



United States Department of Agriculture



Natural
Resources
Conservation
Service

nrcs.usda.gov/

Cara McCarthy

**National Water
and
Climate Center**

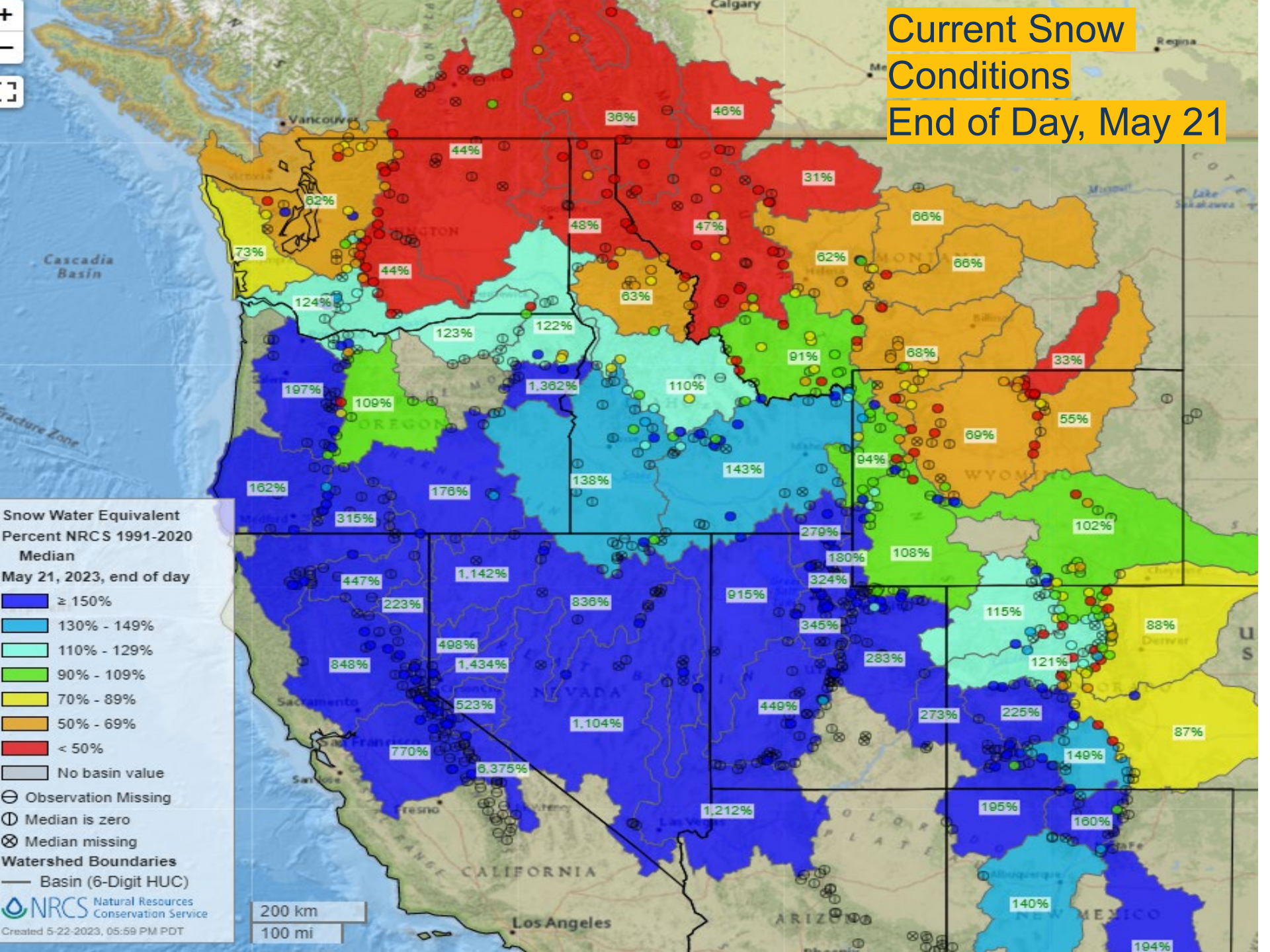
**Snow Survey
and
Water Supply
Forecasting**

**WSWC Spring
Meeting
Water Resources
Committee**

May 23, 2023



Current Snow Conditions End of Day, May 21




Snow Water Equivalent Percent NRCS 1991-2020 Median
May 21, 2023, end of day

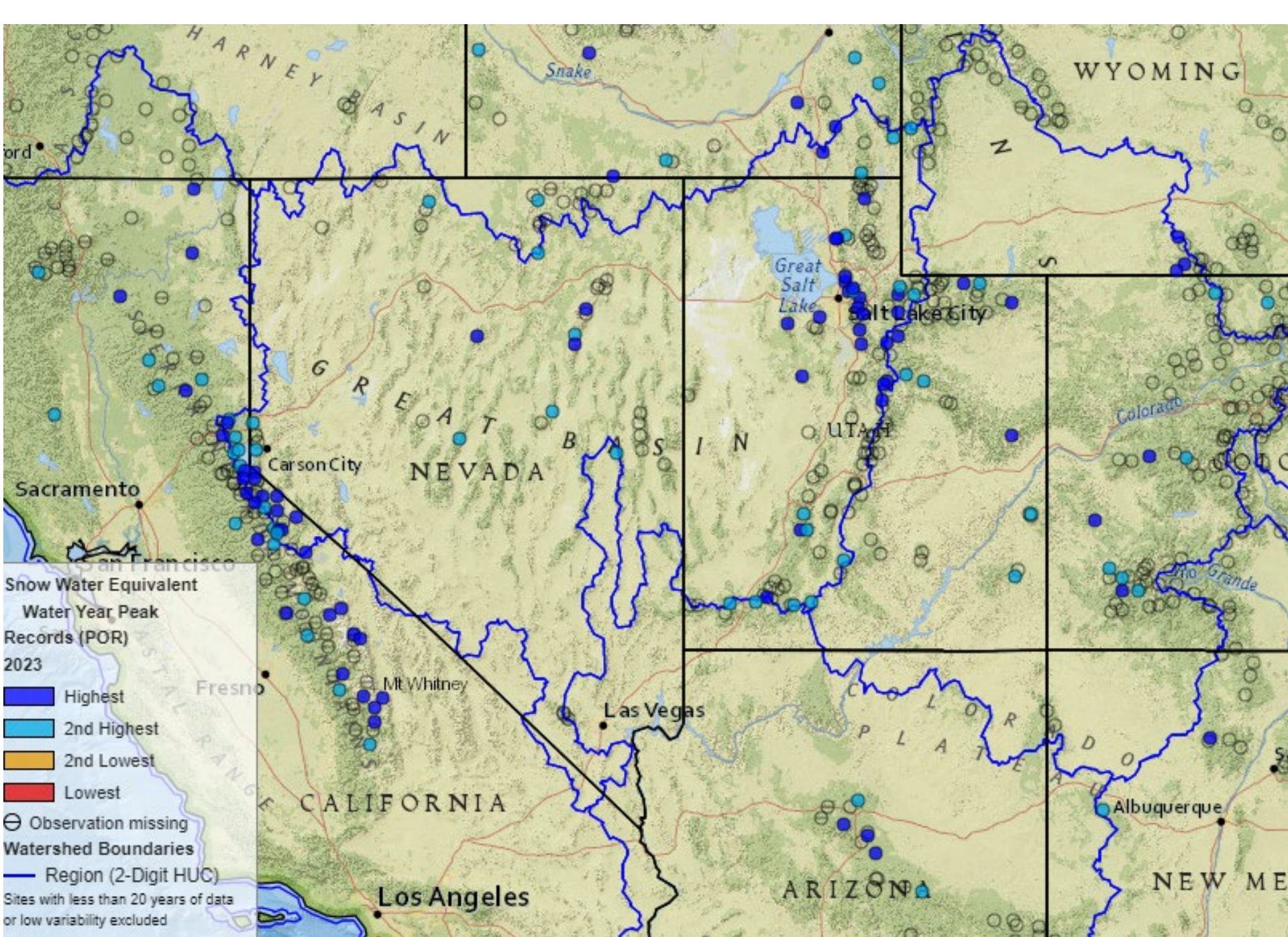
- $\geq 150\%$
- 130% - 149%
- 110% - 129%
- 90% - 109%
- 70% - 89%
- 50% - 69%
- < 50%
- No basin value

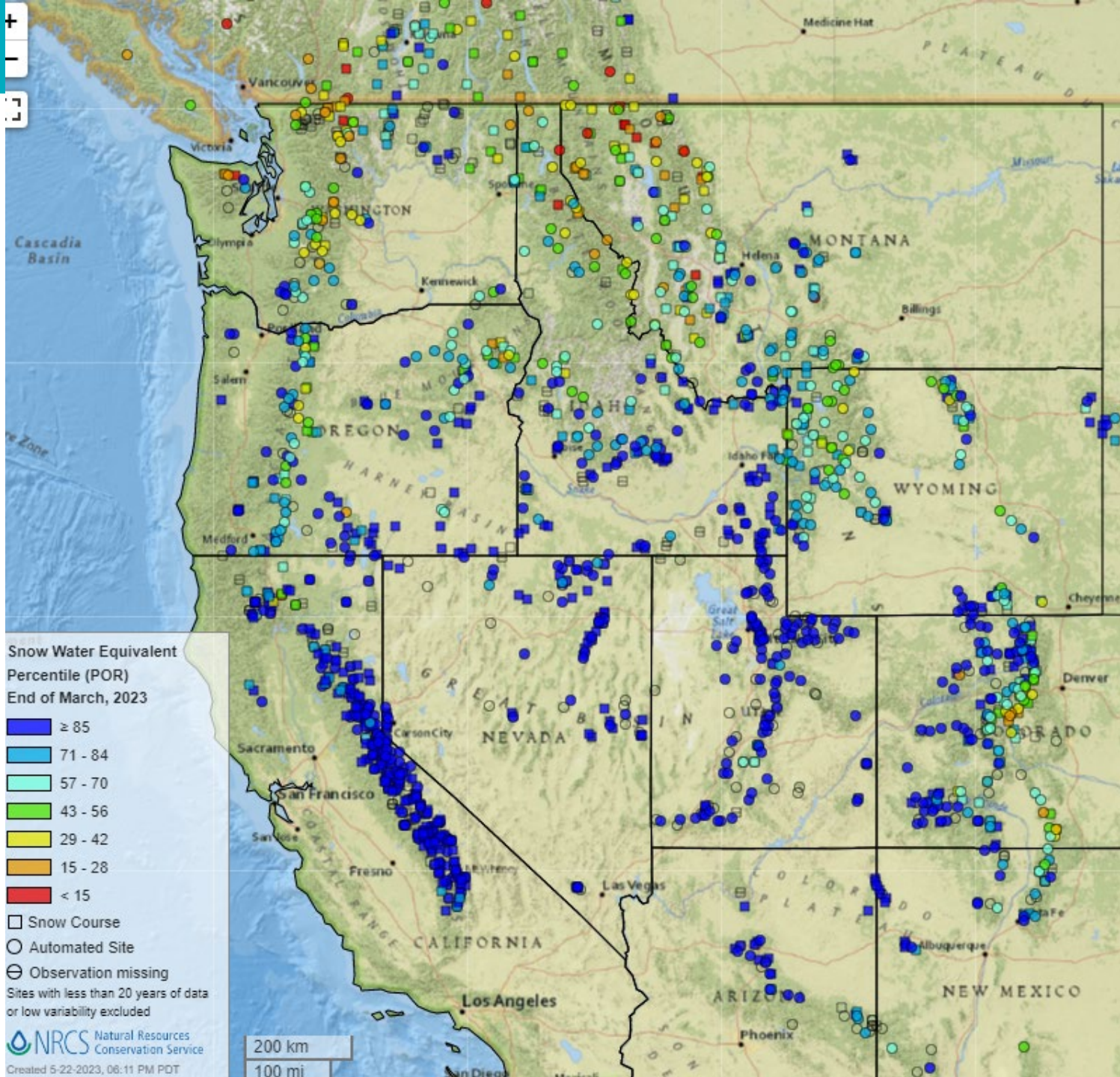
⊖ Observation Missing
⊕ Median is zero
⊗ Median missing

Watershed Boundaries
— Basin (6-Digit HUC)

 **NRCS** Natural Resources Conservation Service
Created 5-22-2023, 05:59 PM PDT

200 km
100 mi



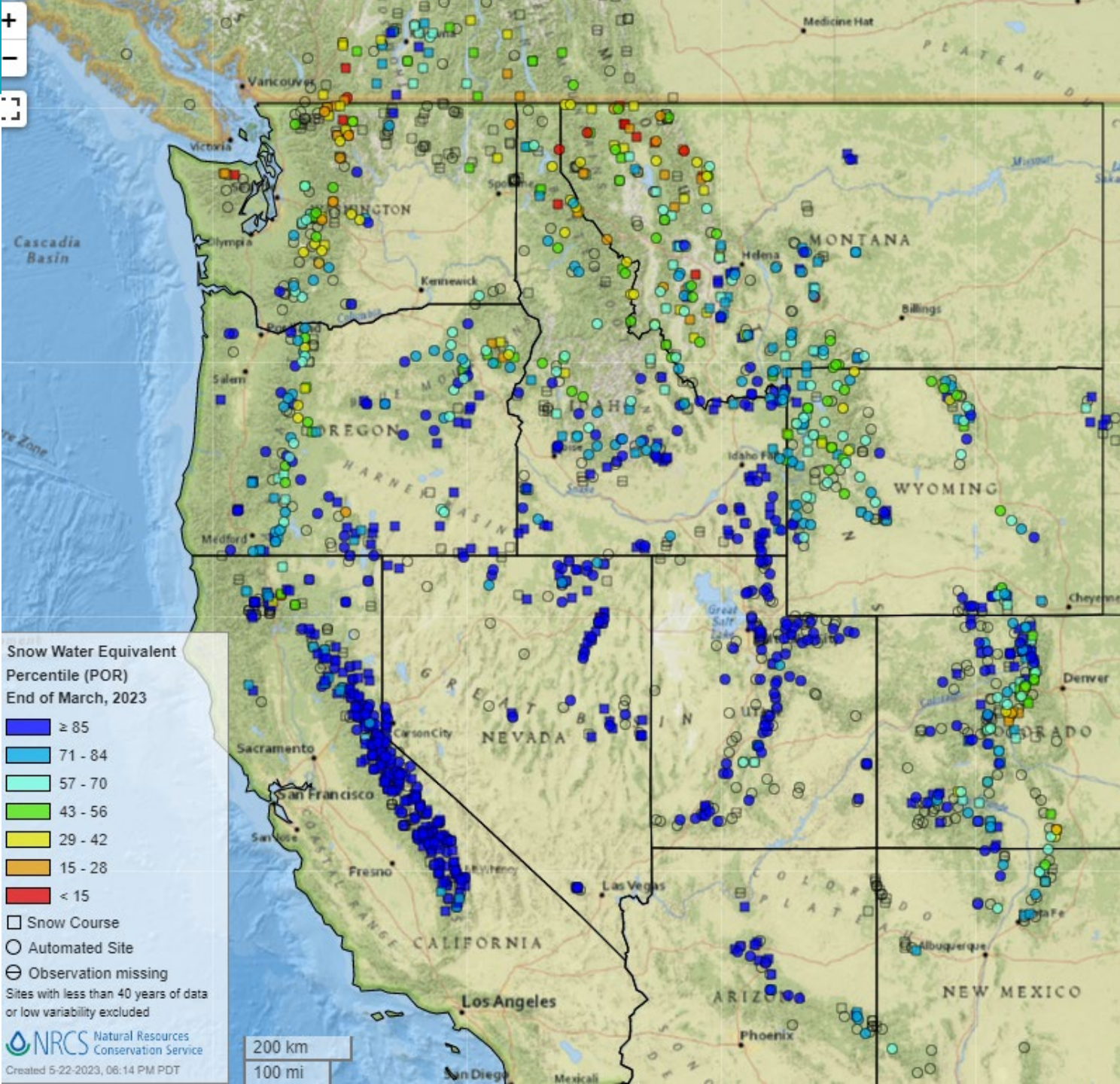


April 1, 2023

Snow Water Equivalent (SWE) Percentile – At least 20 years of record

Natural Resources Conservation Service

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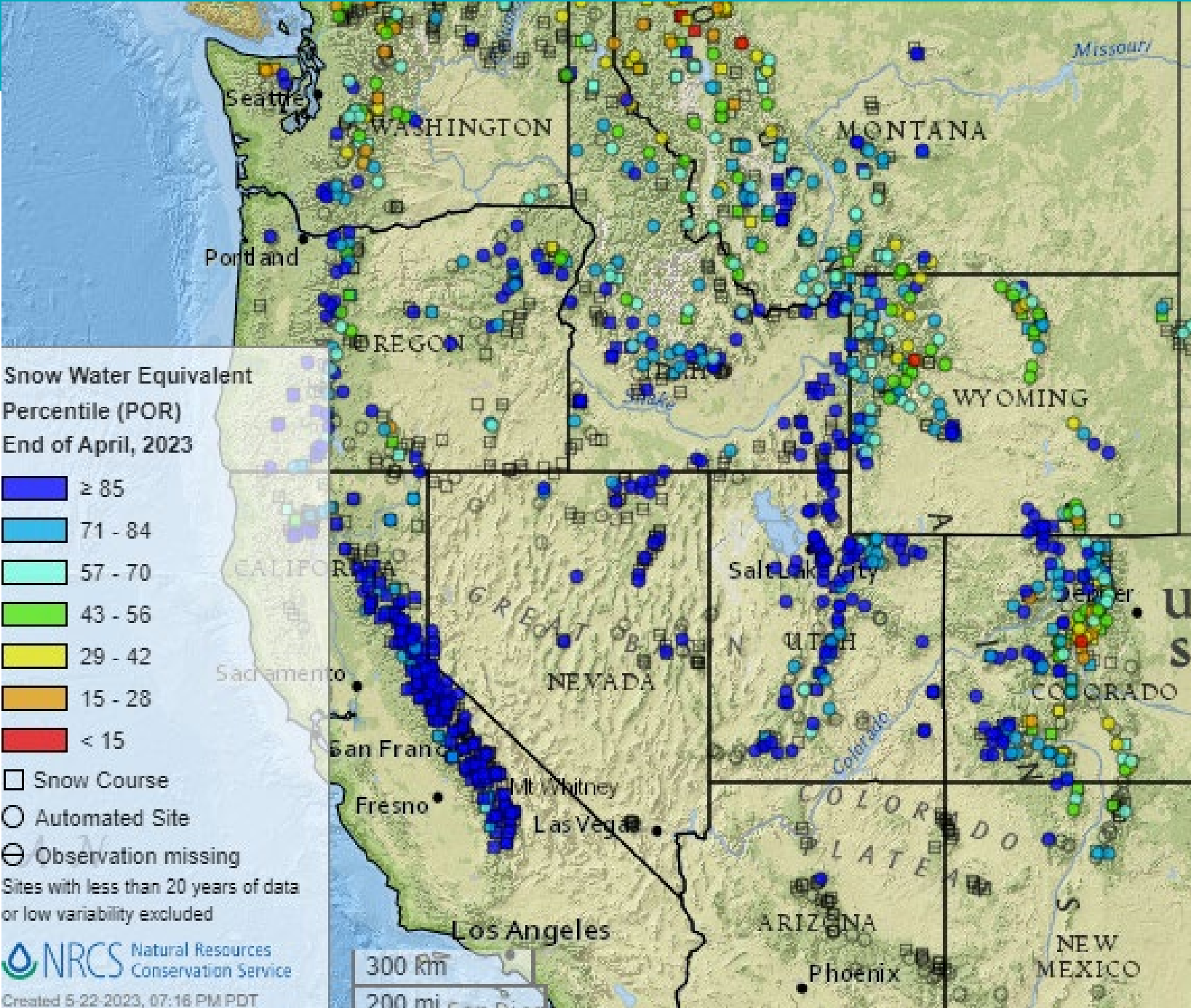


