Monthly Climate Report

NWS Reno

Issued: 04/07/2023

Includes previous Drought update (DGT) and Hydro Report (E5)

Synopsis:

March continued to feature well below average temperatures (Figure 1) and above average precipitation (Figure 2). With the continued well above average water year precipitation and snow water equivalent, much of the Sierra and western Nevada experienced pronounced improvements or elimination of drought conditions.

Weather Events:

The relentless winter continued through much of March with multiple high-impact storm systems. The major series of storms in late February which brought blizzard conditions to the Sierra at times continued into the 1st, then after a brief reprieve the next round of storms rolled through from the 4th through the 10th. While these storms started out cold and added several more feet to the Sierra snowpack with lower elevations also receiving light-moderate snowfall (especially on the 4th-5th), a much warmer system on the 9th-10th driven by a subtropical atmospheric river raised snow levels to near 8000 feet, with heavy rain on snow producing numerous reports of flooding with road closures, especially for parts of western NV south of US-50. Roof collapses from the weight of heavier snow accumulating on top of existing snow increased in Sierra communities.

Bands of snow showers including periods of heavier snowfall continued to pile up the Sierra snowpack (generally 2-4 feet) from the 11th-13th. Another warmer storm threatened to bring additional flooding concerns on the 14th, but this system split with the heaviest precipitation shifting more quickly to southern CA. Avalanche activity in the Sierra which began with the late February storms increased further with these early-mid March storms, including a section of US-395 near Lee Vining which remained closed through the full month.

The first real break in weather activity for the month finally arrived from the 15-18th, giving Sierra communities some time to clean up from the 3-week barrage of winter storms, while milder temperatures helped melt some additional valley snowpack..

March wasn't finished with active weather though--a weaker storm brought lighter snowfall to the Sierra on the 19th, followed by a second storm which spread a swath of moderate-heavy snow across the Sierra, especially for Mono County. Around a foot of snow fell for higher elevations around Tahoe with spotty amounts from a trace to 6" at lake level, while nearly 3 feet piled up at Mammoth Mountain.

Weaker weather systems on the 23rd and 24th brought additional snow showers with spotty light snowfall totals to Sierra locations, generally less than 4" with a few sites receiving 8". During the night of the 25th, a persistent snow band brought a swath of 5-9" snowfall in western NV across southwest-south Reno, Virginia City eastward to Yerington, with lighter amounts across the remainder of Reno-Sparks southward to Minden.

One more storm brought heavy Sierra/northeast CA snowfall on the 28th, with widespread totals of 1-2 feet in higher elevations, up to 2.5 feet for higher elevations of Mammoth Mountain, and 6-12” around Truckee and down to lake level at Tahoe. Peak wind gusts of 50-60 mph were common across western NV, with stronger gusts 65-75 mph reported in Yerington and Hawthorne. An area of steady snow that continued overnight into the morning of the 29th produced accumulations of 1-5” in west central NV from US-95 eastward.

Additional snow showers continued on the 29th in the Sierra with bands of heavier snow and snow pellets extending into far western NV from the afternoon through the late night hours. Most locations received between a dusting and 3”, with a few sites north of Reno receiving up to 5”. More isolated snow showers formed on the 30th with minimal additional accumulations.

Even though it was only one day, the final day of March went “out like a lamb” as dry conditions returned to the region with temperatures moderating into the 40s for Sierra communities and 50s for western NV valleys.

As March came to a close, season-long snowfall surpassed 600” at all higher elevation reporting sites and ski resorts along the Sierra crest. By the 31st, the Central Sierra Snow Lab officially recorded 59.58 feet of snowfall, which is the second most snowfall recorded since the all time record of 67.65 feet was set back in 1952. Another all-time snowfall record was established at Mammoth Mountain, where the main lodge surpassed 700 inches of snow by the end of the month.

Hydrology:

March sealed the deal on record to near record snowpacks through most of the region. Below normal temperatures limited melting to shallow lower elevations and sent drought packing or at least greatly diminished (see details below). Snowpack is near or exceeding records throughout the area (Figures 3 and Figure 4), with the most extreme records south of Lake Tahoe. Most sites in the Carson River Basin, Walker River Basin, and Mono County are breaking previous records for snow water equivalent. Some of these snow courses have periods of record exceeding 80 years (Figure 5)!

Streamflows in March were mostly above normal in Western Nevada, and near normal along the upper Humboldt and below average along the lower Humboldt (Figure 6 left side). March did see the return of flow to the lower Humboldt at Imlay, and by the end of the month nearly twice as much water had passed Imlay as in the entire 2022 water year (which was a record low). Water year to date streamflow is generally above to near normal draining the Sierra and still well below normal in the lower Humboldt (Figure 6 right side). The enormous snowpack will provide well above normal April-July water supply conditions through the region, with record volumes expected along the Carson and Walker Rivers (Figure 7). Reservoir changes were a mixed bag for March. Tahoe recorded large gains in storage, along with modest gains in the Truckee system, while flood control releases from Lahontan and along the Walker resulted in significant drawdown in those reservoirs. Rye Patch on the lower Humboldt had some very modest gains with the return of flow (Figure 8).

The March 9th-10th warm atmospheric river storm led to rain and very significant and rapid melt of low elevation and relatively shallow snow leading to widespread flooding impacts throughout the region. Impacts included flooding in Smith Valley from Desert Creek and other sources (see photo below), and flooding along 6 Mile Canyon in Lyon county (photo below). Other locations that experienced flooding included near Steamboat Creek in Paradise Valley, the east side of Washoe Lake and many locations in Douglas county. Major flooding also occurred along the East Walker River below Bridgeport Reservoir (Figure 9). Rain and snowmelt in and

below the Sierra Valley lead to delayed flooding along the Middle Fork of the Feather near Portola. The crest was extended and exacerbated by warm windy conditions on and around March 14th (Figure 10).

Drought/Climate Update:

Drought conditions continued to improve across the HSA during March (Figure 11). As of April 4th (encompassed the improvements from March), only 9% of the HSA remains in drought compared to 69% at the beginning of the month. This includes the complete removal of all severe drought (D2) in northwest NV and northeast CA. Additionally, all of the Sierra locations have no drought or abnormally dry conditions for the first time since January 28th, 2020. The only areas remaining under moderate drought (D1) are northern Lassen County as well as a small portion of Pershing county. As for the area of D1 in Pershing County, this area has had significant agricultural impacts over the last 3 years. Conditions continue to improve, but there still remains low groundwater levels and remnant agricultural impacts. Since the start of the water year, there have been 2 to 3 category improvements to the drought throughout much of the HSA (Figure 12).

Water year precipitation as well as longer term precipitation surpluses continue to be impressive throughout the region, especially in the Sierra. Current water year precipitation is between 150-300% of average across the entire service area (Figure 13). In the Sierra, one year precipitation is now at 150-250% of average, and even two year precipitation is at 100-150% of average. Due to much colder than average temperatures this winter (Figure 14), a majority of this is still locked up as snow. Another way to gauge water surpluses throughout the service area is to look at both the water year and one year SPEI. Water year SPEI is currently between 1-1.5 in the north and 1.5-2.5 in the remainder of the HSA, signifying that there are wet to extremely wet conditions region-wide. One year SPEI is between 1-2.5 in the Sierra, and between 0.5-1 in western NV. This is very impressive given the long term precipitation deficits as well as the extreme summer and fall temperatures experienced during the last three years of drought.

Photos and Impacts:

Plumas-Eureka State Park museum. Taken on 3/9 by NWS employee Scott McGuire.

"Another canopy at a South Lake Tahoe gas station fell on Thursday evening, this time causing a fire at one of the gas pumps." - SouthTahoeNow.com and photo by Carey Brown.

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The METAR from Truckee Airport on 3/3/23. There was enough snow on both sides of the runway to restrict wing span.


