

Nevada Drought Update - JANUARY 2023

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Drought improving (s Cool and wet conditions in northern Nevada are promising (no counting chickens yet). Moderate temperatures balanced dry conditions in the south

Current drought conditions in Nevada and across the West

Less than a quarter of the state remains in D3-Extreme drought and none of the state is experiencing D4-Exceptional drought (Fig. 1, Table 1). This puts Nevada roughly on par with conditions in late 2021 and early 2022. Last year, more of the state was in D4-Exceptional drought, but some areas that are now in D2-Severe or D3 drought were in D1-Moderate drought.

Across the West, D2-Severe and D3-Extreme drought remain entrenched over Nevada, Utah, California, southeastern Oregon, and parts of northern Montana (Fig. 1). Large parts of the Pacific Northwest and the Southwest are drought-free or just Abnormally Dry (D0).

Over the last month, drought conditions have mostly improved across the West, with one-category improvements in almost every western state (Fig. 2). In Nevada, central and northeastern areas shifted from D3 to D2. Drought worsened primarily in eastern Colorado.

Date	12/28 2021	9/27	11/29	12/27
None	0.0	0.0	0.0	0.0
Abornmally Dry-D0	0.0	0.0	0.0	0.0
Moderate Drought-D1	10.7	0.5	0.5	0.5
Severe Drought-D2	61.1	47.3	61.6	75.1
Extreme Drought-D3	20.6	52.2	37.9	24.5
Exceptional Drought-D4	7.5	0.0	0.0	0.0

Table 1. Percent of Nevada in each drought class from the [US Drought Monitor](https://droughtmonitor.unl.edu).

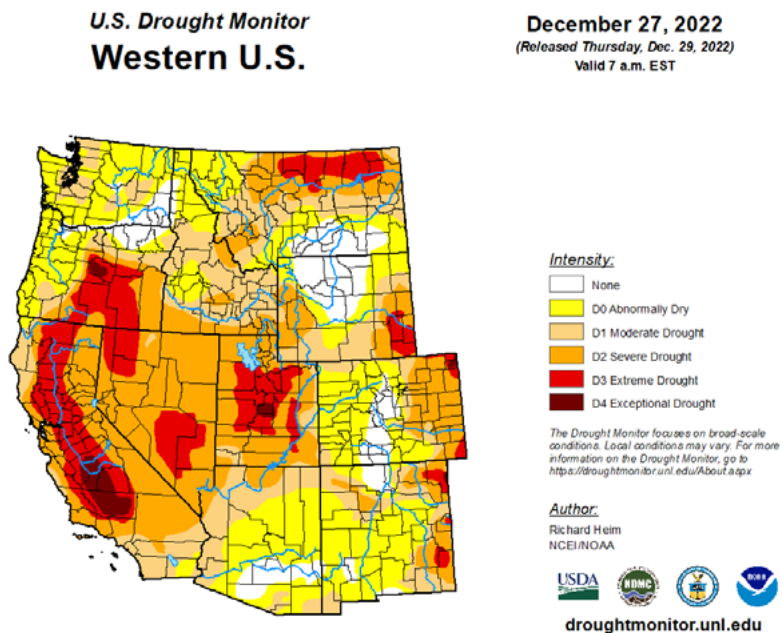


Fig. 1. Drought Monitor map for the western US, released on December 29, 2022, reflecting conditions as of December 27, 2022.

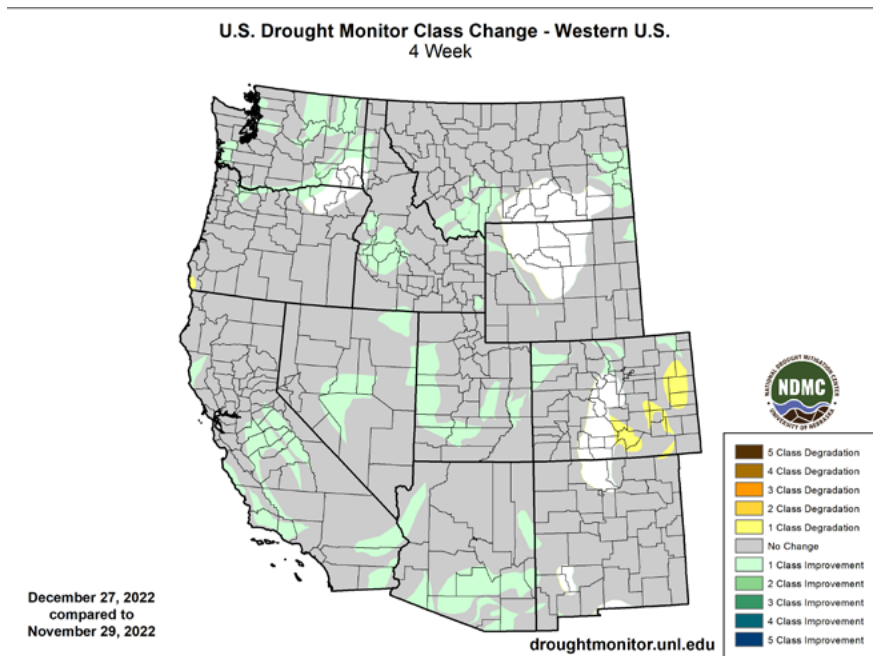


Fig. 2. Drought Monitor change map showing places where drought conditions improved (green) or worsened (yellow to brown) between late November and late December 2022.