April 1, 2023

Snow
Water
Equivalent
Percentile –
At least 40 years
of record

Natural
Resources
Conservation
Service

nrcs.usda.gov/



May 1, 2023

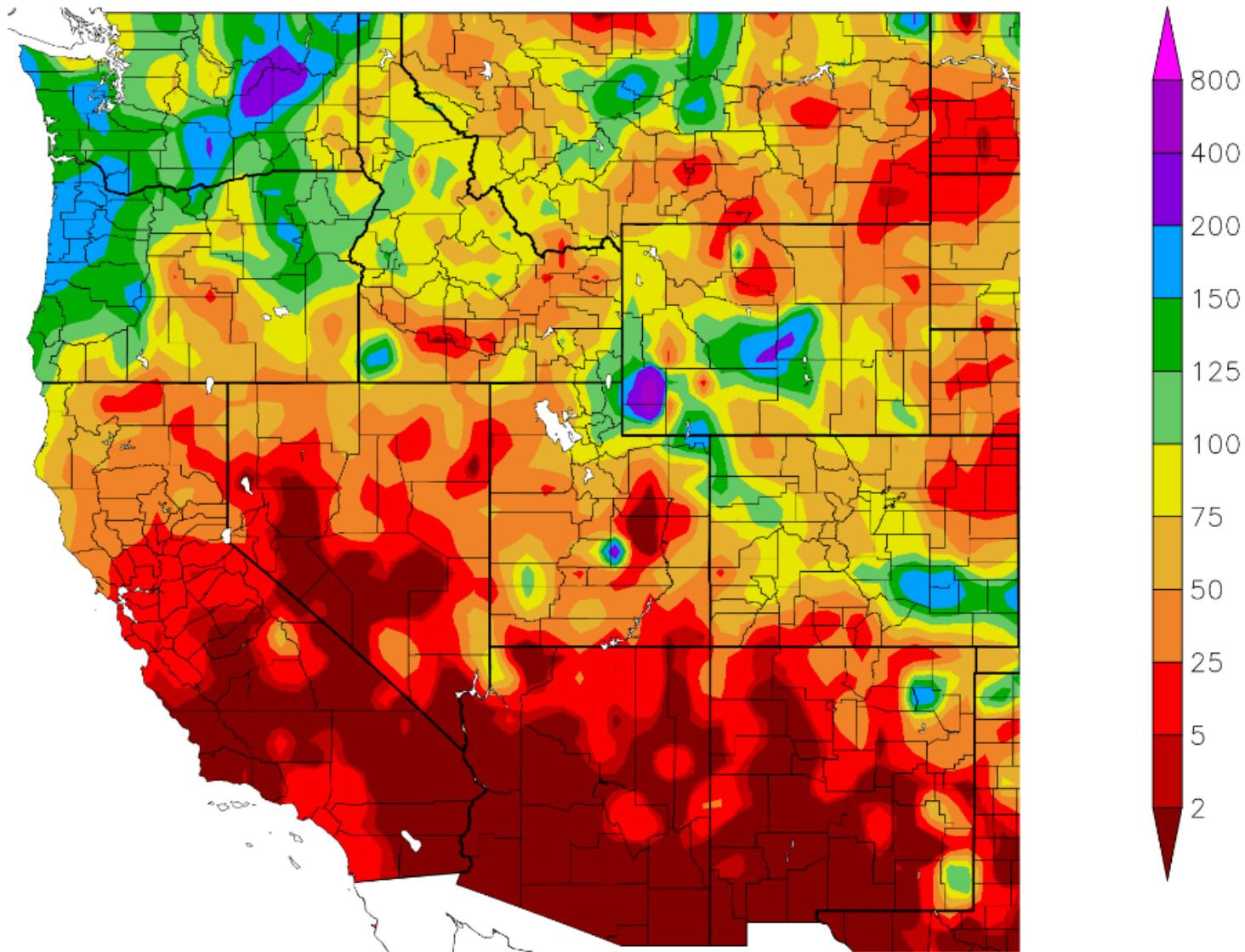
Snow Water Equivalent Percentile

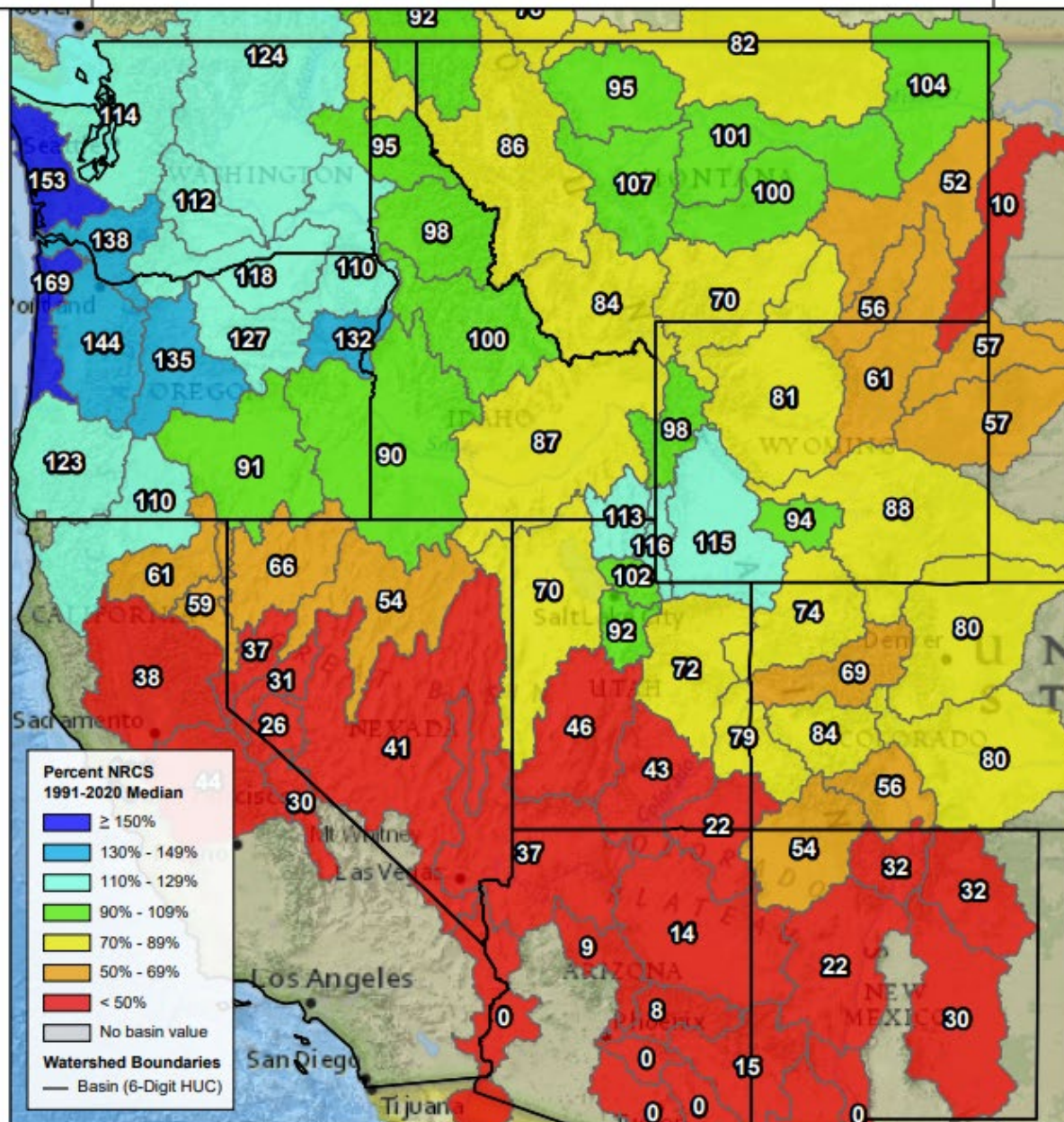
At least 20 years of record

Natural Resources Conservation Service

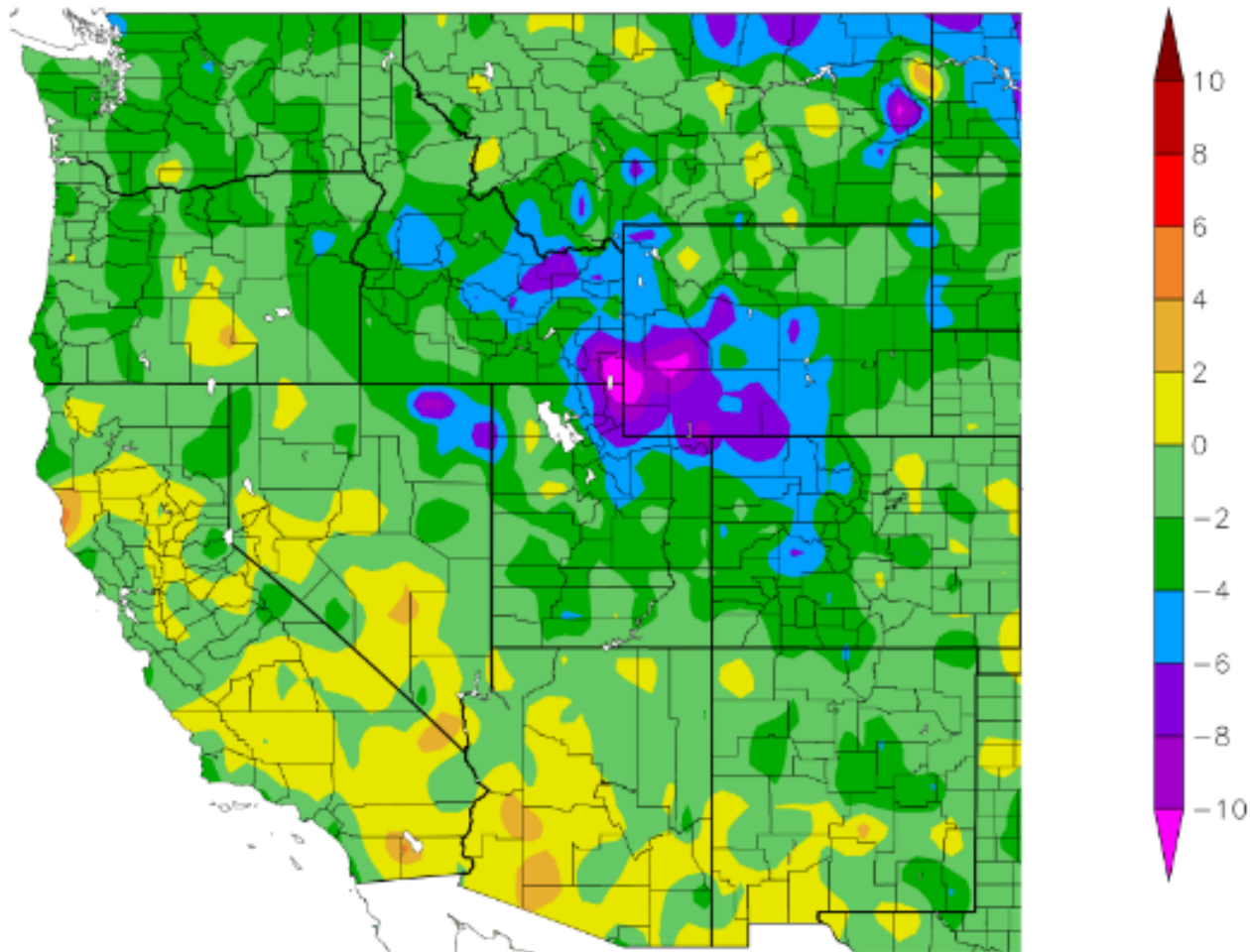
nrcs.usda.gov/

Percent of Normal Precipitation (%) 4/1/2023 – 4/30/2023



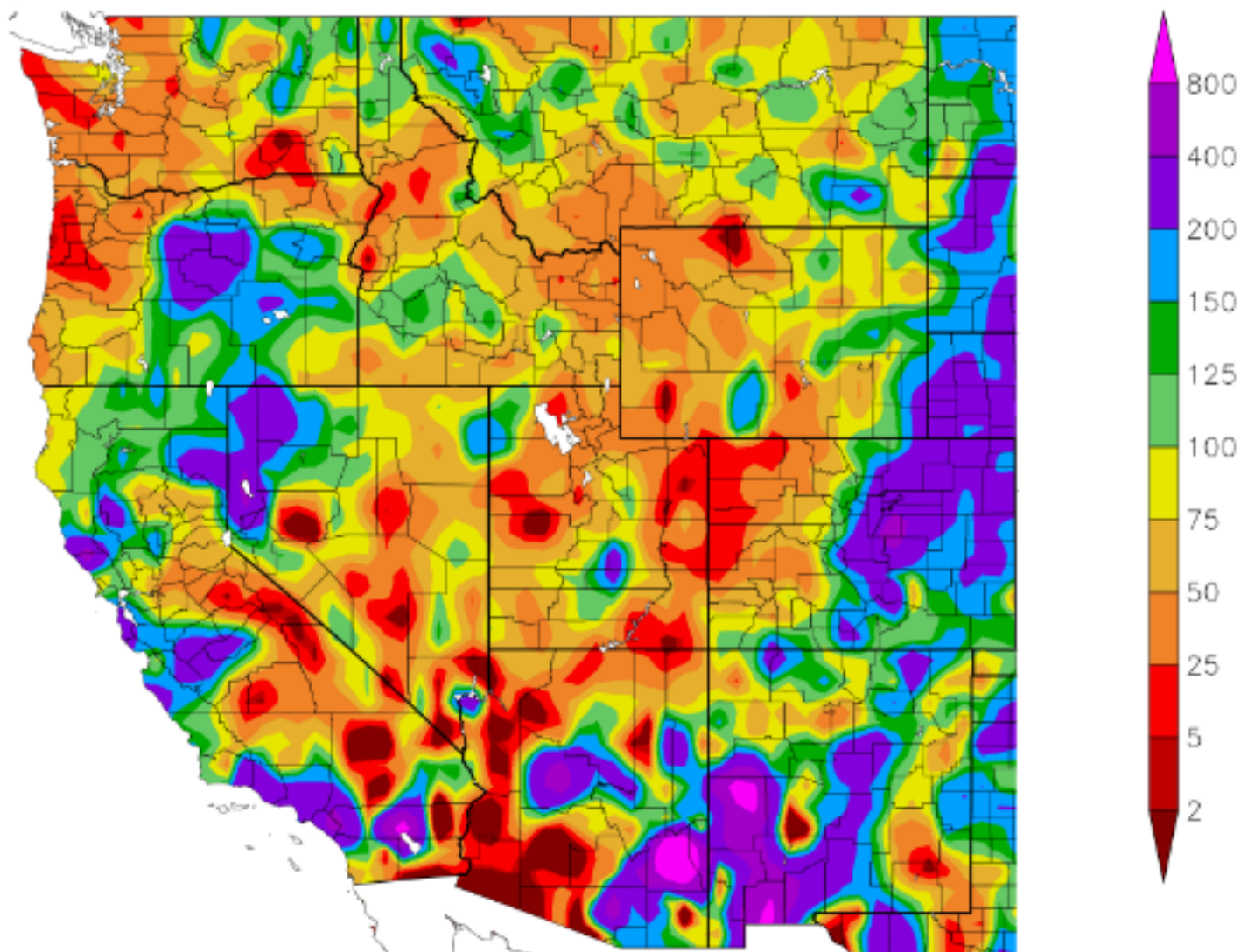


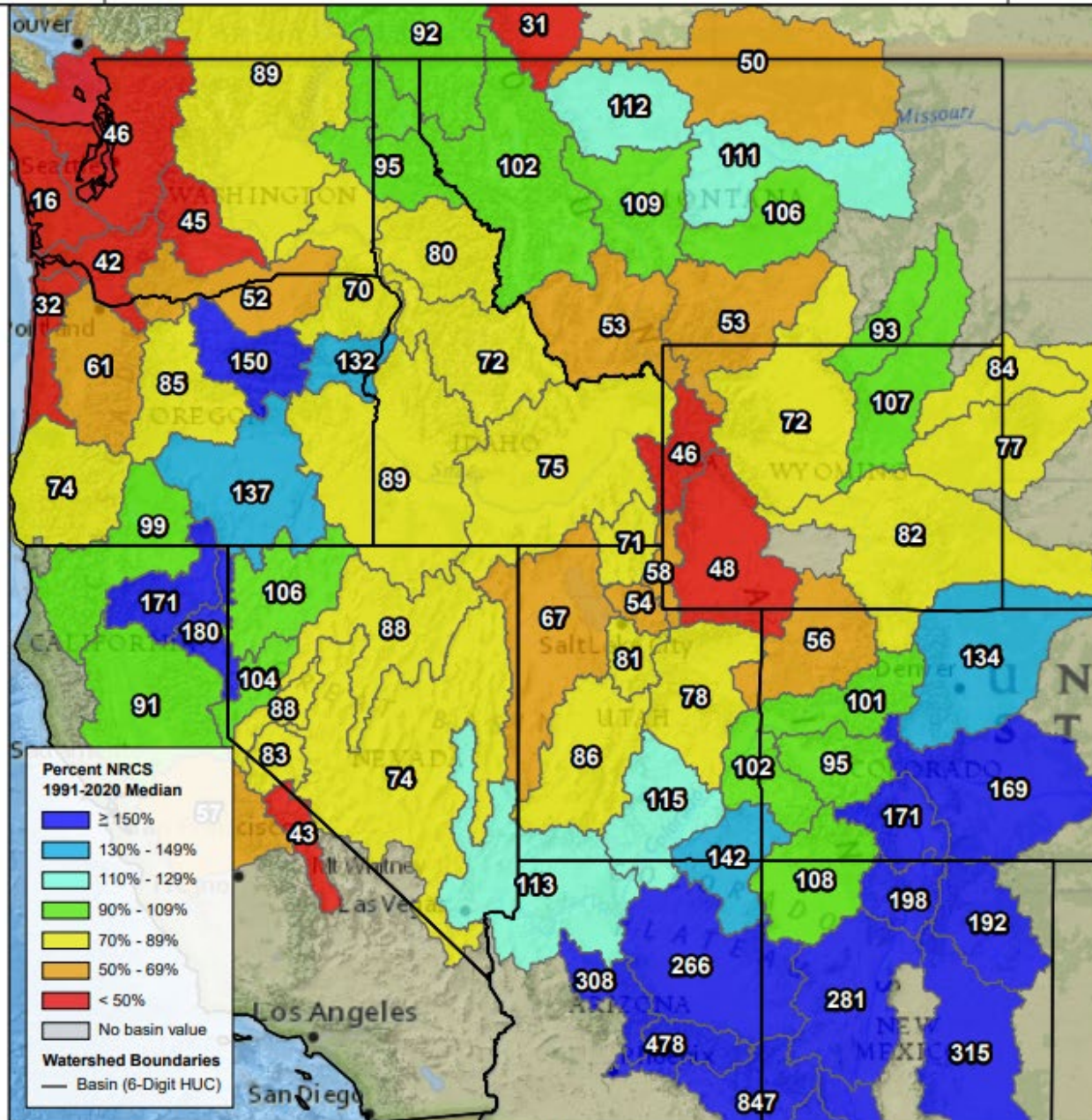
Departure from Normal Temperature (F) 4/1/2023 - 4/30/2023