Six Mile Canyon Road 3/10/23
410K
Photo Credit Storey County

Additional Information on Drought and Climate:

Report Drought conditions here
Nevada statewide Drought update
NV Living with Drought
Drought Monitor
New Drought.gov
California Nevada Drought Early Warning System
NOAA CPC Drought page-
CNAP Drought tracker
California Nevada River Forecast Center
WRCC Drought Tracker
WRCC Enso page
WRCC Monthly Climate Summaries
Evaporative Demand Drought Index
US Seasonal Drought Outlook

Contact NWS Reno Climate Team
rev.climate@noaa.gov 775-673-8100
https://www.weather.gov/rev/

Figures.

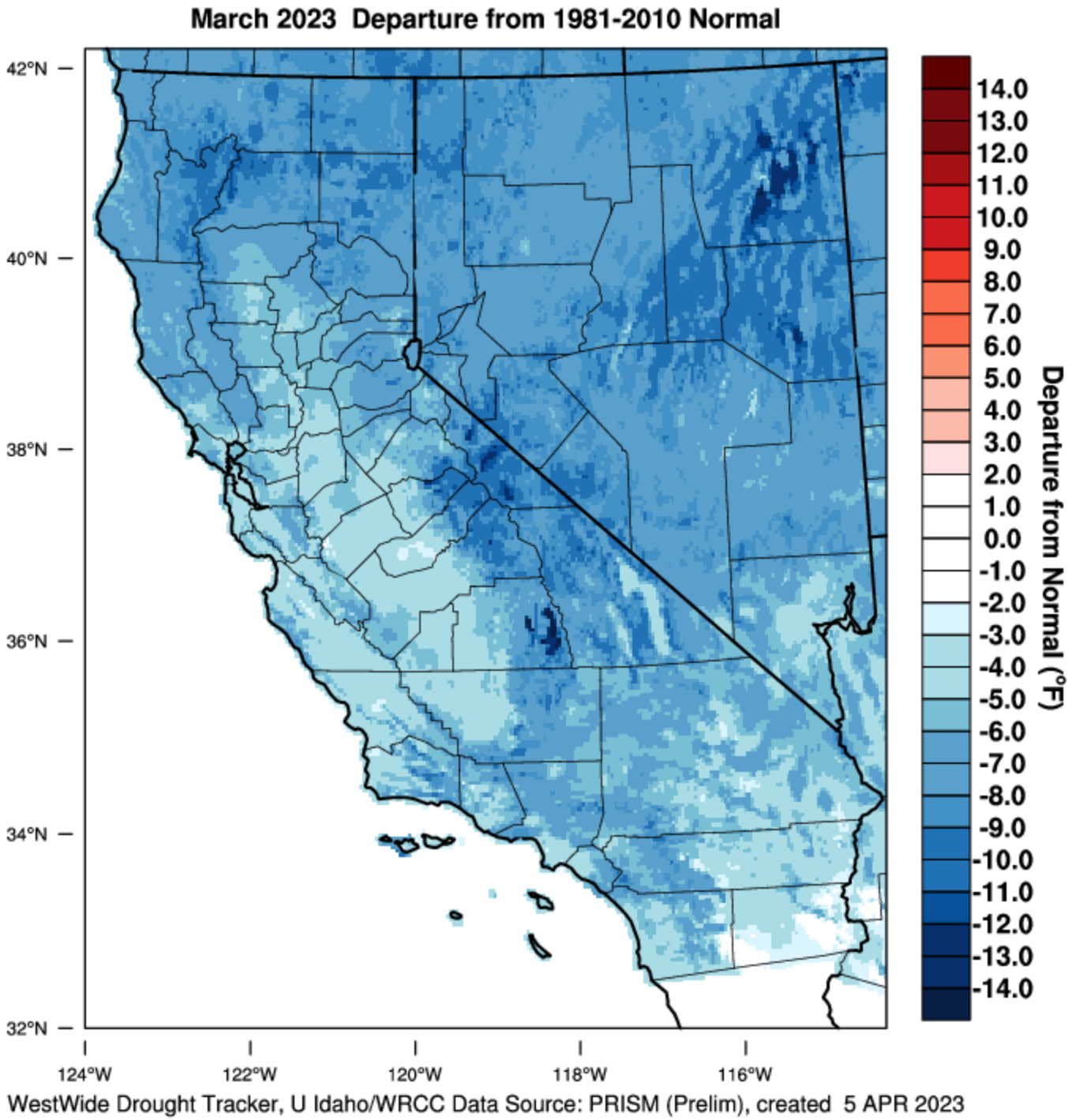

Figure 1. Departure from normal temperatures for March 2023. Data courtesy of WestWideDroughtTracker (WWDT)

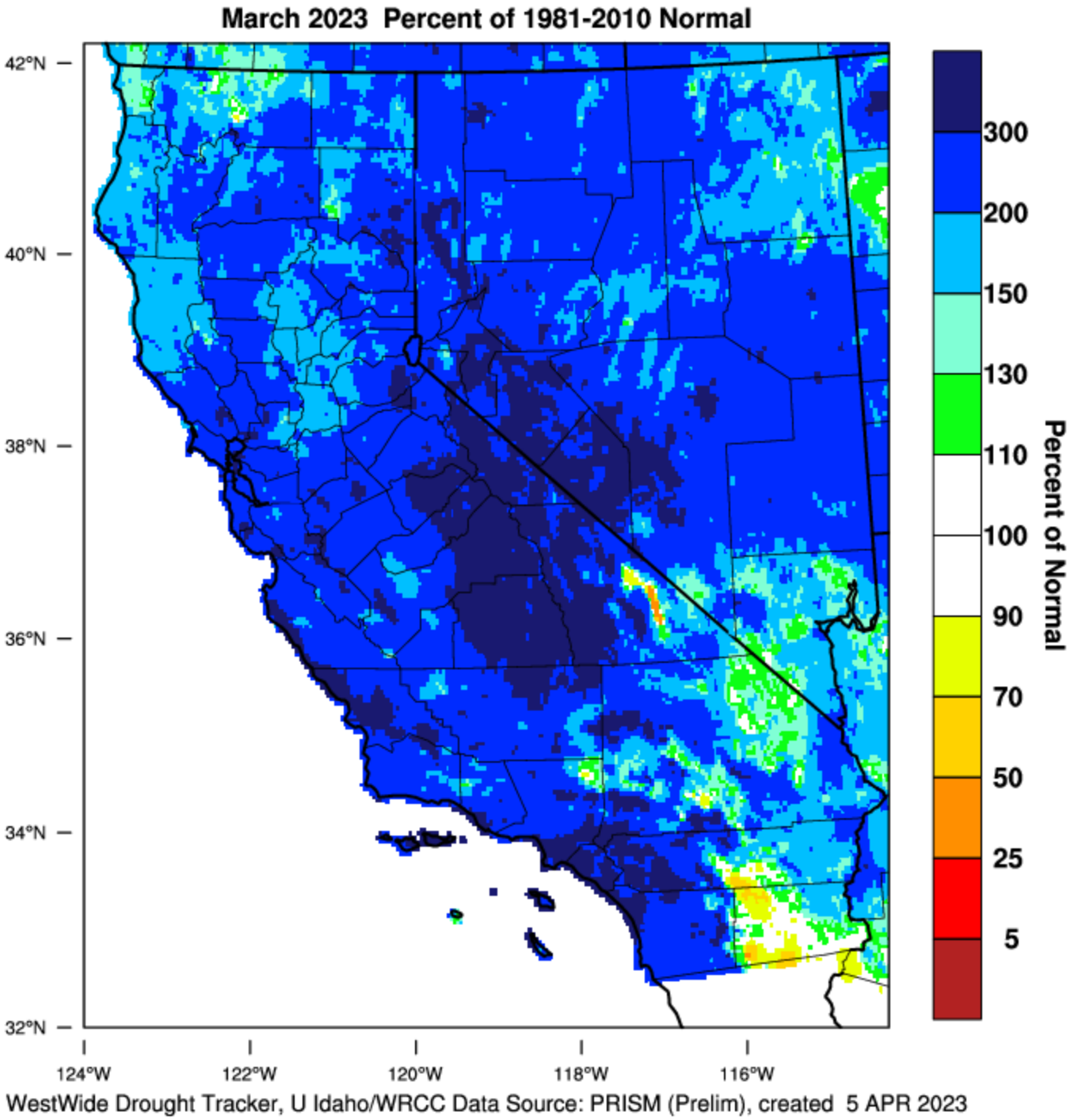

Figure 2. Percent of average precipitation for March 2023. Data courtesy of WestWideDroughtTracker (WWDT)

