carson				
West Walker blw Little Walker				
Walker River nr Mason*				
Humboldt nr Imlay				
Mono County small streams**				

Unlikely
Low probability
Moderate Probability
High Probability
Very High Probability

Outlook based purely on snowmelt flood potential. Does not incorporate heavy spring rain flooding. Focused on W Nevada and NE California, Don't forget Humboldt and tribs (especially Lamoille Creek)

Current channel capacity can be a wild card.

*Ongoing efforts to address sediment on the Walker should change this risk, and matrix significantly.

** no specific flood stages set

Recap - Outlook and Key Scenarios

Key Points

- Region prone to flooding if we have strong AR events March-April. Above normal risk of snowmelt flooding on unregulated rivers and streams May-July depending on swings in weather, temperatures.
- **Scenarios we're watching: 1)** wet + warm AR (3-7 day lead time), **2)** sudden + prolonged heatwave (4-8 day lead time).
  Worst case scenario for flooding: keep building snowpack this spring including mid/low elevations then a big AR or heatwave.
- **Let's end positively:** Water supply looking great with CNRFC outlooks showing 1.5 to 2x normal volume. Peak flows May-June.

Situational Awareness - When Should I Freak Out?

NWS Reno Monthly Scan for Hydrological Issues in the Sierra + Northern/Western Nevada

	1st Half of March	2nd Half of March	April	May	June	July
Flooding from Heavy Rainfall	No big AR signal next 1-2 weeks.	No clear signals but setup is there for flooding if we see a strong, warm AR		Less AR, but more t-storm flash flood concern	Flash flood events from t-storms - mainly a concern for recent burn areas + steep terrain + urban zones.	
Flooding from Snowmelt	We're fine here - not high enough solar angle/ warm enough for rapid snowmelt. Reductions in low elevation snow can reduce flood risk some.		Low elevations melting. Increased flows.	Mid and upper elevation snows start melting, rate depends on how hot we get. Above normal flows pretty certain, but flooding TBD.		High flows likely to continue.

What Does This Mean? Integrates impacts and confidence	No worries	Low freakoutness	Moderate freakoutness	High freakoutness	Really bad