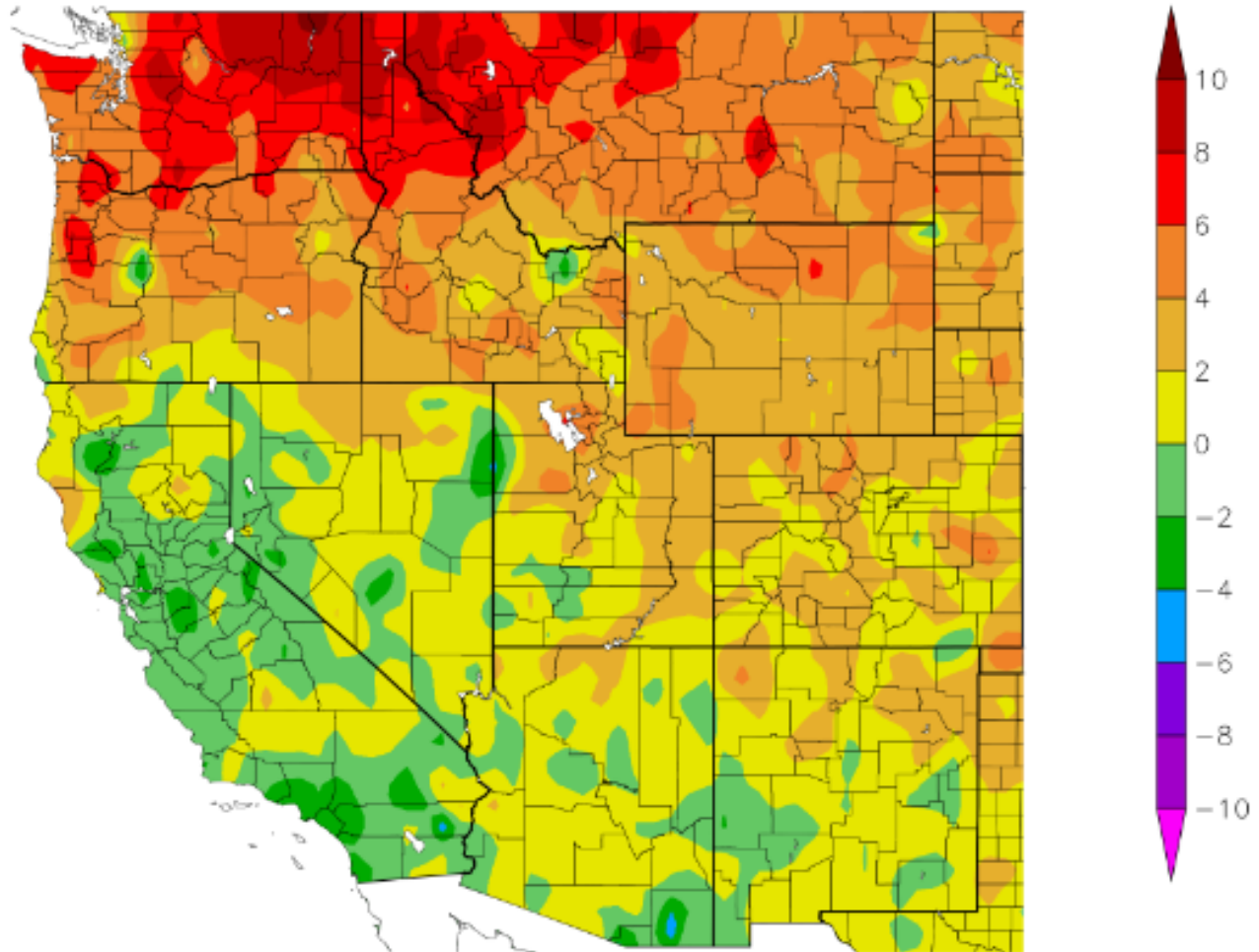
Percent of Normal Precipitation (%)

5/1/2023 – 5/21/2023

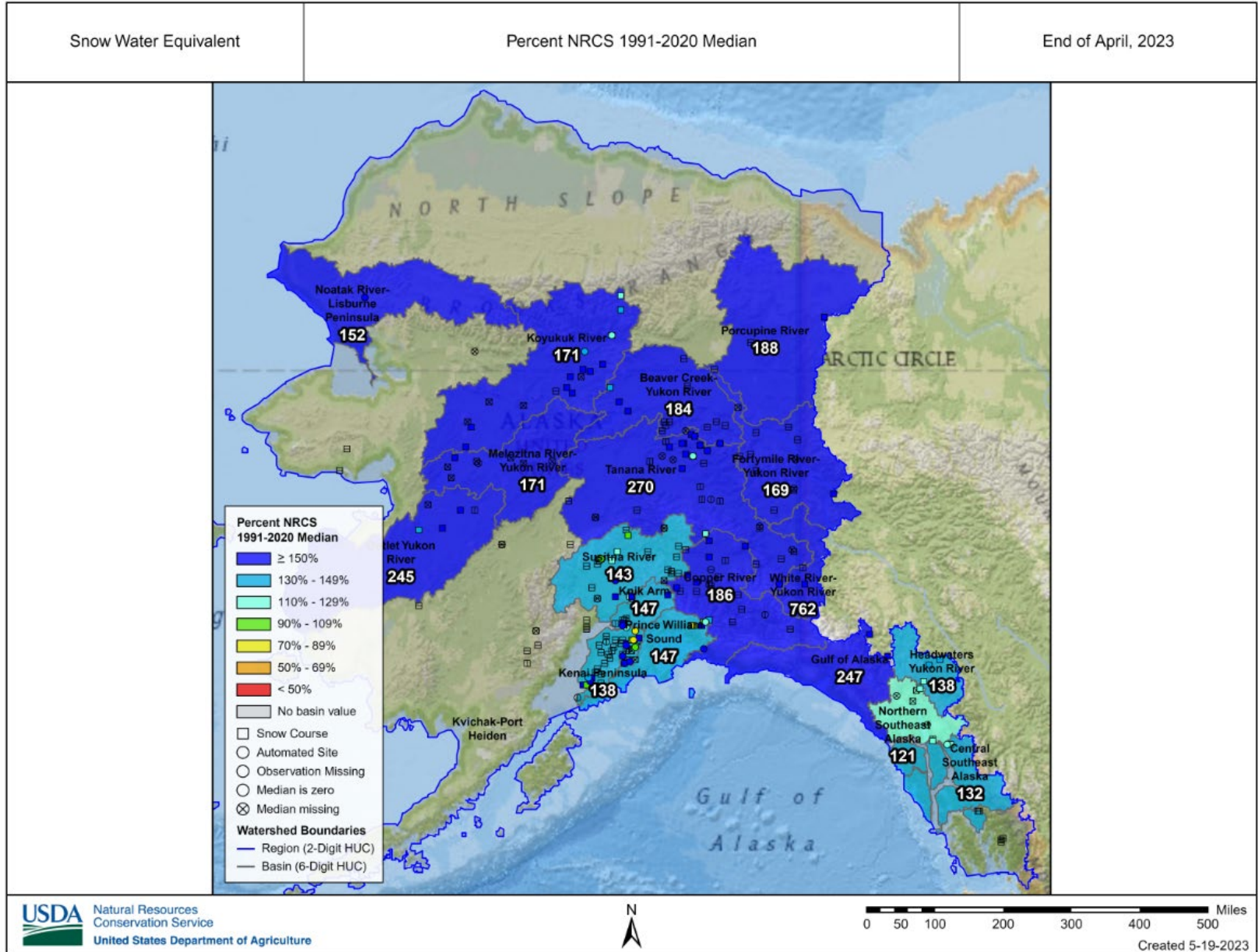




Departure from Normal Temperature (F) 5/1/2023 – 5/21/2023



Alaska - Parts of the state are experiencing significant flooding due to massive ice jams after a cold, snowy winter. <https://www.ktoo.org/2023/05/19/ice-jam-floods-continue-to-plague-alaska-river-communities/>

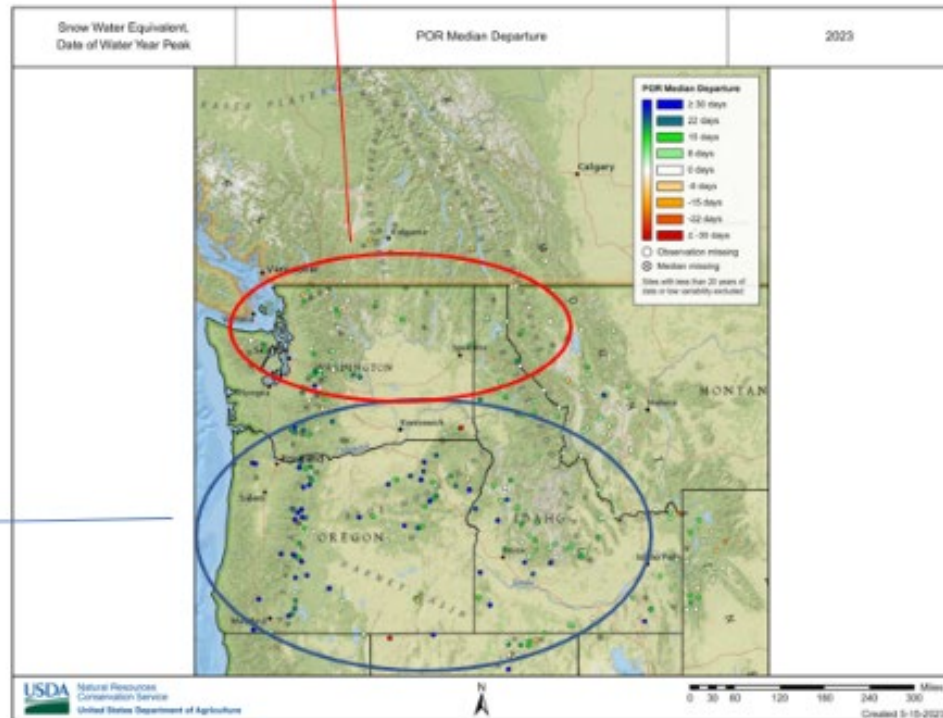
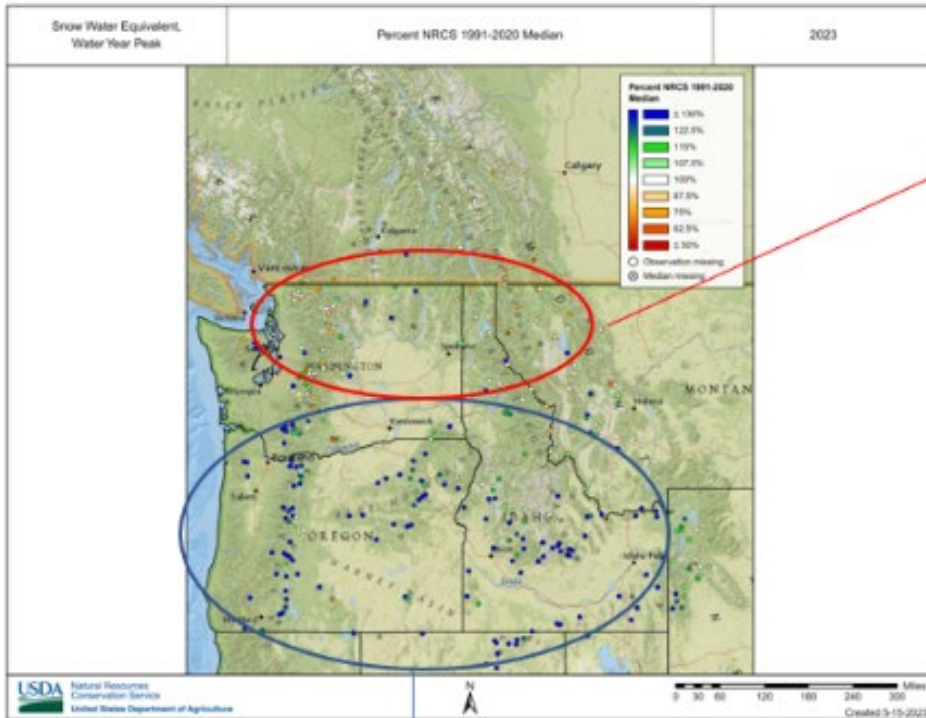


Peak Snow Water Equivalent Amount % Median

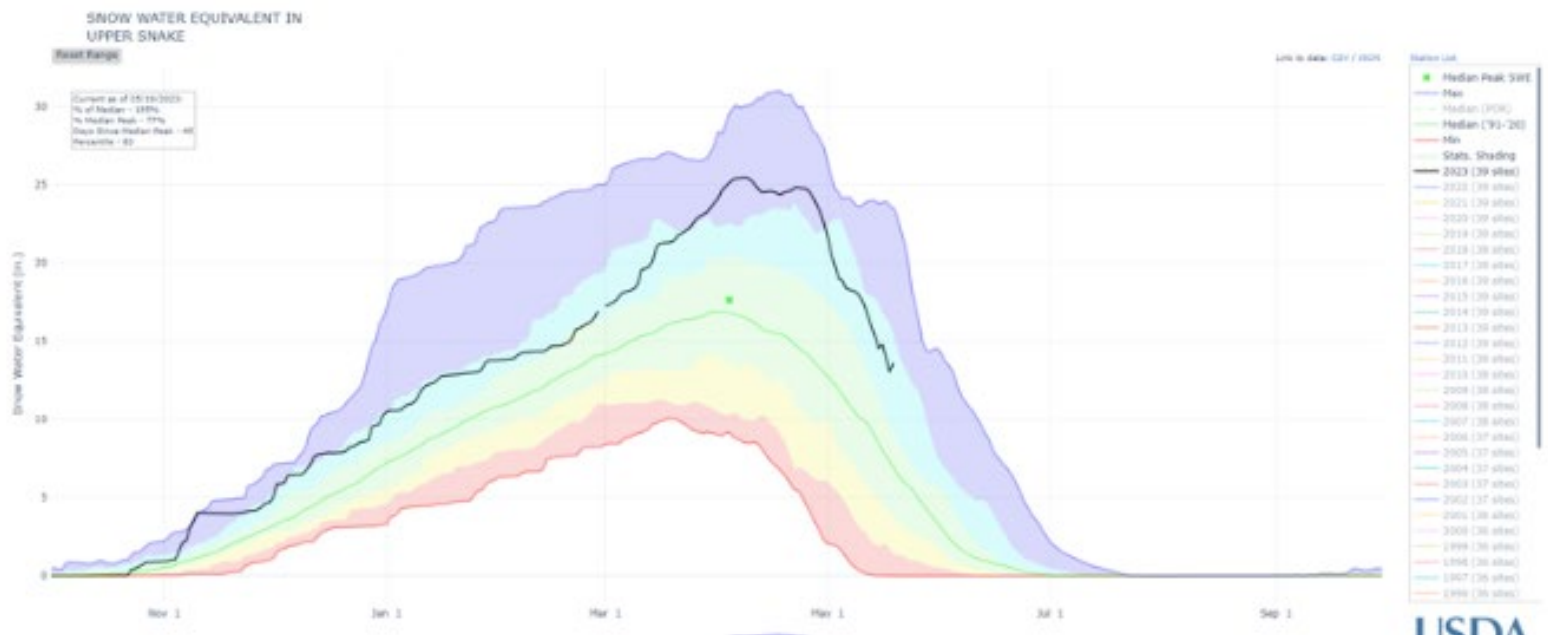
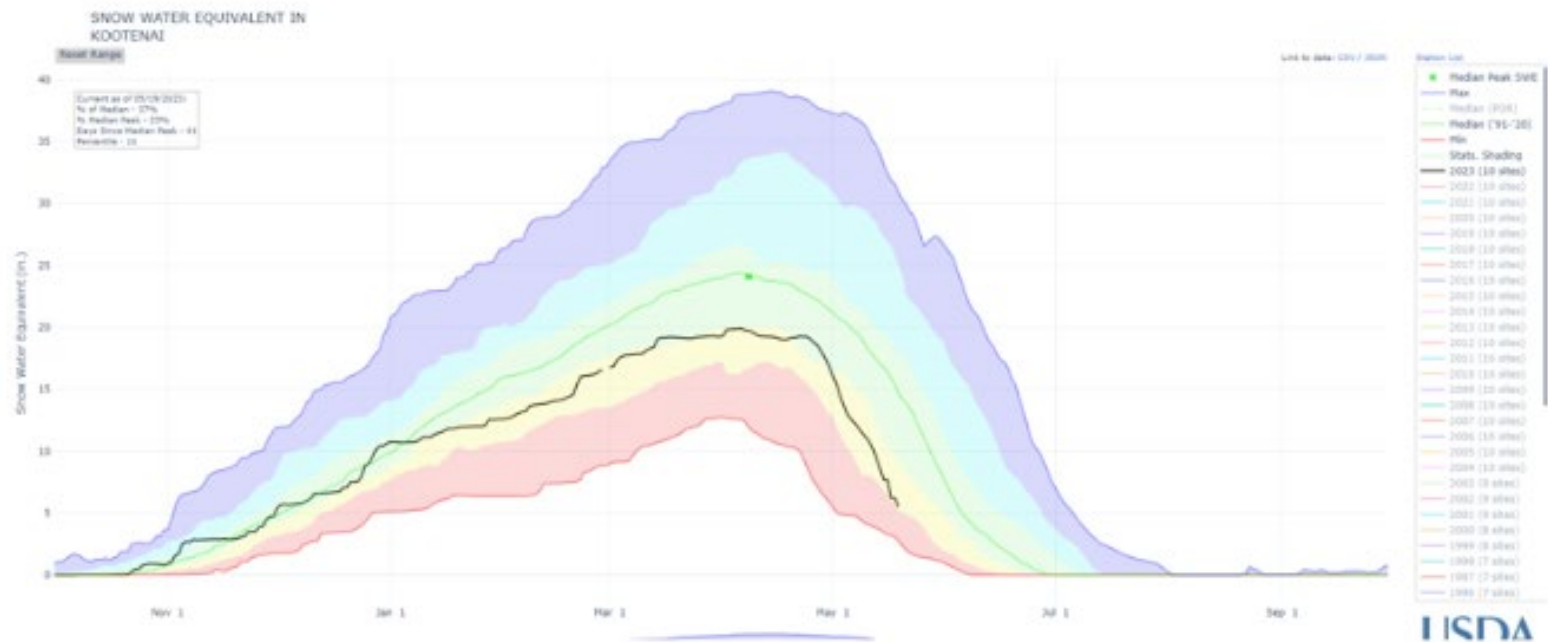
Snowpack
peaked below
median and
near normal
timing