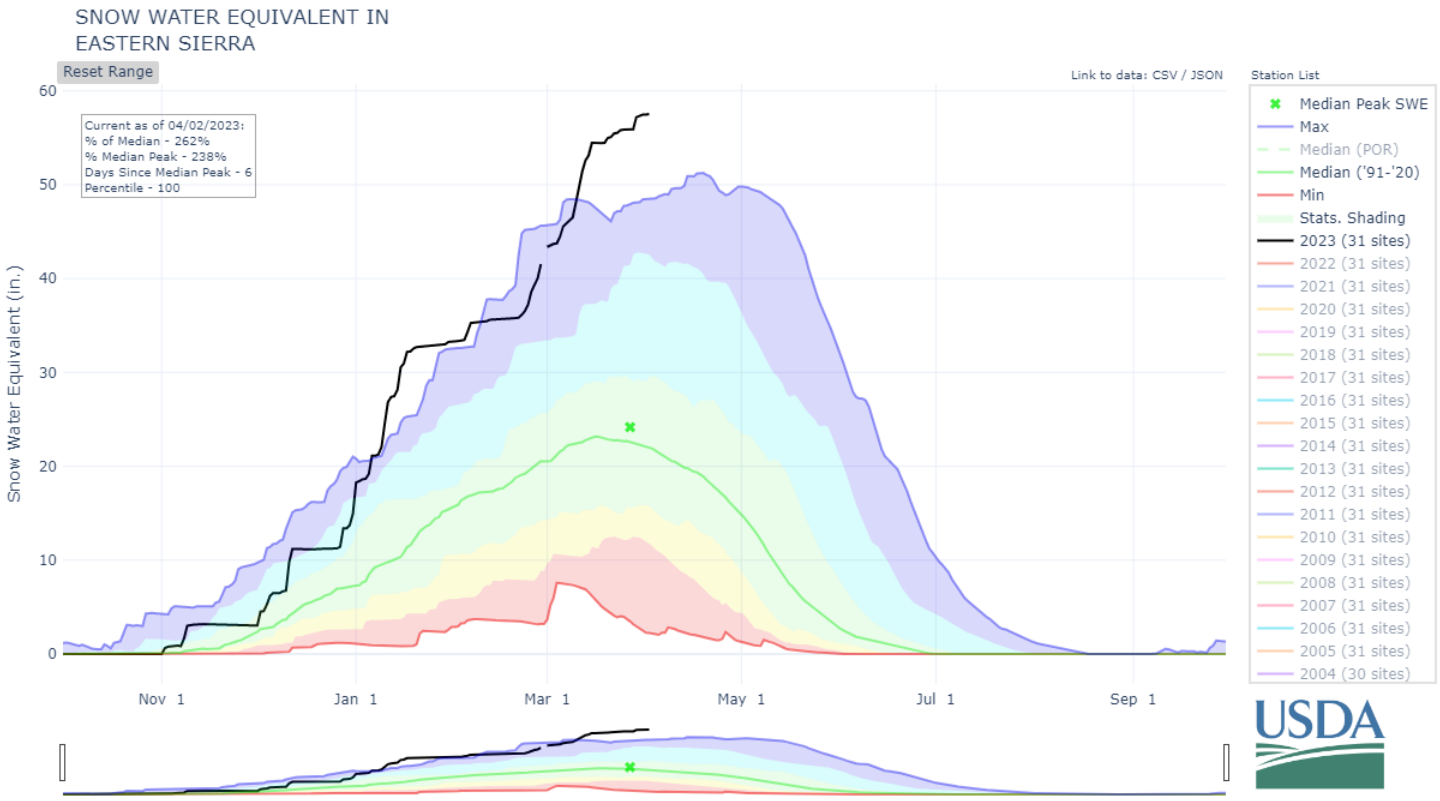

Figure 3. Snow water equivalent for Eastern Sierra watersheds (Tahoe, Truckee, Carson and Walker). Black line represents the water year 2022-2023. As of April 2nd, this area was 262% of median and 238% of the median peak. (NRCS)

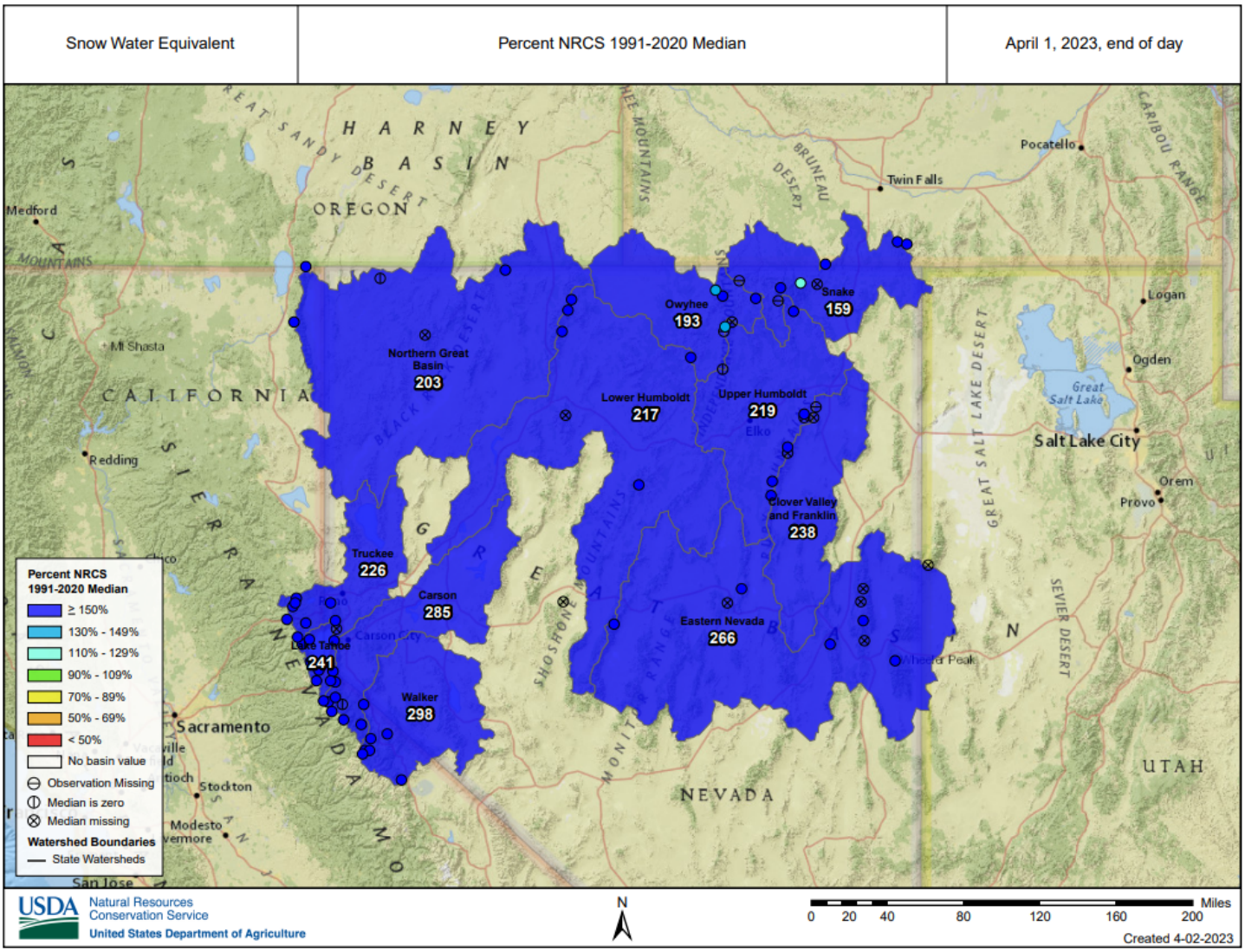

Figure 4. SNOTEL snowpack % of median as of April 1st, 2023.