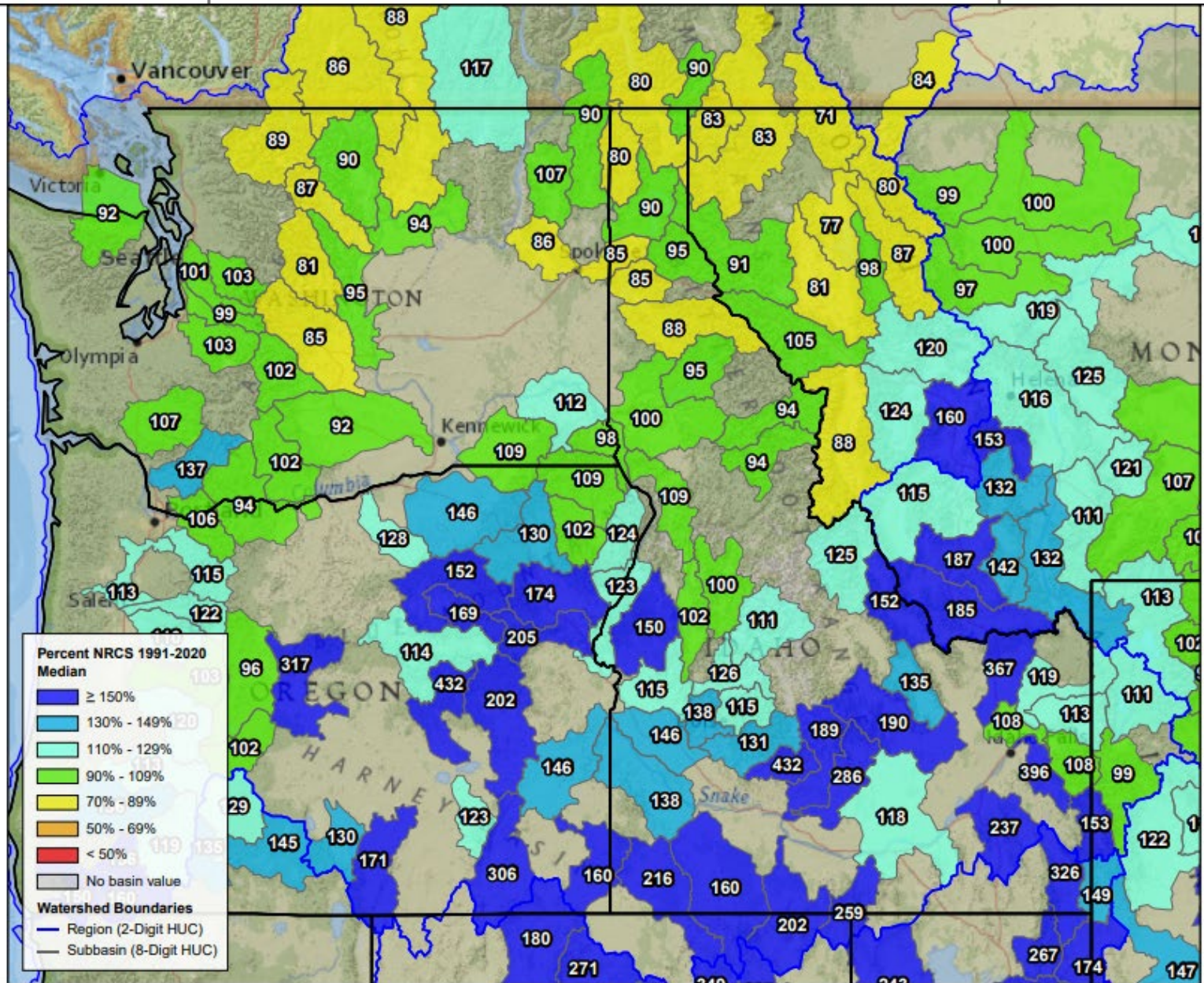
Peak Snow Water Equivalent Timing Median departure

Snowpack
peaked above
median and
later than
usual



Kootenai vs Upper Snake Seasonal Snowpack

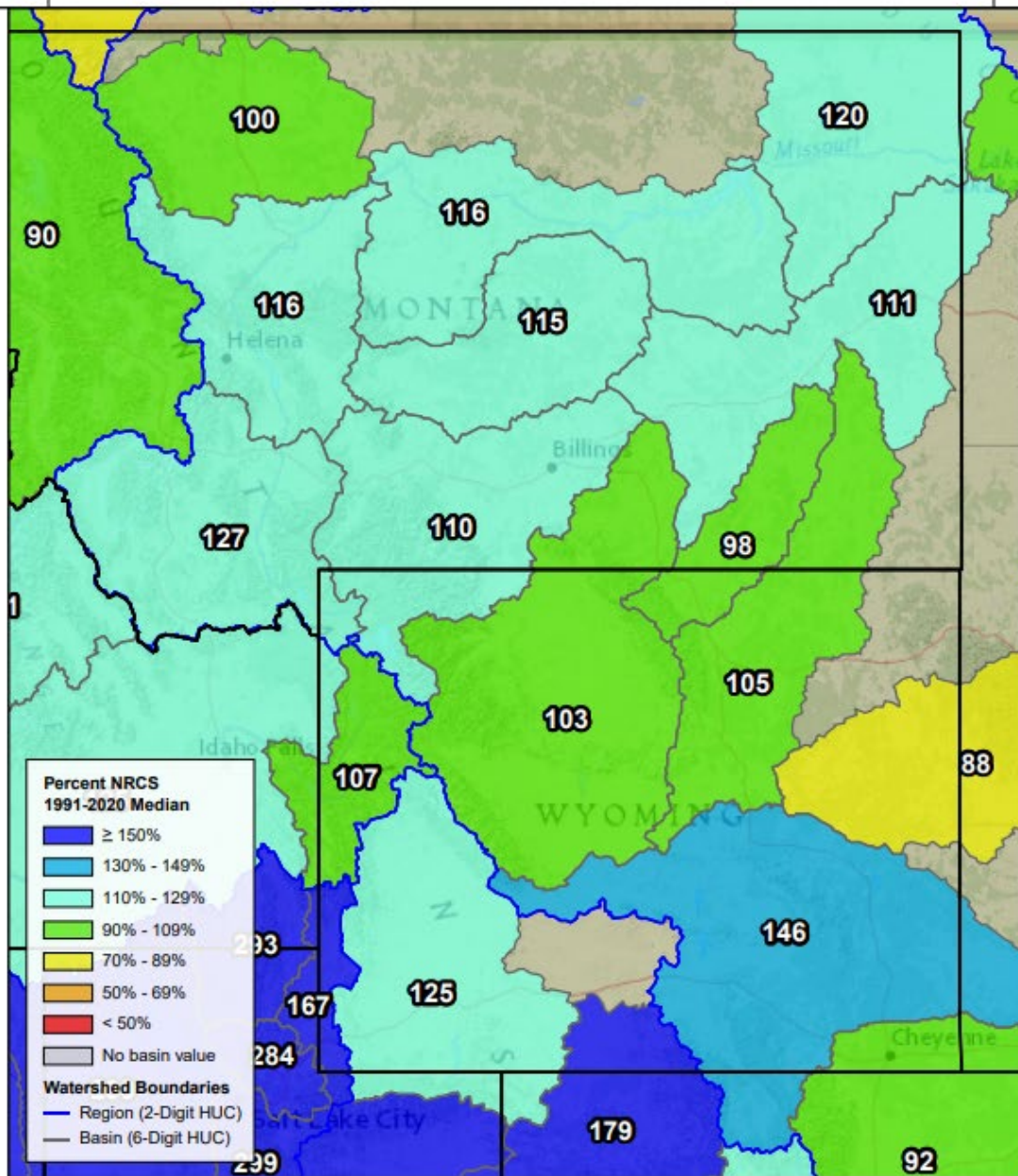




Missouri
Basin
Headwaters

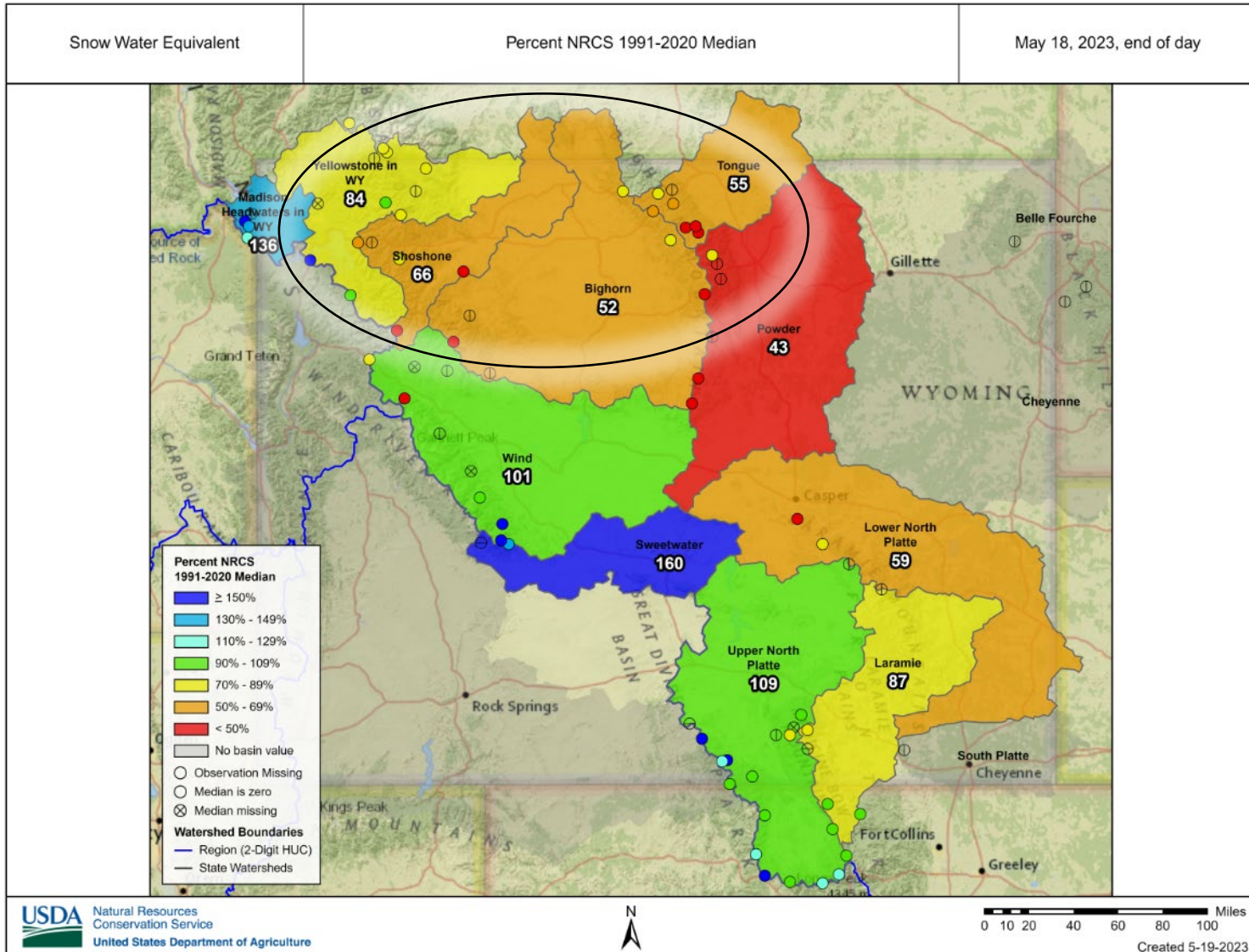
May 1
50% Exceed.
Forecasts

Average to
Above
Average
Flows



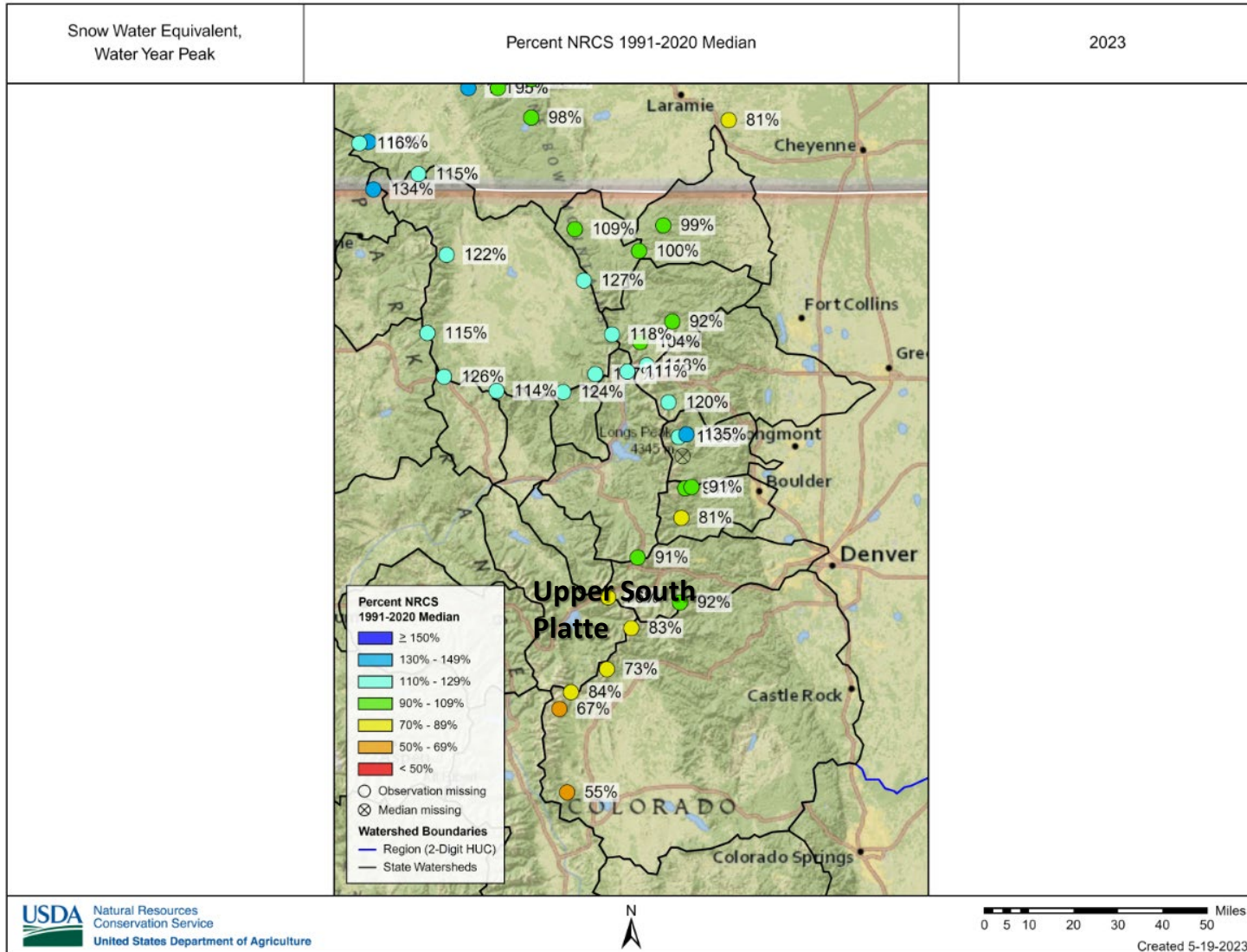
Missouri River Basin – Northern Wyoming

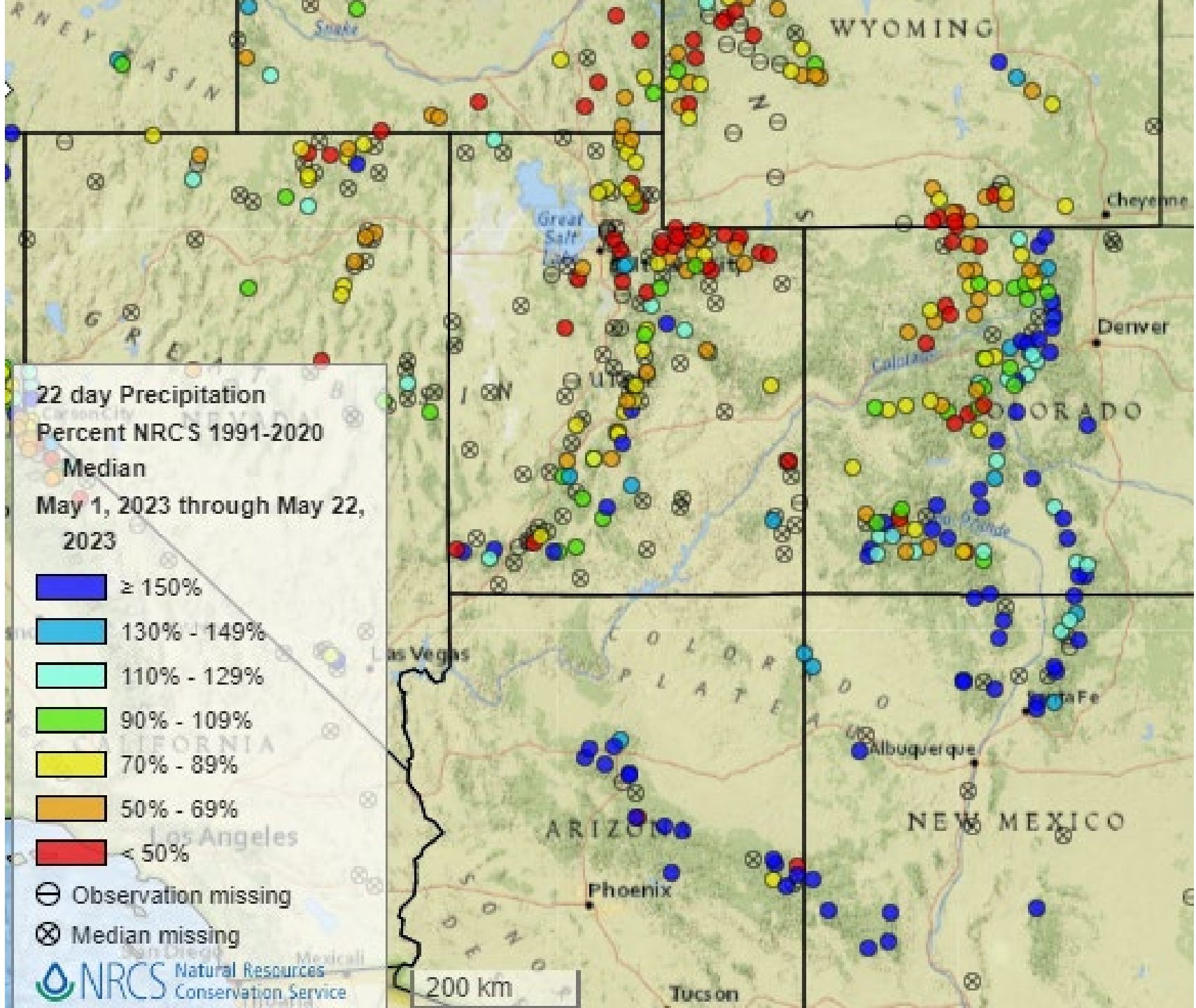
These basins had near to above median SWE on May 1, but have melted rapidly and now have below median SWE remaining. It's also been a dry May, particularly in the western part of the state. Below is SWE as % of median, May 18.



Missouri River Basin - Upper South Platte

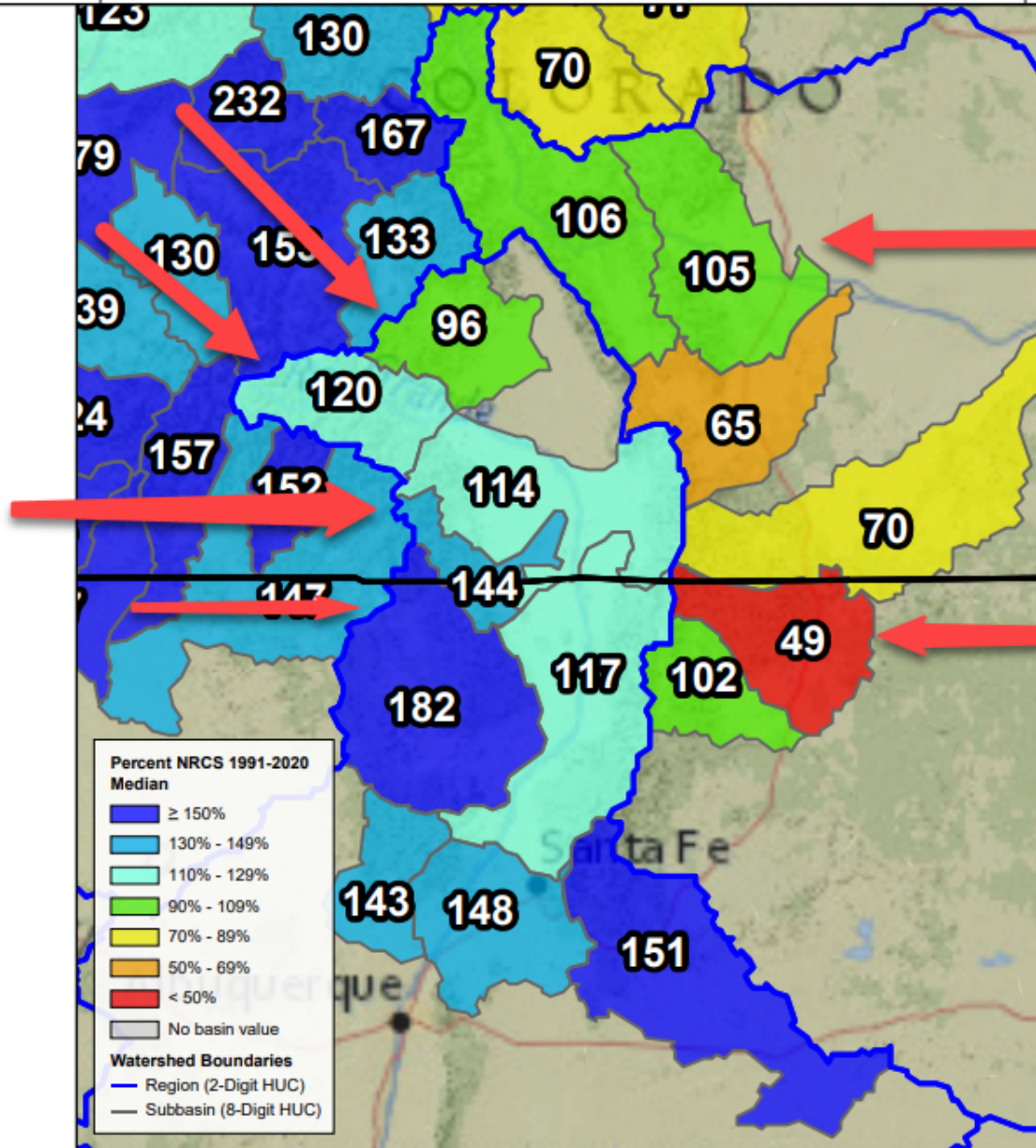
This basin was one of the drier areas in the west this winter. Peak SWE and current values are below median, but the basin has experienced above median precipitation so far during May.



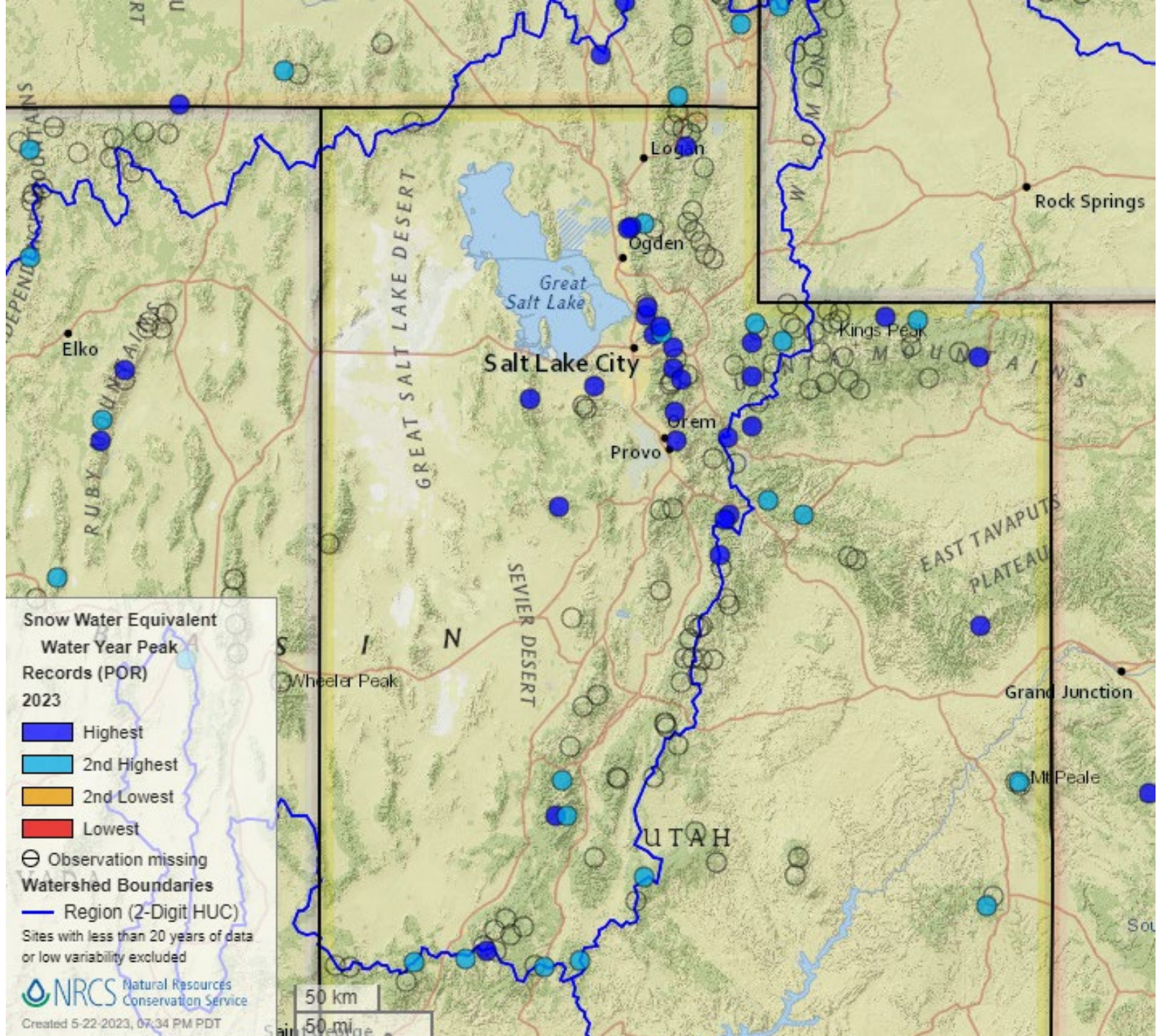


Upper Rio Grande:
Above average flows predicted

Arkansas:
Average to
Below
Average



Canadian:
Below to
Average – **But**
precipitation
has been
above average
since May 1



Snow Water Equivalent Water Year Peak Records (POR) 2023

■ Highest
■ 2nd Highest
■ 2nd Lowest
■ Lowest

⊖ Observation missing

Watershed Boundaries
 Region (2-Digit HUC)

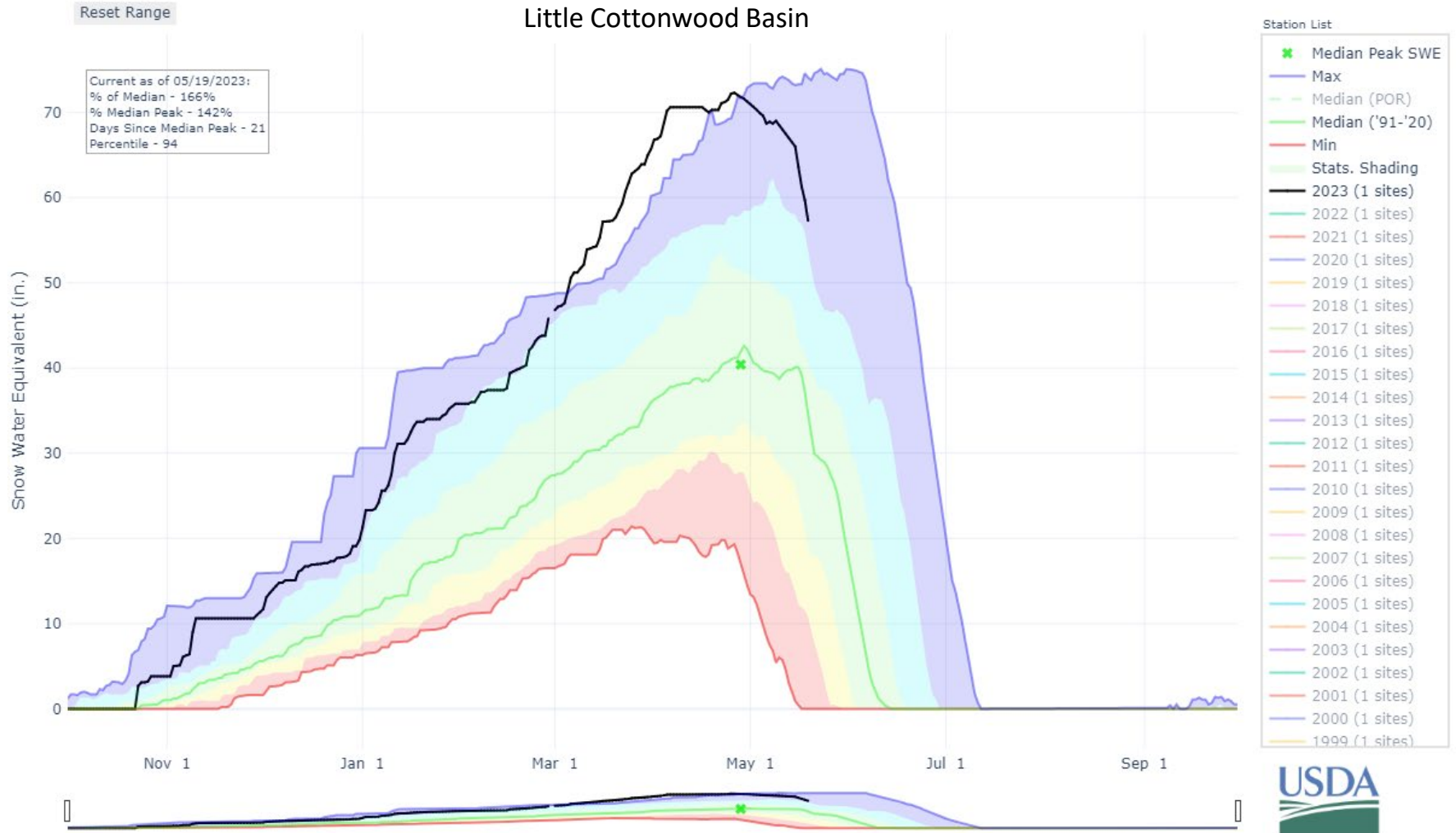
Sites with less than 20 years of data or low variability excluded

NRCS Natural Resources Conservation Service
 Created 5-22-2023, 07:34 PM PDT

50 km
 50 mi

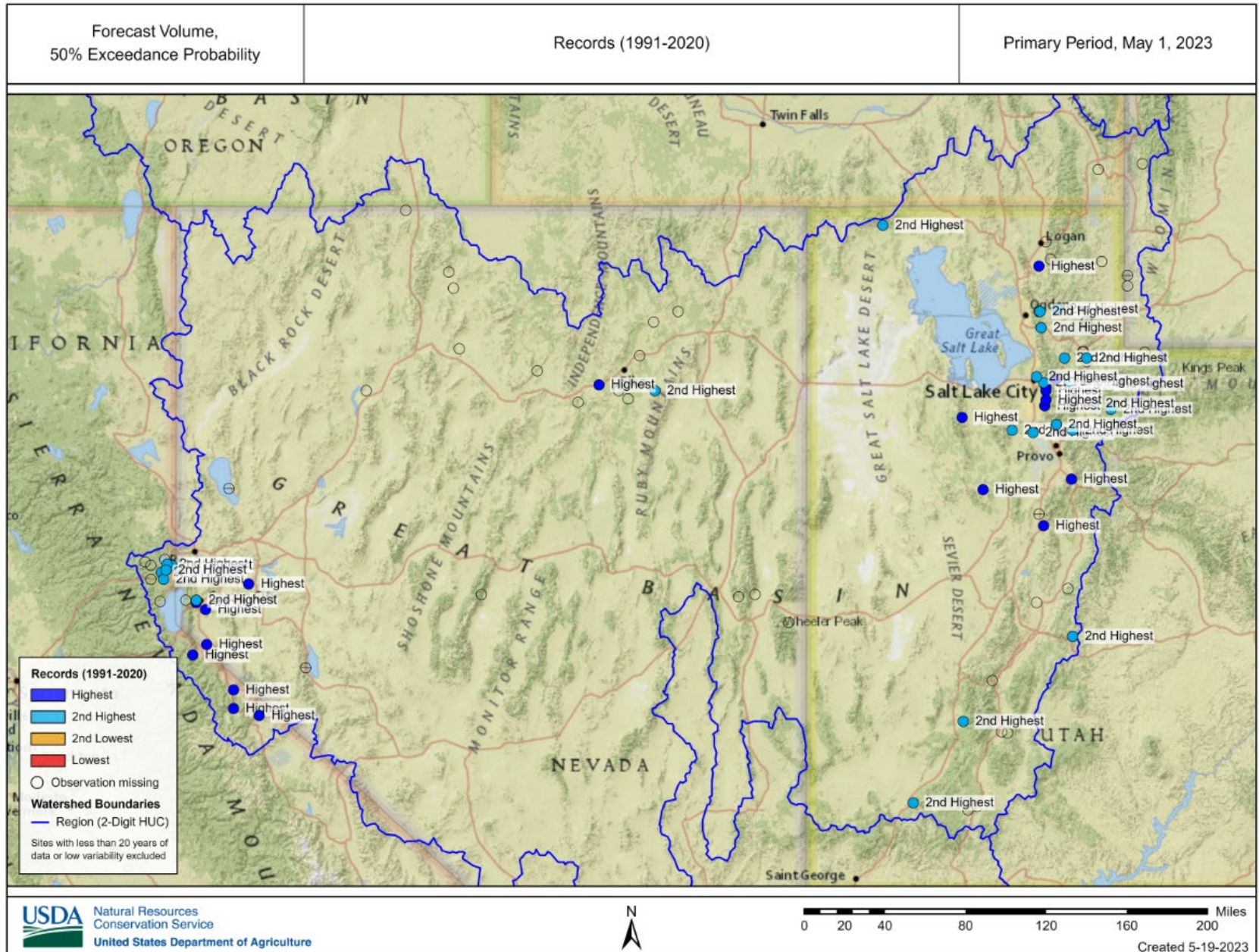
Eastern Great Basin in Utah

Still a lot of snow at high elevations near Salt Lake City. Many sites still have much more snow than at typical peak SWE