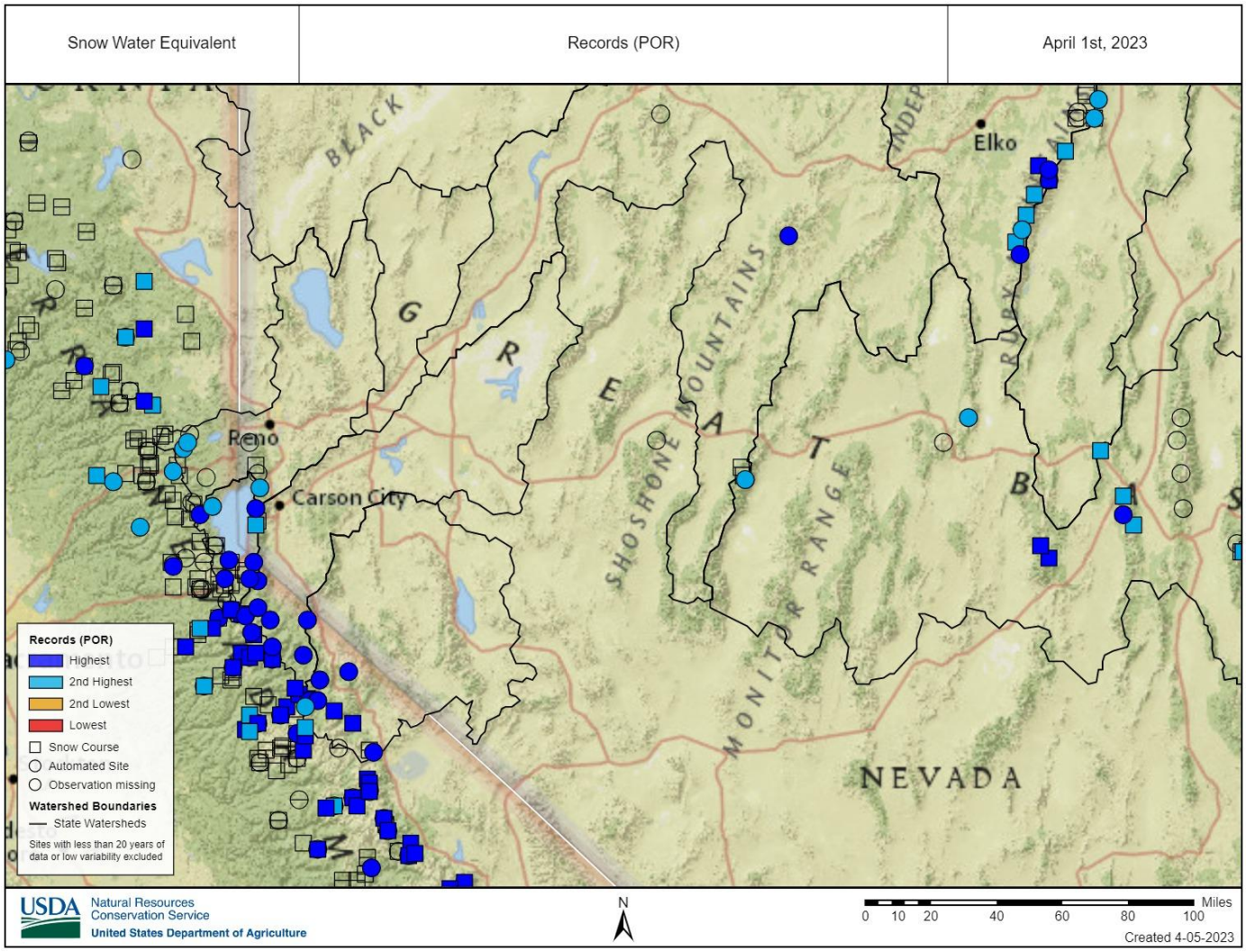

Figure 5. April 1st SNOTEL (circles) and snow course (squares) record and near record SWE. Most SNOTELs have over 40 years of record, and many snow courses have records exceeding 80 years. (Link)

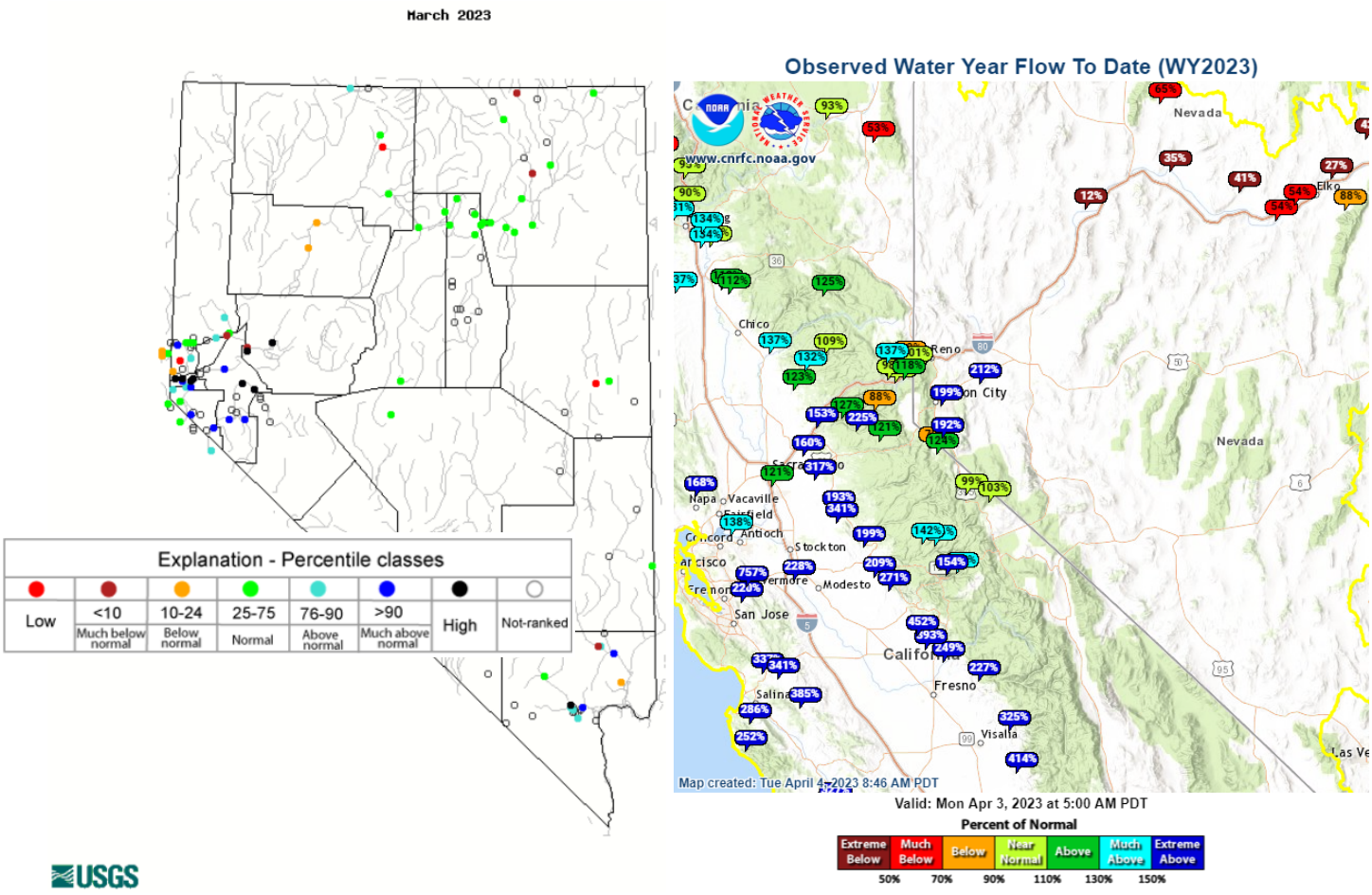

Figure 6: March monthly USGS streamflow on the left, and CNRFC water year observed flow to date on right.

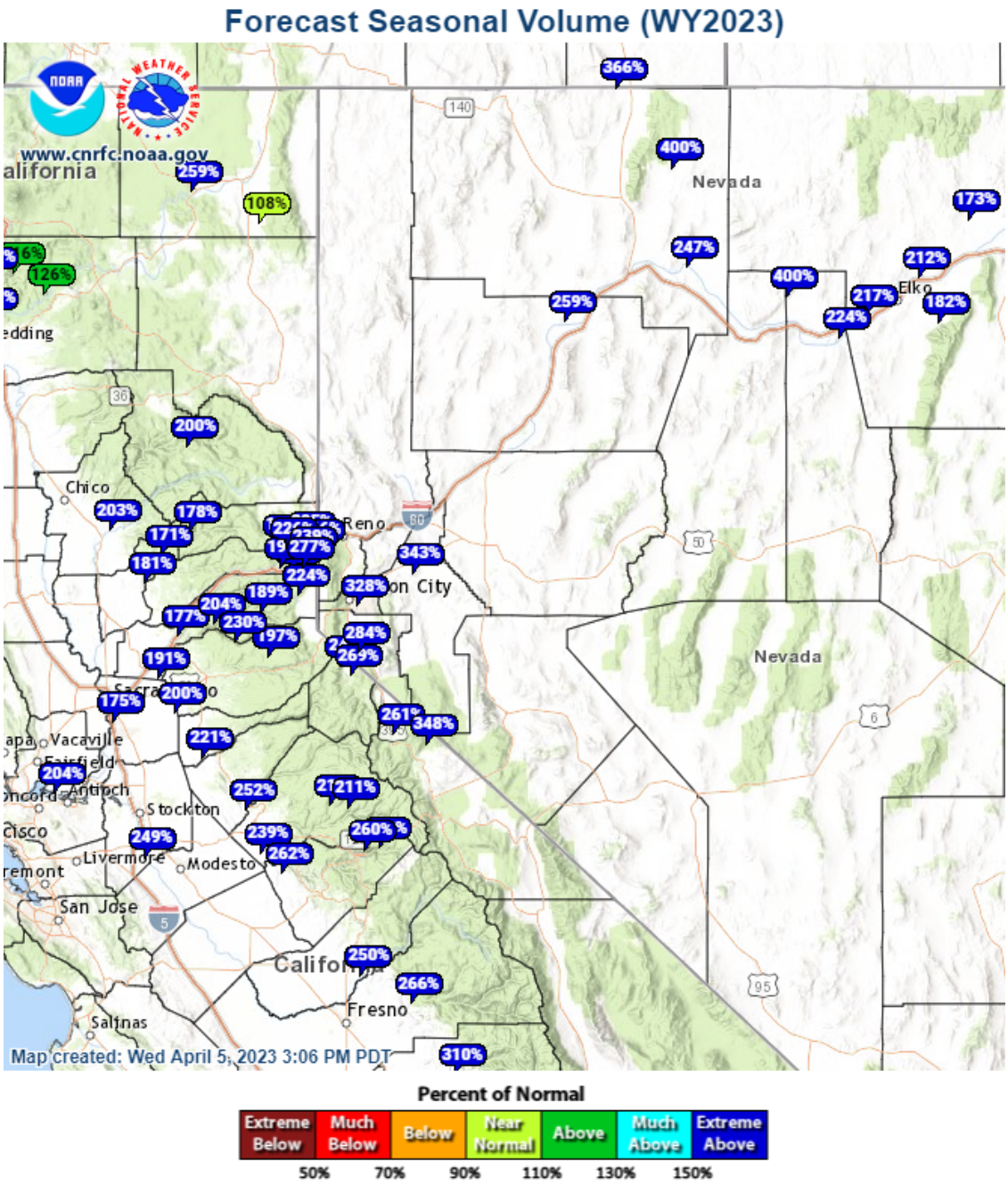

Figure 7 Median April -July water supply forecasts as percent of average. Updates available at cnrfc.noaa.gov