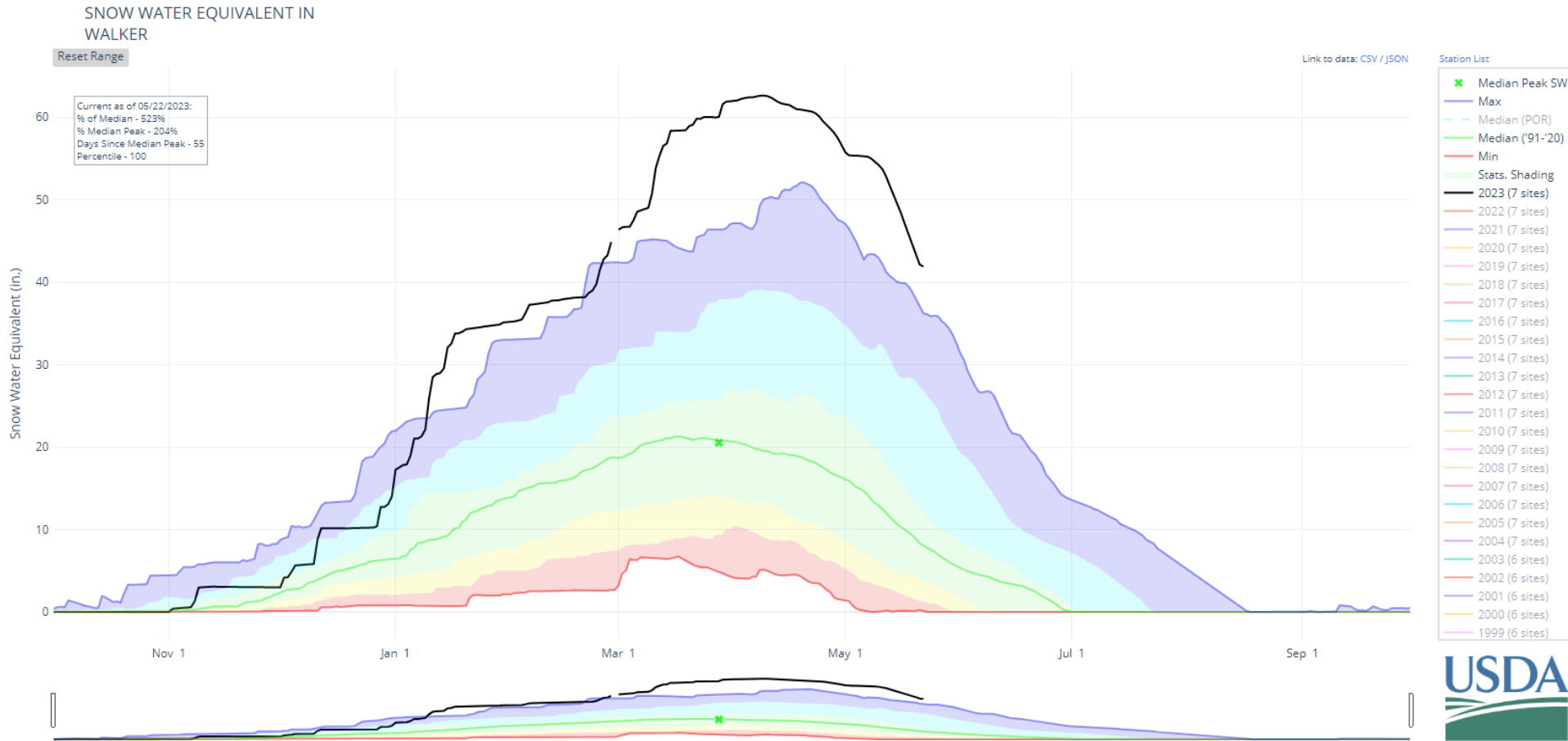
Great Basin

May 1 forecast at 50% exceedance is for record streamflow volume at numerous locations



Western Great Basin in Nevada

Below graph is based on seven SNOTEL sites associated with the Walker River Basin, as of May 21, 2023.



Below graph is based on twelve SNOTEL sites associated with the Upper Carson in California and Nevada, as of May 22, 2023.

SNOW WATER EQUIVALENT IN UPPER CARSON

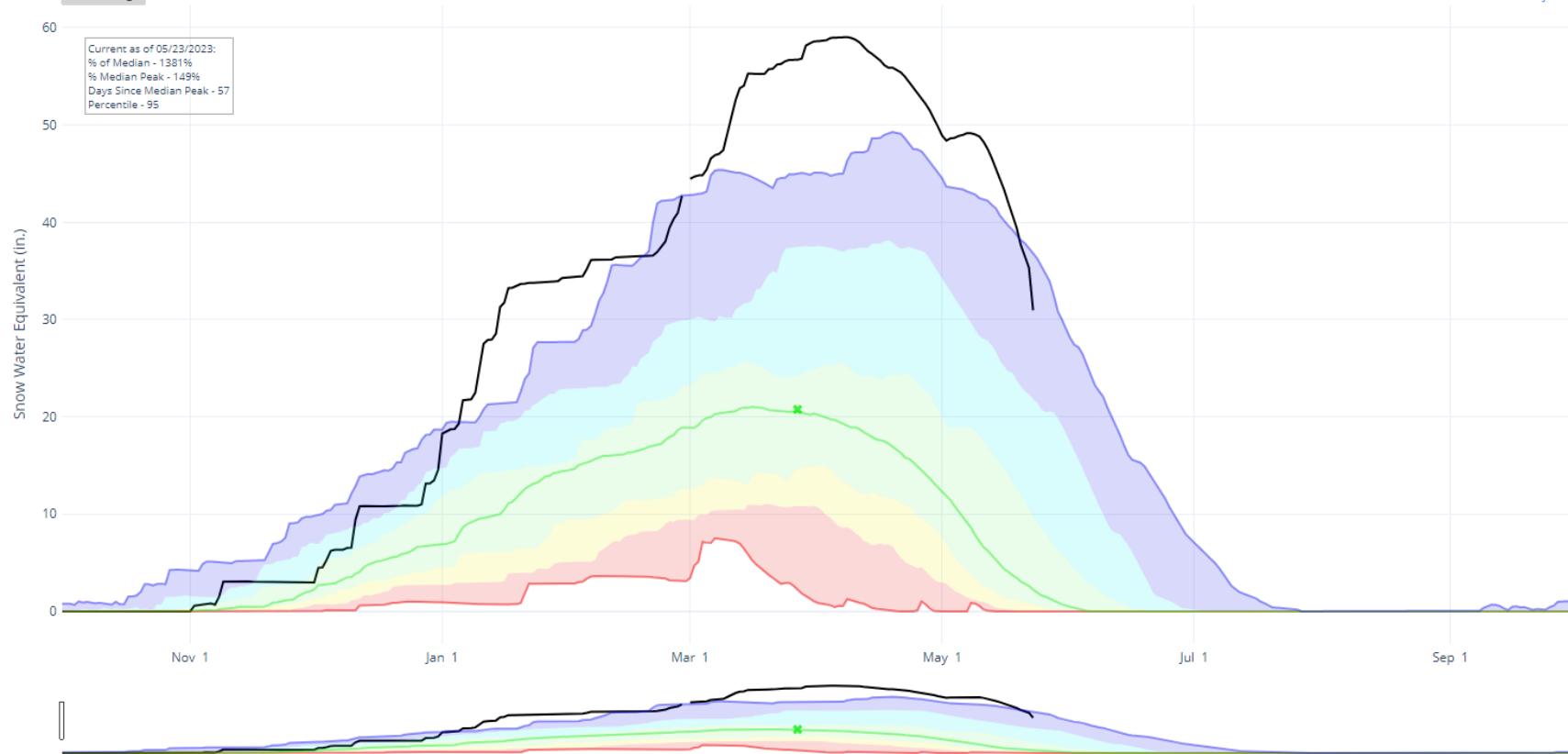
Reset Range

[Link to data: CSV / JSON](#)

Current as of 05/23/2023:
% of Median - 1381%
% Median Peak - 149%
Days Since Median Peak - 57
Percentile - 95

Station List

- ✖ Median Peak SWE
- Max
- Median (POR)
- Median ('91-'20)
- Min
- Stats. Shading
- 2023 (12 sites)
- 2022 (12 sites)
- 2021 (12 sites)
- 2020 (12 sites)
- 2019 (12 sites)
- 2018 (12 sites)
- 2017 (12 sites)
- 2016 (12 sites)
- 2015 (12 sites)
- 2014 (12 sites)
- 2013 (12 sites)
- 2012 (12 sites)
- 2011 (12 sites)
- 2010 (12 sites)
- 2009 (12 sites)
- 2008 (12 sites)
- 2007 (12 sites)
- 2006 (12 sites)
- 2005 (12 sites)
- 2004 (11 sites)
- 2003 (8 sites)
- 2002 (8 sites)
- 2001 (8 sites)
- 2000 (8 sites)
- 1999 (8 sites)



Statistical shading breaks at 10th, 30th, 50th, 70th, and 90th Percentiles
For more information visit: [30-Year Hydroclimatic Normals](#)

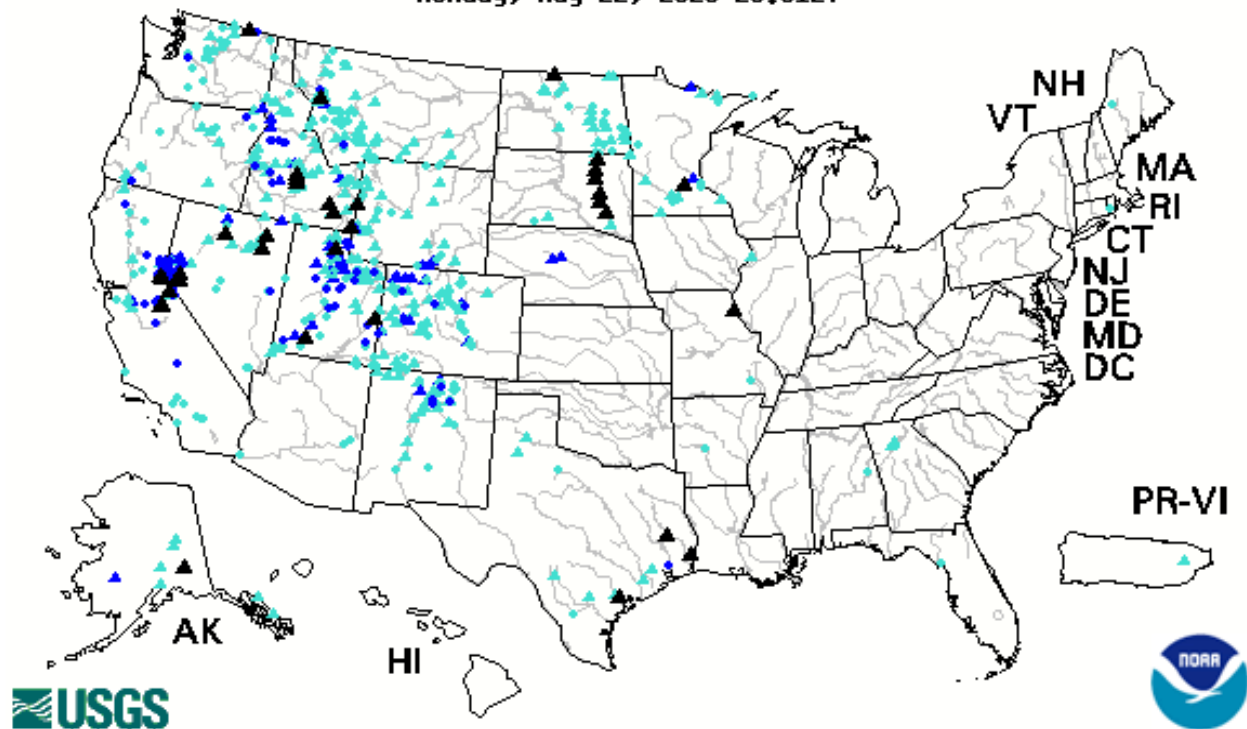


Map of flood and high flow condition (United States)

(37 streamgages are in flood)

State or Water-Resources Regions

Monday, May 22, 2023 23:31ET

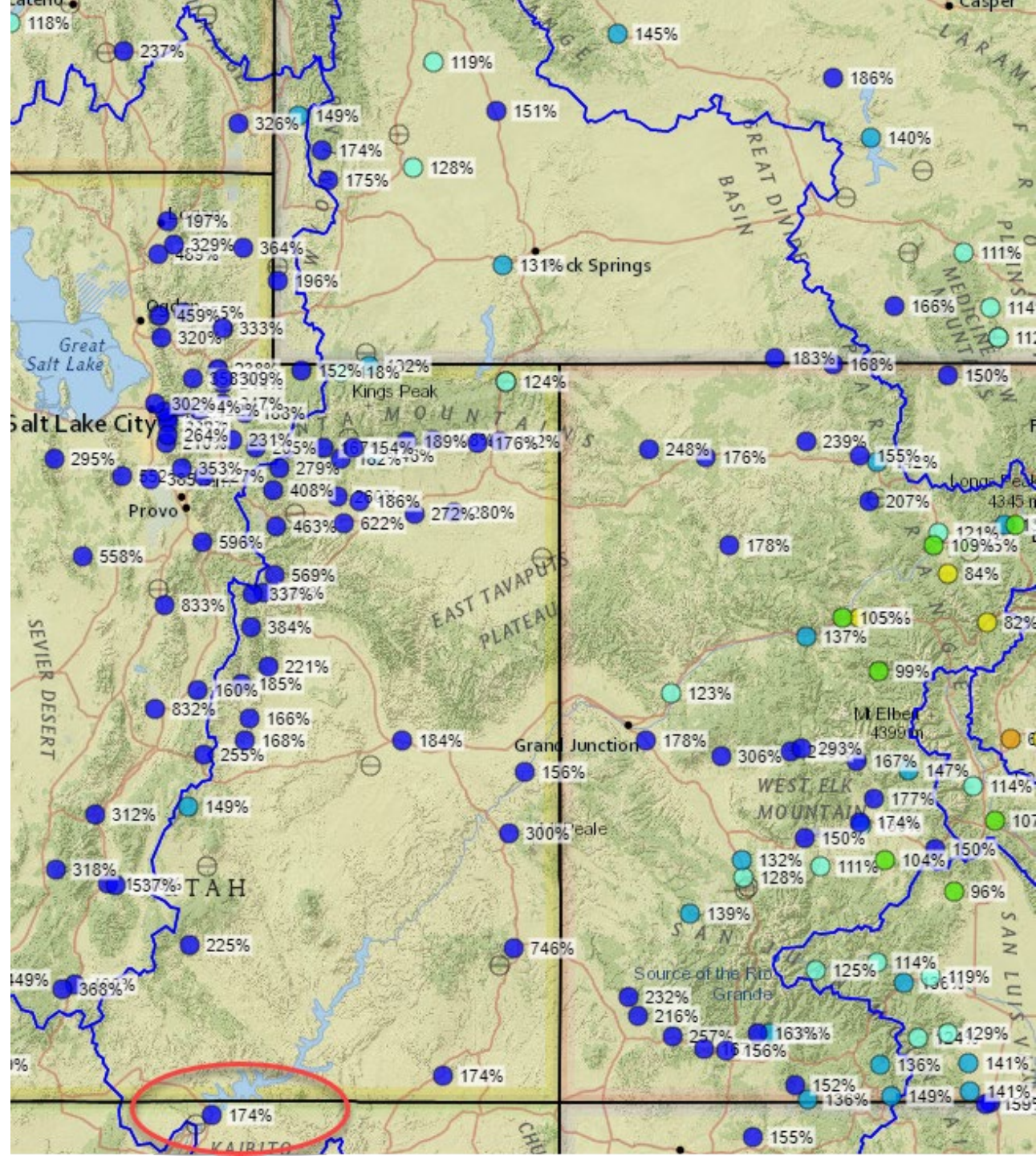
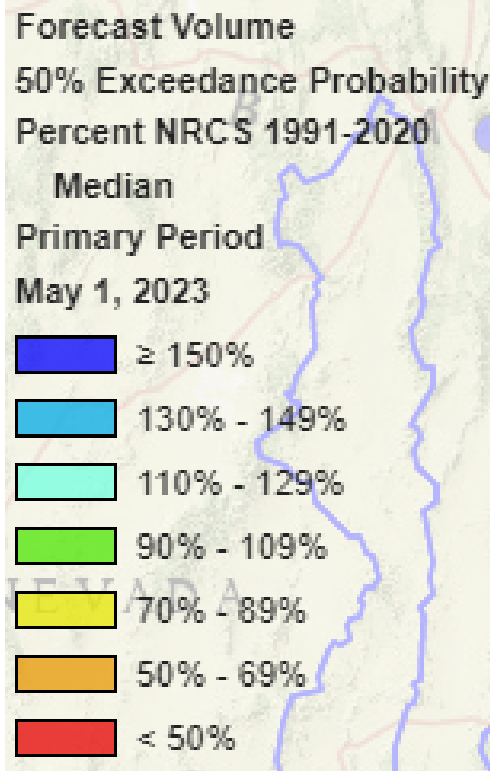


Choose a data retrieval option and select a location on the map

List of all stations in state, State map, or Nearest stations

Explanation - Percentile classes		
95-98	≥ 99	River above flood stage
Streamgage with flood stage	Streamgage with high flow	Streamgage without flood stage

Forecast Volume: May-July, 50% Exceedance Probability, % '91-'20 Median, May 1, 2023

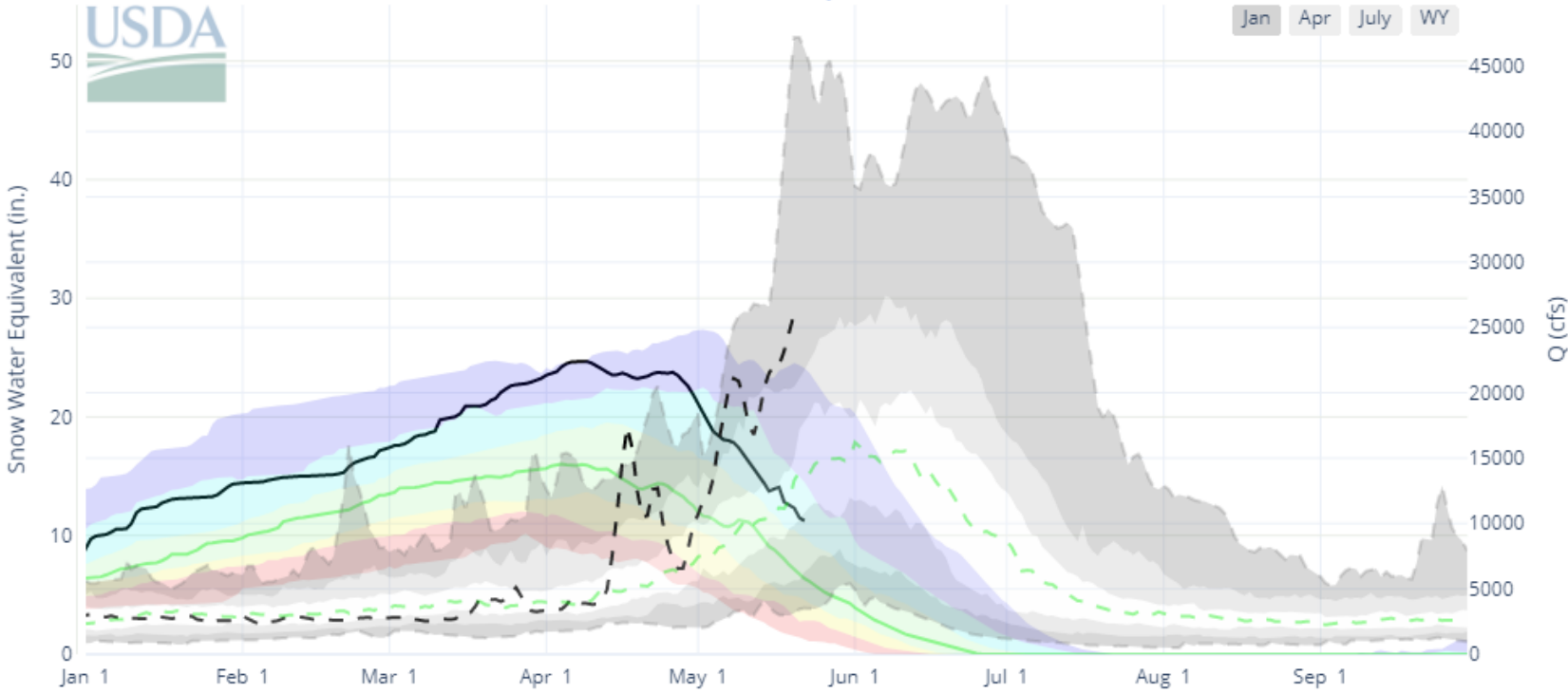


Snow to Flow Relationship for Green R at Green River, UT

[Link to data: CSV / JSON](#)