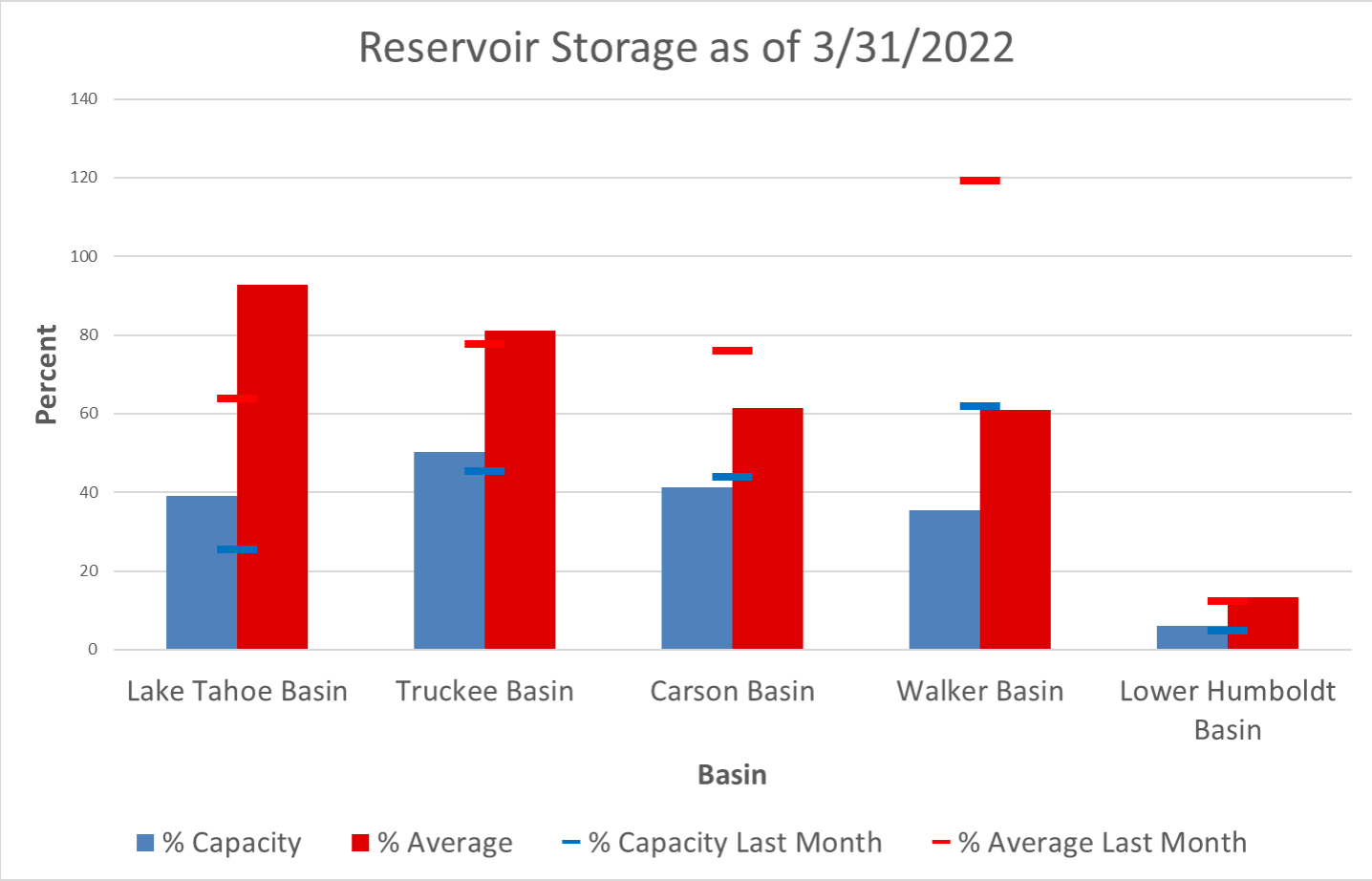

Figure 8: End of March Reservoir storage % of capacity and % of average

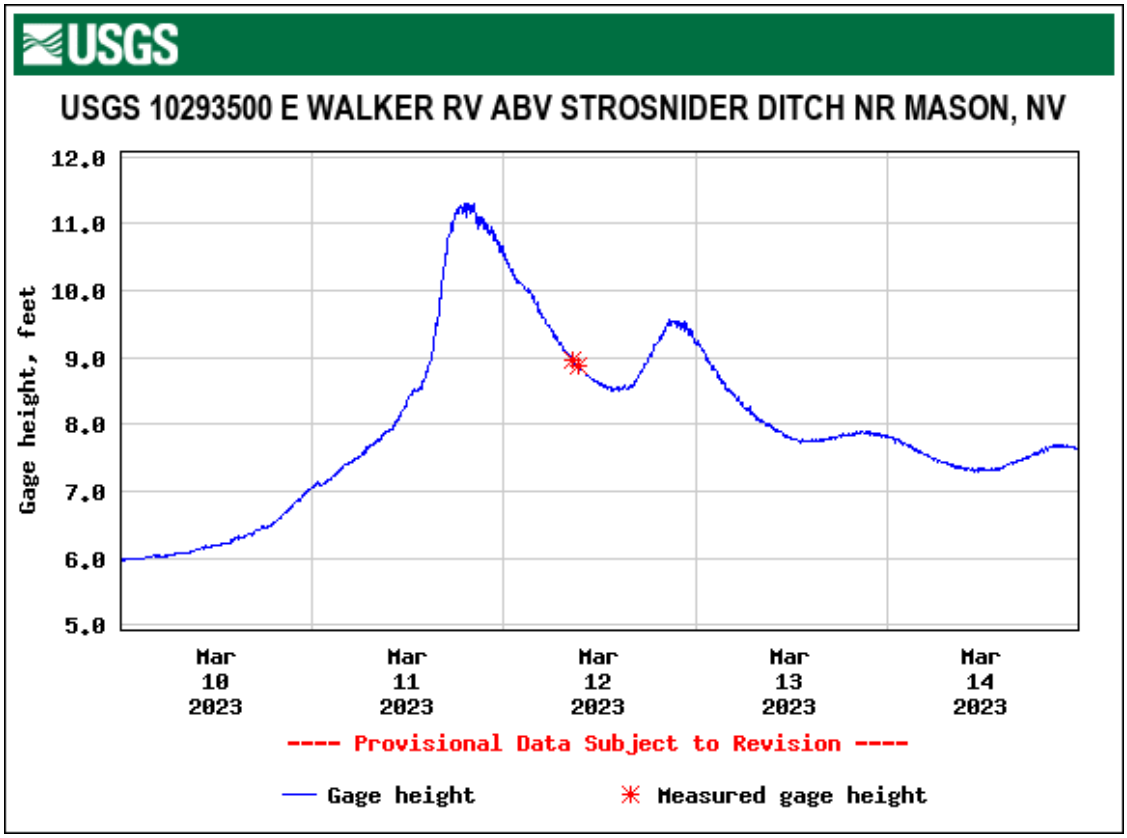

Figure 9 Major flooding along the East Walker River from rapid low elevation snowmelt resulting from a warm Atmospheric River event. For reference, flood stage is 8 feet while the major flood stage is 9.5 feet.