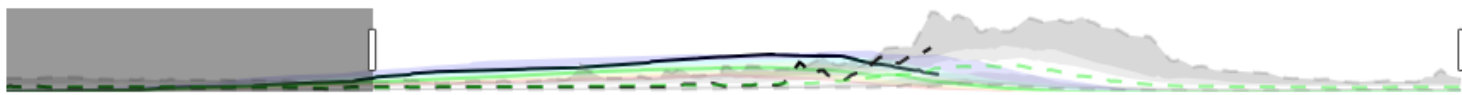
Jan Apr July WY



Station List

- Flow Median
- SWE Median
- Flow Stats
- SWE Stats
- 2023 (31 sites)
- 2022 (31 sites)
- 2021 (31 sites)
- 2020 (31 sites)
- 2019 (31 sites)
- 2018 (31 sites)
- 2017 (31 sites)
- 2016 (31 sites)
- 2015 (31 sites)
- 2014 (31 sites)
- 2013 (31 sites)
- 2012 (31 sites)
- 2011 (31 sites)
- 2010 (31 sites)
- 2009 (31 sites)
- 2008 (31 sites)
- 2007 (31 sites)

Linear Scale
Log Scale

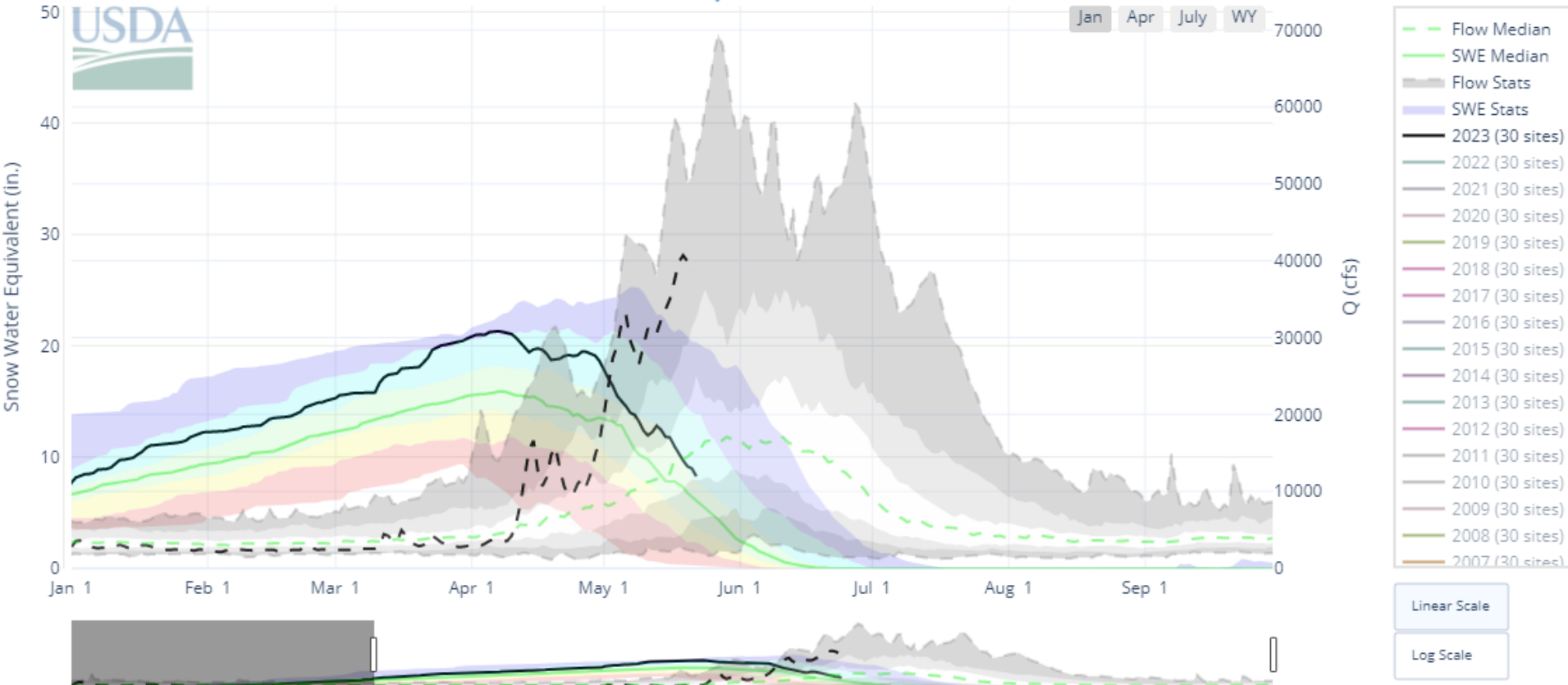


* # of sites does not meet basin threshold, data from this year will not be used in calculation of statistics.
Updated: Monday, May 22, 2023 @ 12 PM CST

Snow Statistics Percentile Classes					Snow	Flow Statistics Percentile Classes					Flow
					—						...
Min - 10%	10% - 30%	30% - 70 %	70% - 90%	90% - Max	in.	Min - 10%	10% - 30%	30% - 70 %	70% - 90%	90% - Max	cfs
Much Below Median	Below Median	Near Median	Above Median	Much Above Median		Much Below Median	Below Median	Near Median	Above Median	Much Above Median	

Snow to Flow Relationship for Colorado R nr Cisco

[Link to data: CSV / JSON](#)

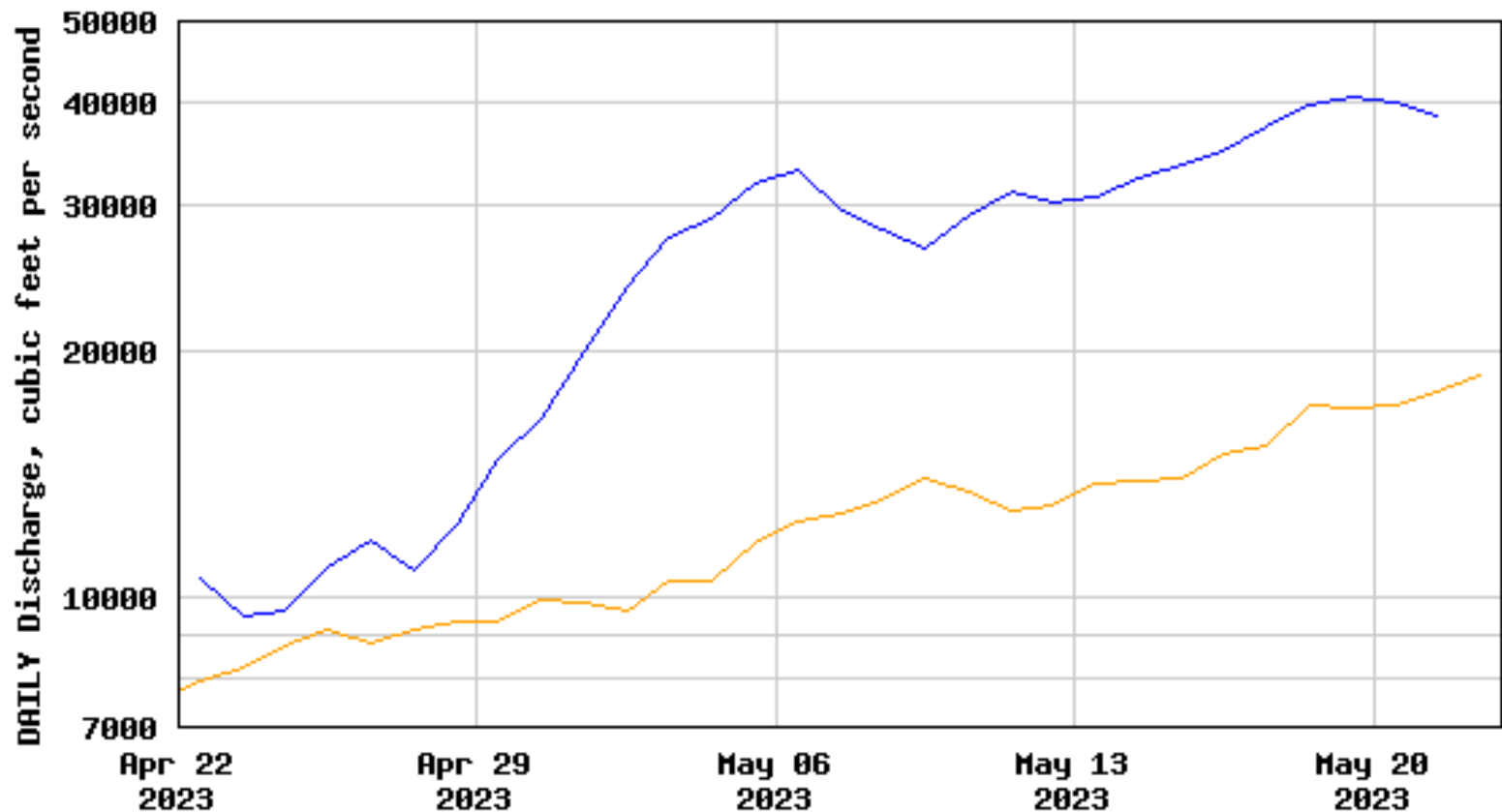


* # of sites does not meet basin threshold, data from this year will not be used in calculation of statistics.
 Updated: Monday, May 22, 2023 @ 12 PM CST

Snow Statistics Percentile Classes					Snow	Flow Statistics Percentile Classes					Flow
					—						- - -
Min - 10%	10% - 30%	30% - 70 %	70% - 90%	90% - Max	in.	Min - 10%	10% - 30%	30% - 70 %	70% - 90%	90% - Max	cfs
Much Below Median	Below Median	Near Median	Above Median	Much Above Median		Much Below Median	Below Median	Near Median	Above Median	Much Above Median	

Discharge, cubic feet per second

USGS 09180500 COLORADO RIVER NEAR CISCO, UT

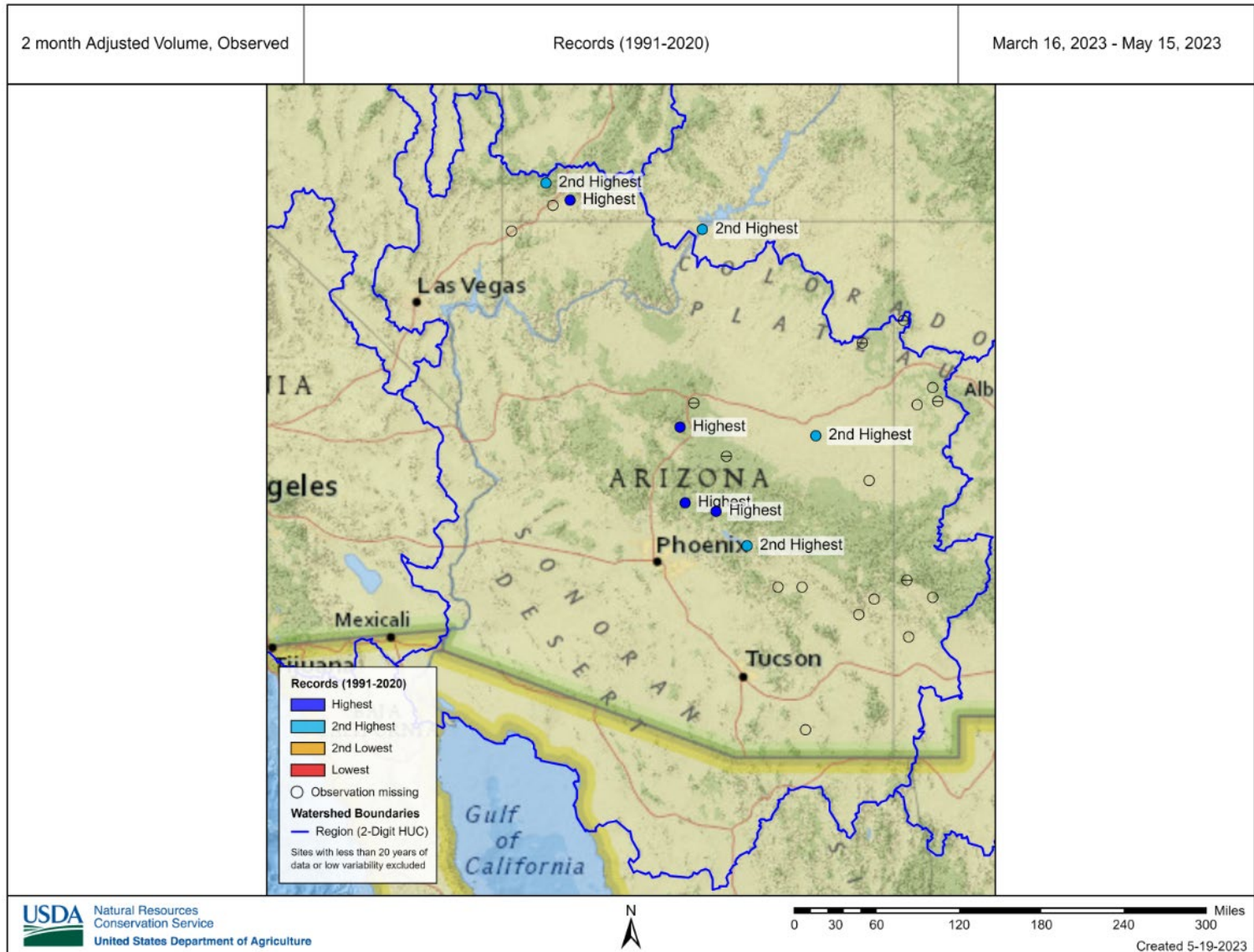


---- Provisional Data Subject to Revision ----

— Median daily statistic (104 years) — Daily mean discharge

Lower Colorado River Basin

Record high runoff (mid-March through mid-May) for the Virgin, Oak Creek, Tonto, Verde, and Little Colorado Rivers.



(Colorado Sun, May 9, 2023)

Impacts to Runoff: Dust on Snow

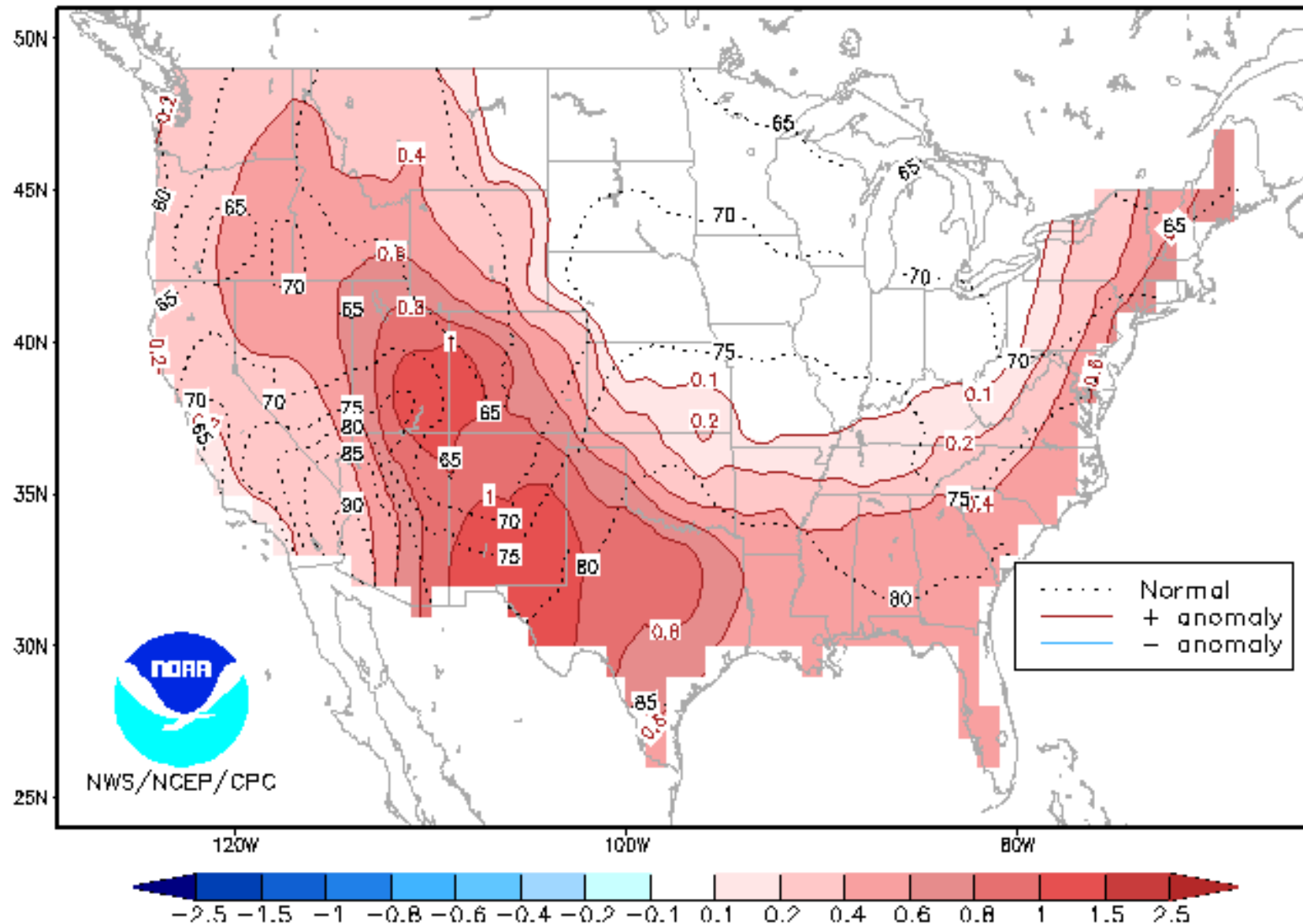


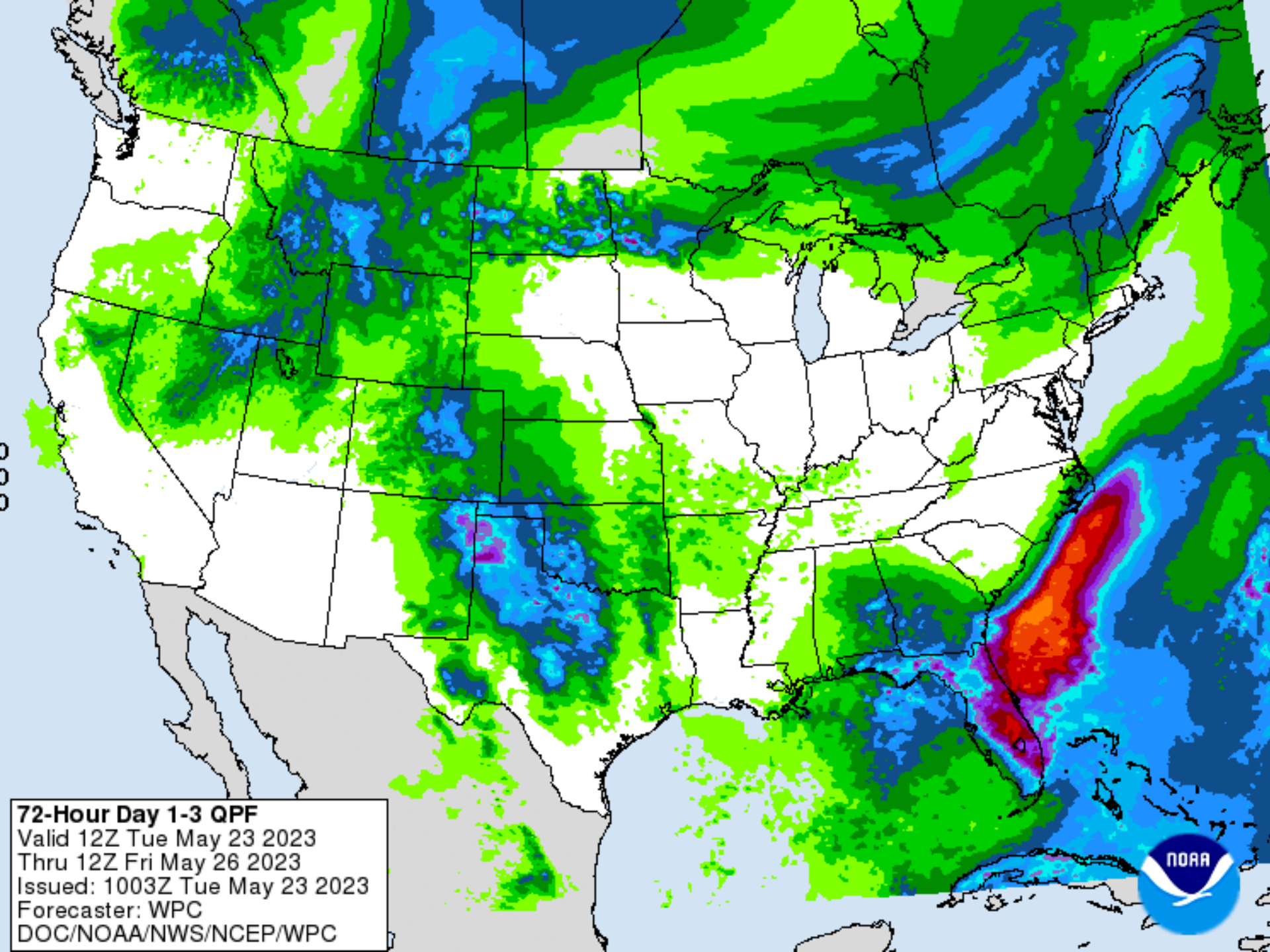
The layer of dust, much of which came from a dust event on April 3, is clearly visible in the Castle Creek watershed near Aspen as Jeff Deems, left, measures the height of the snowpack on April 12. Dust darkens the snow's surface and quickens the rate of snowmelt. (Shannon Mullane. The Colorado Sun)

Probability of Exceedence (POE) Maps for Jun-Jul-Aug 2023

Impacts to Runoff:
High Temperatures

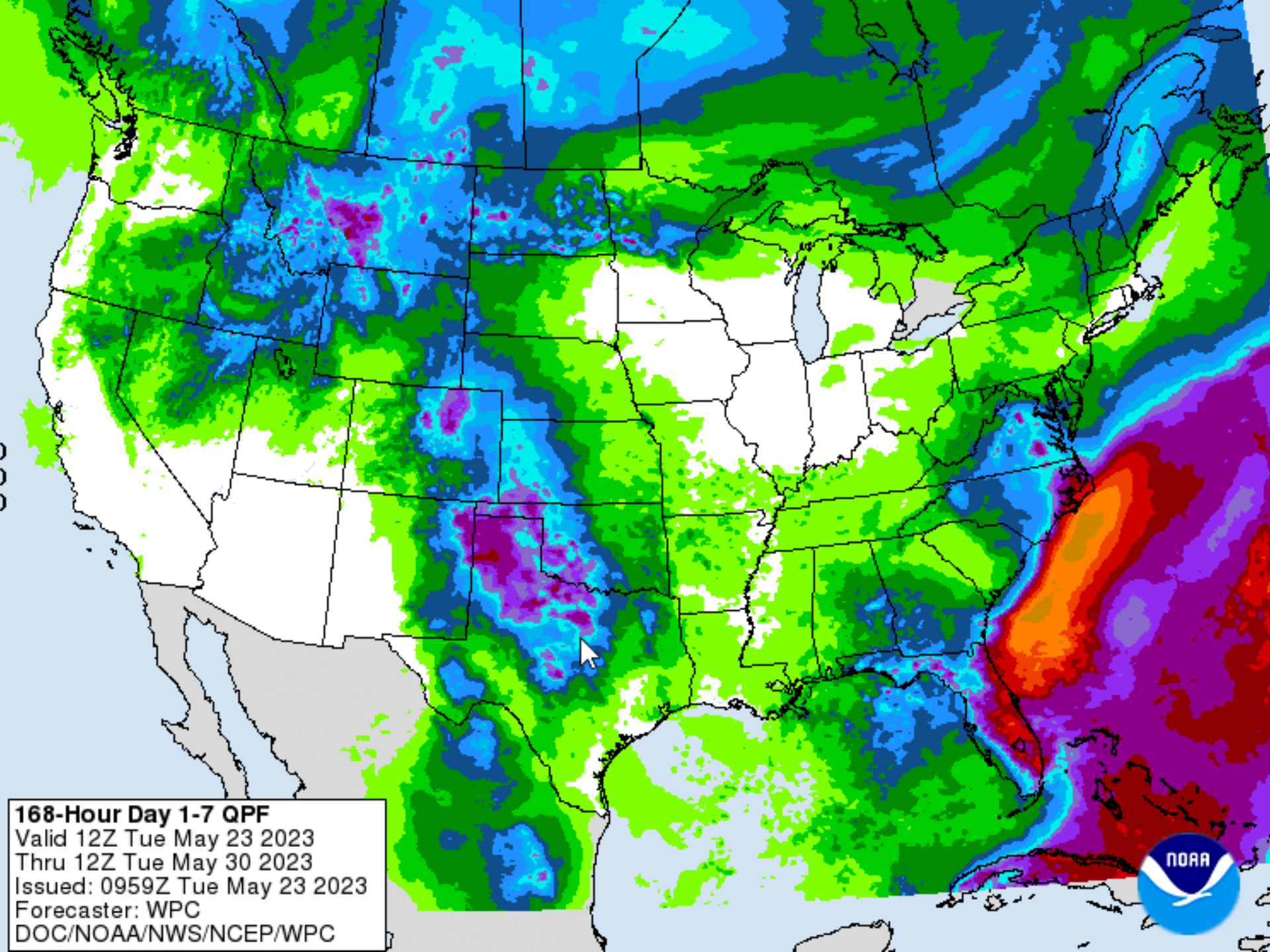
Temperature Forecast





72-Hour Day 1-3 QPF
Valid 12Z Tue May 23 2023
Thru 12Z Fri May 26 2023
Issued: 1003Z Tue May 23 2023
Forecaster: WPC
DOC/NOAA/NWS/NCEP/WPC





168-Hour Day 1-7 QPF
Valid 12Z Tue May 23 2023
Thru 12Z Tue May 30 2023
Issued: 0959Z Tue May 23 2023
Forecaster: WPC
DOC/NOAA/NWS/NCEP/WPC



Westwide Reservoir Storage – May 1, 2023



WESTWIDE RESERVOIR STORAGE
AS OF MAY 1, 2023



Median
■ 1991-2020
■ Below Median
■ Above Median

State
Reporting Reservoirs / Total Reservoirs

AZ

CO

ID

MT

NM

NV

OR

UT

WA

WY

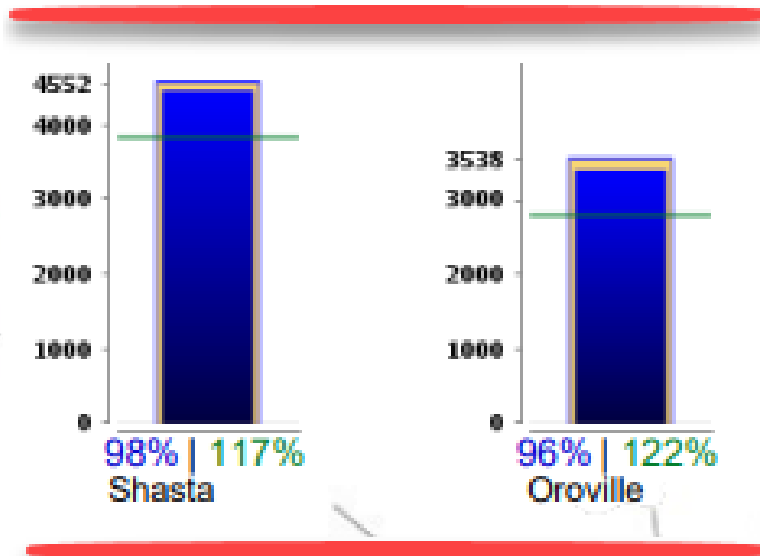
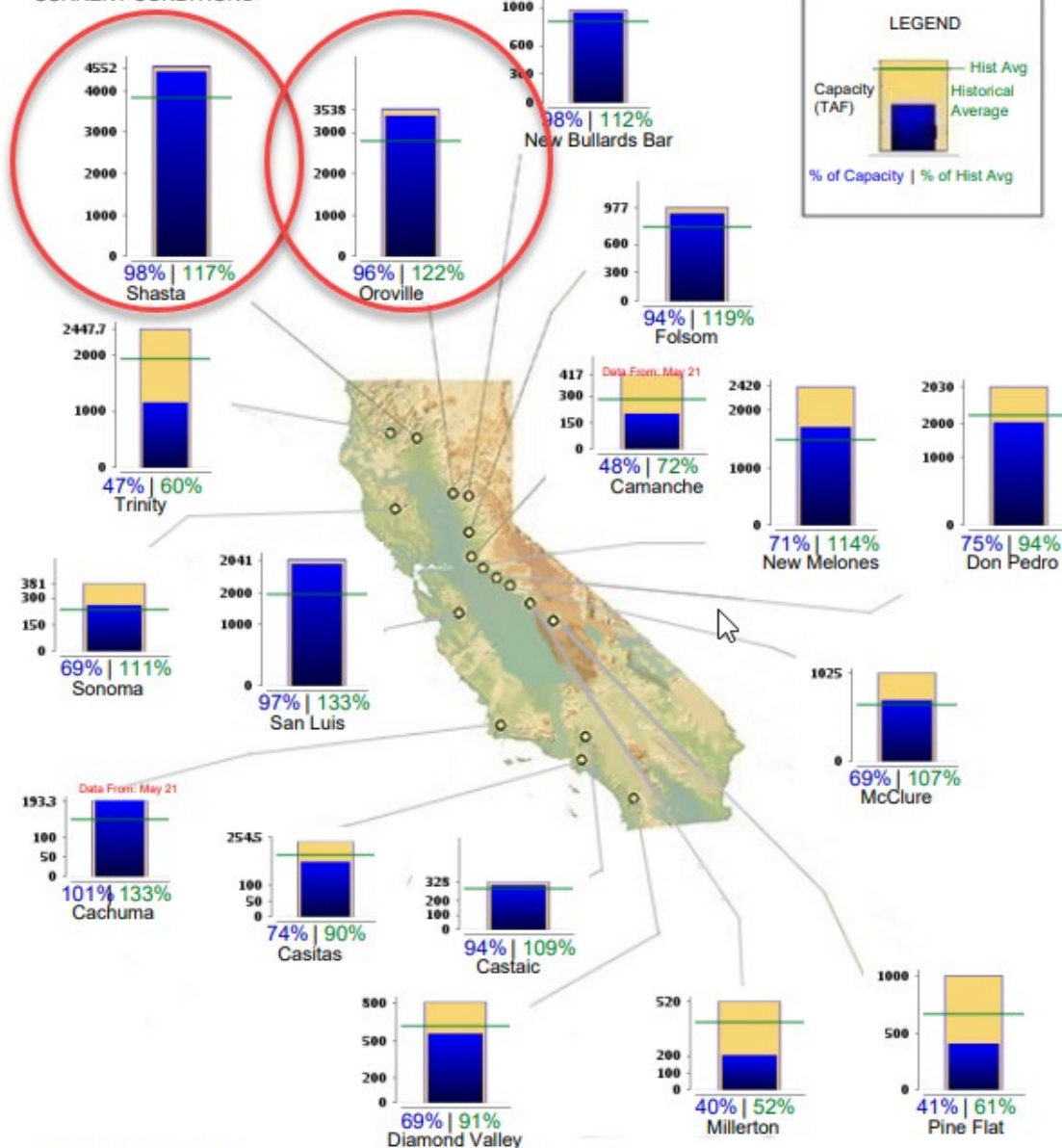


CURRENT RESERVOIR CONDITIONS

CALIFORNIA MAJOR WATER SUPPLY RESERVOIRS

Midnight - May 22, 2023

CURRENT CONDITIONS



<https://cdec.water.ca.gov/cgi-progs/products/rescond.pdf>

Colorado River states announce breakthrough water sharing deal

May 22, 2023 · 2:02 PM ET

Heard on [All Things Considered](#)

By Kirk Siegler

Water managers in Arizona, California and Nevada have agreed on a plan to cut their water use by well over a third of the entire traditional flow of the Colorado River through the seven states that rely on it. The federal government will pay some \$1.2 billion dollars to cities, irrigation districts and Native American tribes if they temporarily use less water.

The deal, which only runs through the end of 2026, amounts to the largest reductions of water use in modern times and are very likely to require significant water restrictions for farms and residents across the Southwest.

In FY2023, Congress allocated \$16.751M to SSWSF. This marks a 76.5% increase over the FY22 budget. The Senate Congressional Record, S7825, December 20, 2022, states the following:

“The agreement provides \$16,751,000 for the Snow Survey and Water Forecasting Program ...

The agreement provides an increase of \$7,000,000 to expand NRCS Snow Telemetry Network, of which \$1,000,000 is for a study, following consultation with the Committees, of potential expansion of the SNOTEL automated mountain weather monitoring network to the northeastern United States. The agreement also encourages consideration of expansion into the Alpine zone of glaciated mountain ranges, and consideration of working with university, tribal, and non-profit partners on the installation and maintenance of such SNOTEL sites. ³”

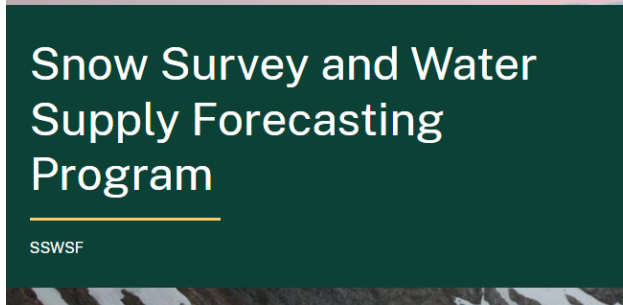


WEBSITES:

NEW



<https://www.nrcs.usda.gov/programs-initiatives/sswsf-snow-survey-and-water-supply-forecasting-program>



Home > Programs & Initiatives > Snow Survey and Water Supply Forecasting Program

NRCS hydrologists manage a comprehensive network of manually-measured snow courses and automated Snow Telemetry (SNOTEL) monitoring sites throughout the West, manage the data collection process, and estimate the runoff that will occur when it melts.



OLD

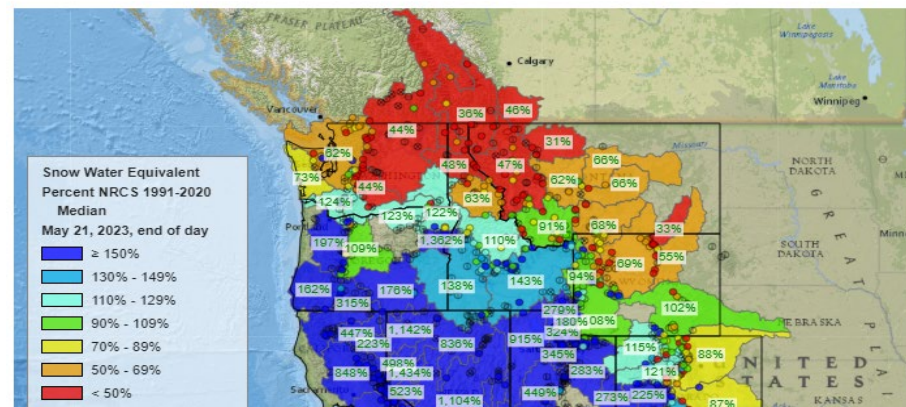


<https://www.nrcs.usda.gov/wps/portal/wcc/home/>

Welcome to the National Water and Climate Center

As part of the USDA Natural Resources Conservation Service, the National Water and Climate Center supports the Snow Survey and Water Supply Forecasting Program and Soil Climate Analysis Network (SCAN) Pilot Program for the U.S.

Current Conditions: [Snow Water Equivalent](#) | [Precipitation](#) | [Streamflow](#)



Thank You!

cara.s.mccarthy@usda.gov