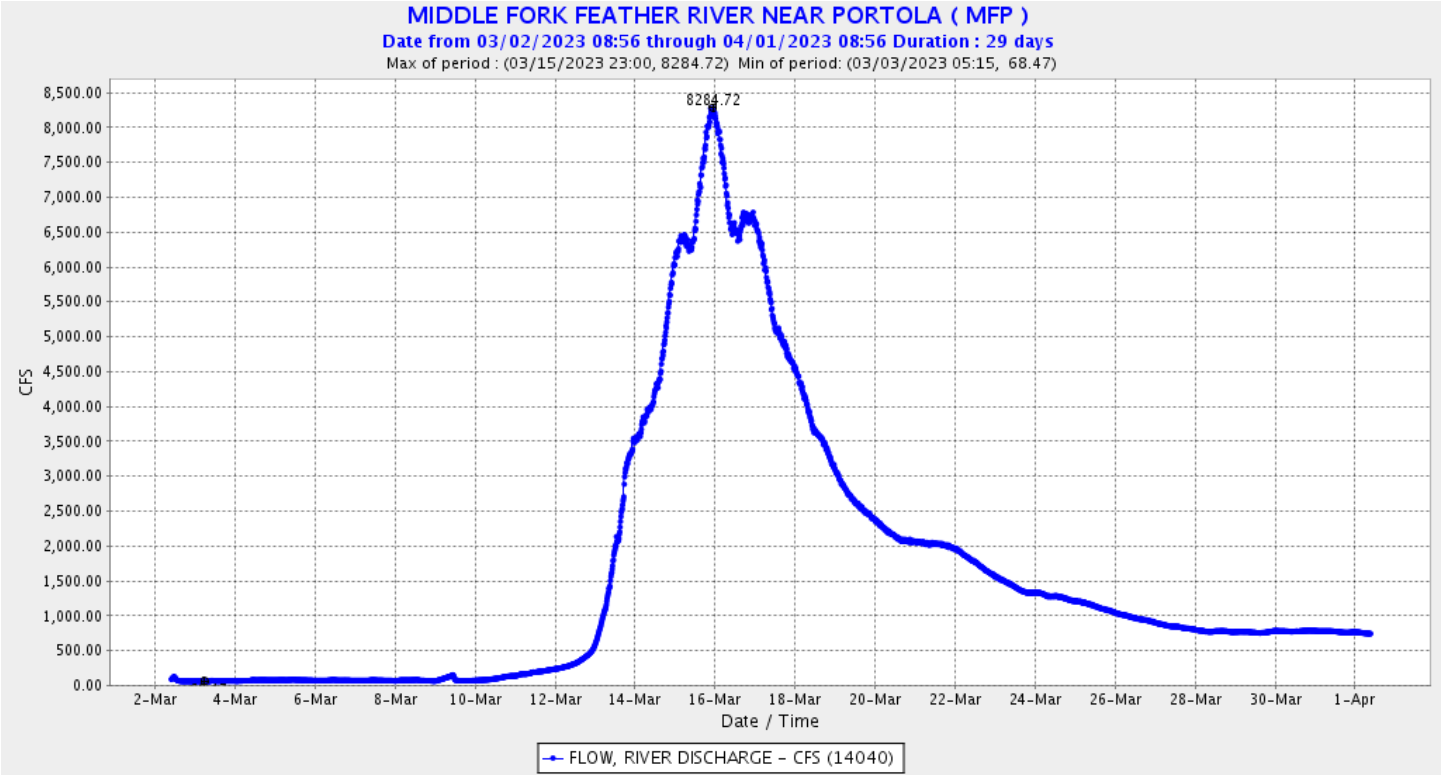

Figure 10, flood flow along the Middle Fork of the Feather river

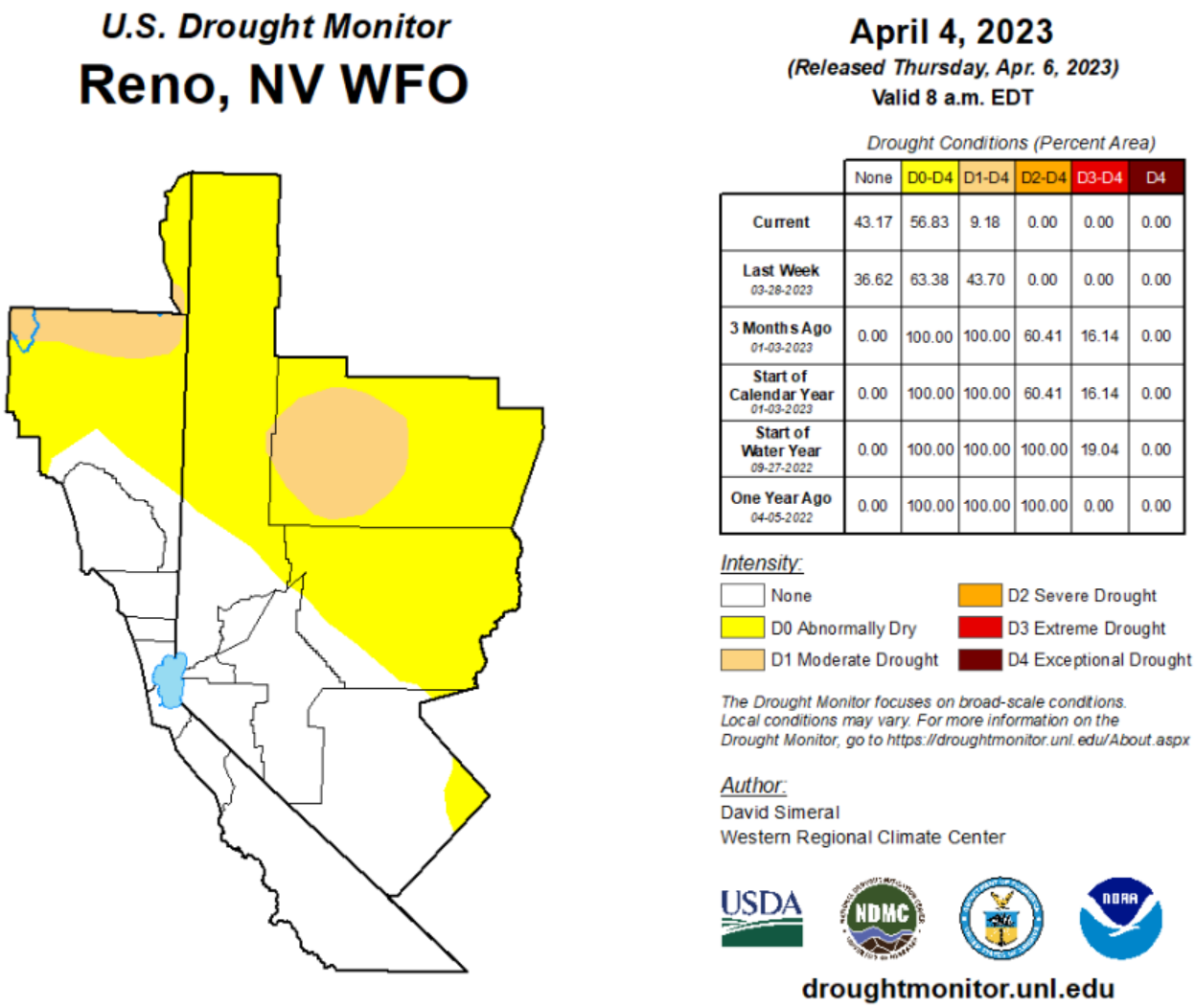

Figure 11. End of March Drought Monitor Status for NWS Reno Service area.(Drought Monitor)

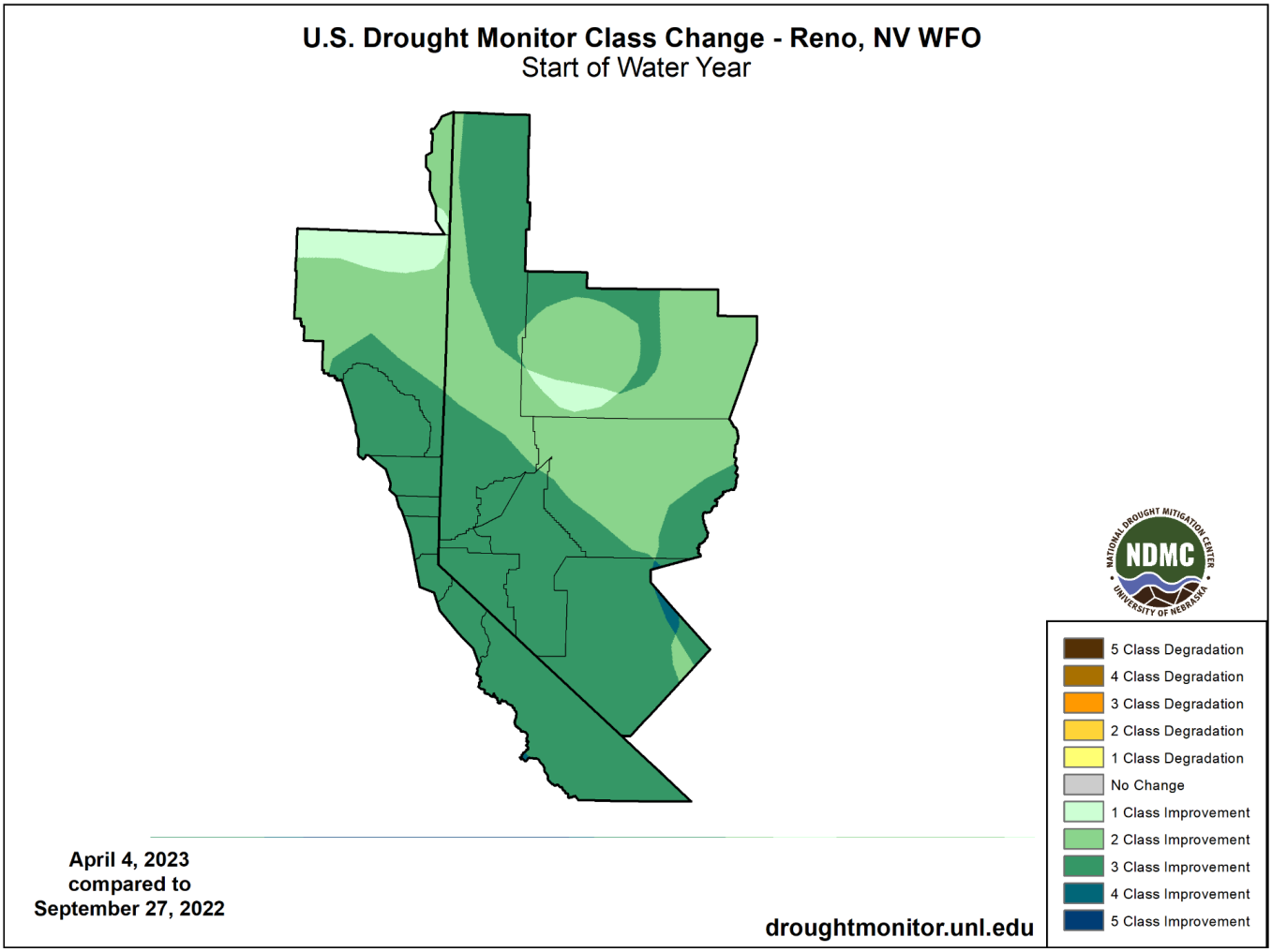

Figure 12. Changes in drought categories since the start of the water year, Oct. 1, 2022, shows two to three class improvements for most of the Sierra, and one to three class improvements for much of northwestern Nevada. (Drought Monitor)

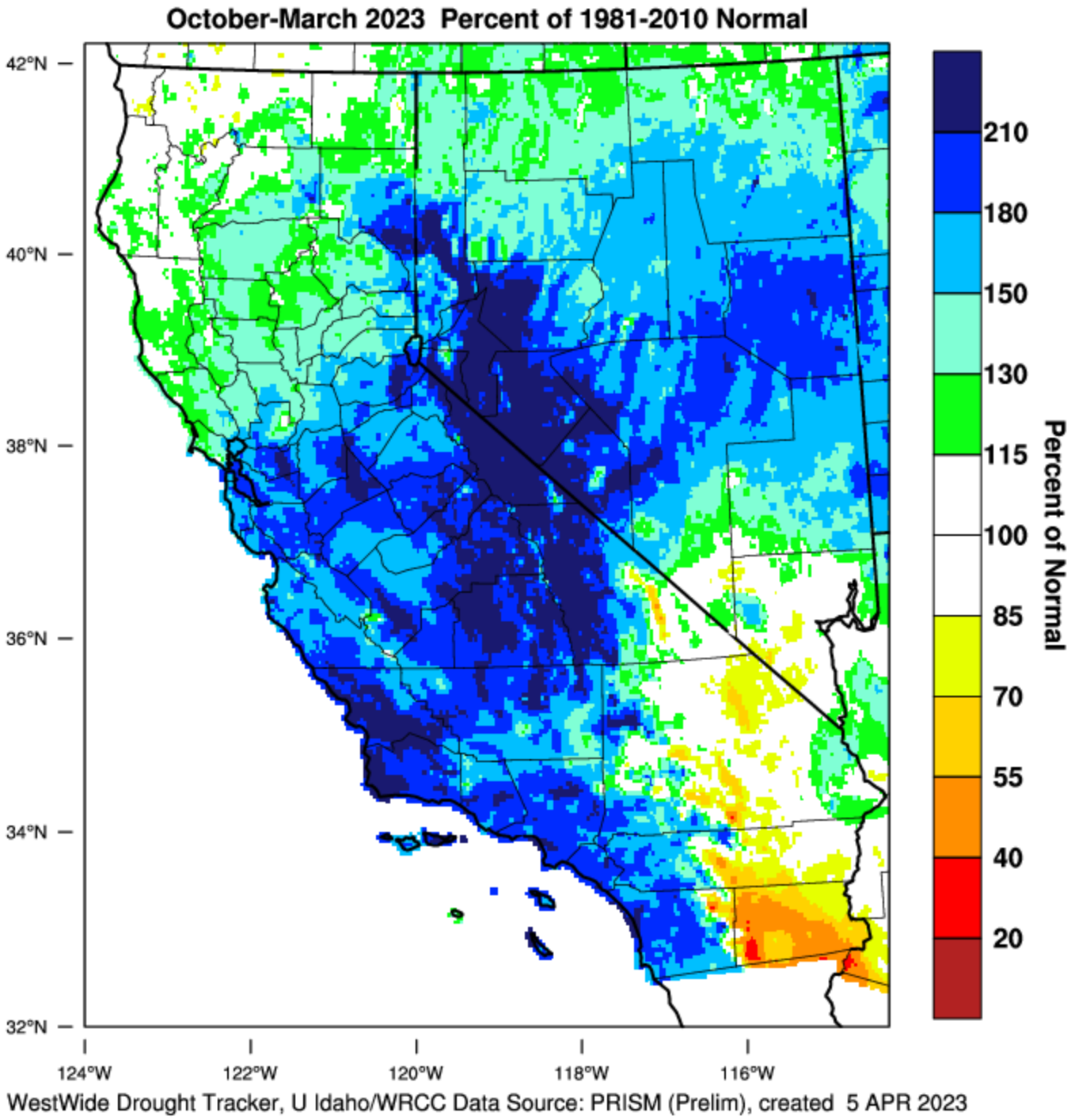

Figure 13. Percent of normal current water year to date. A majority of our region has received 150-250% of normal precipitation. Data courtesy of WestWideDroughtTracker (WWDT)

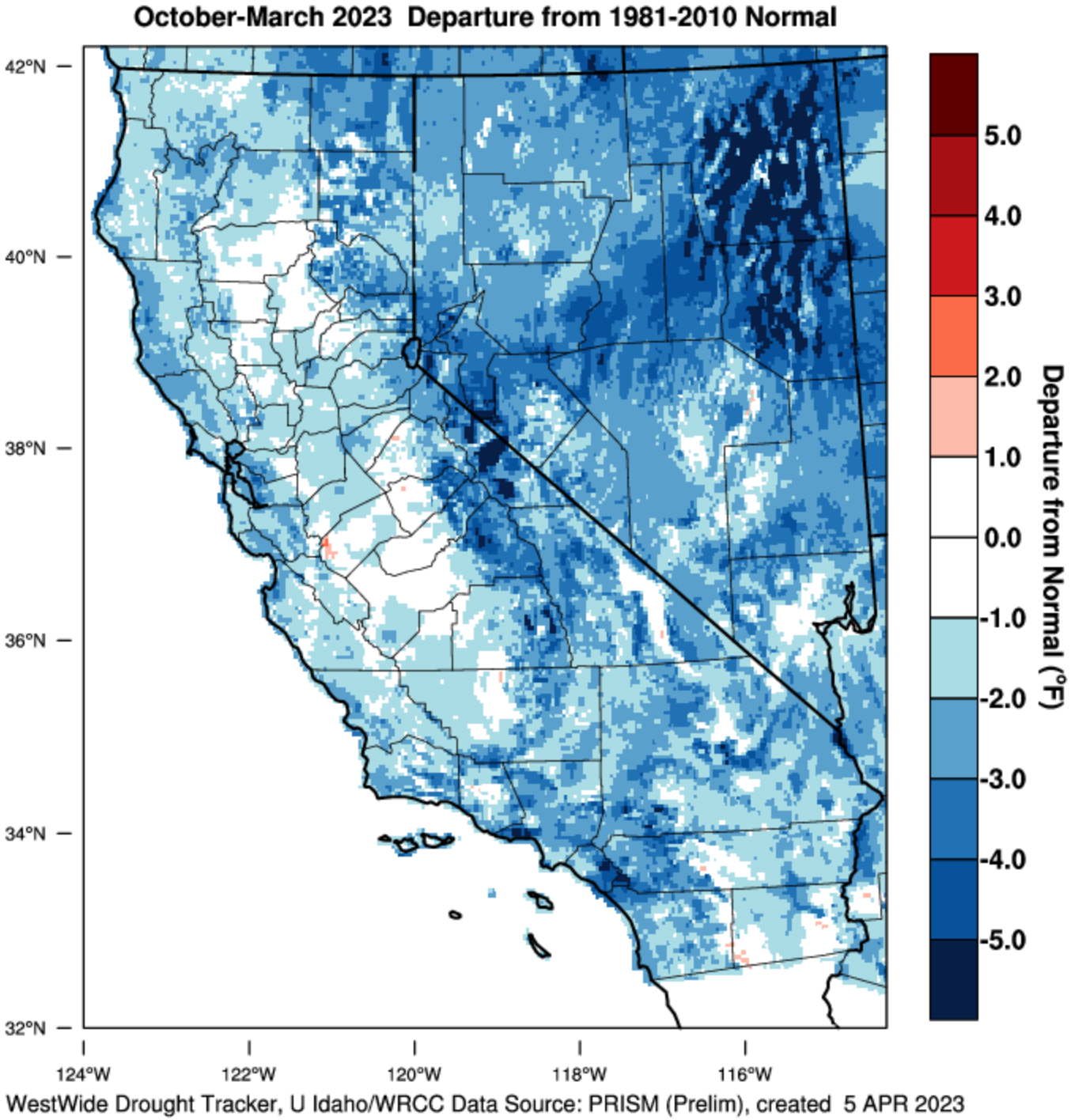

Figure 14. Departure from normal temperatures for the water year. Data courtesy of WestWideDroughtTracker (WWDT).