December Temperature, Precipitation & Snowpack

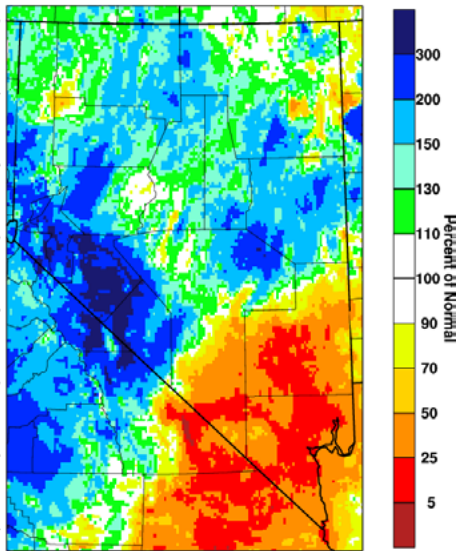


Fig. 3. Percent of average (1981-2010) December precipitation in 2022. PRISM from [Westwide Drought Tracker](#).

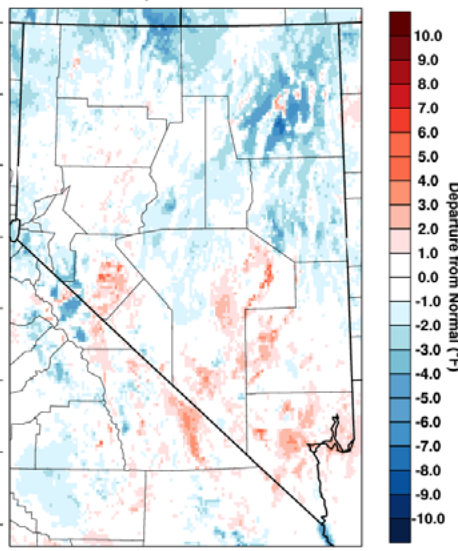


Fig. 4. Difference from average (1981-2010) December temperature (°F) in 2022. PRISM from [Westwide Drought Tracker](#).

The northern two-thirds of the state had a wet December (Fig. 3). There was a moderate storm in the second week of the month and a series of storms, including a significant atmospheric river that began around Christmas Day and caused some flooding. Although the fringes of some storms did brush southern Nevada, most of Lincoln, Clark and southern Nye counties have had less than half or even a quarter of the normal December rain and snow.

December temperatures were largely unremarkable, within a

few degrees of normal over most of the state (Fig. 4). There were notably cold temperatures in parts of northeastern and north-central Nevada.

The most recent storms were warm, so even relatively high elevations received a mix of rain and snow. The healthy existing snowpack and, at least in northwestern Nevada, an early change to snow on New Year's Eve, have left the snowpack at 175 to nearly 300% of normal (Fig. 5). Snowpack in the Upper Colorado River basin is reasonable, at 90 - 155% of normal. Snowpack is even near normal in dry southern Nevada, as recent storms added to a snowpack that was about a month ahead of normal (Fig. 6, left).

It is too early to assume that current conditions promise a solid spring snowpack. The late-December snowpack in the eastern Sierra this year (Fig. 6, right) is similar to that in water-year (WY) 2022 (last year) and WY 2011. After a break in January 2011, later season storms delivered a solid snowpack in WY 2011. Last year, however, the wet season essentially ended at New Year's, and the year's snow tally was disappointing. So, celebrate the snow (I am!), but don't count your chickens quite yet.

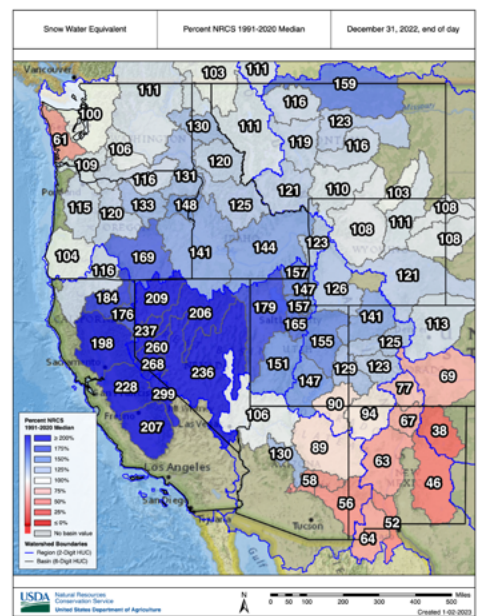


Fig. 5. December 31 snowpack as percent of the 1991-2020 median. [Natural Resources Conservation Service](#).

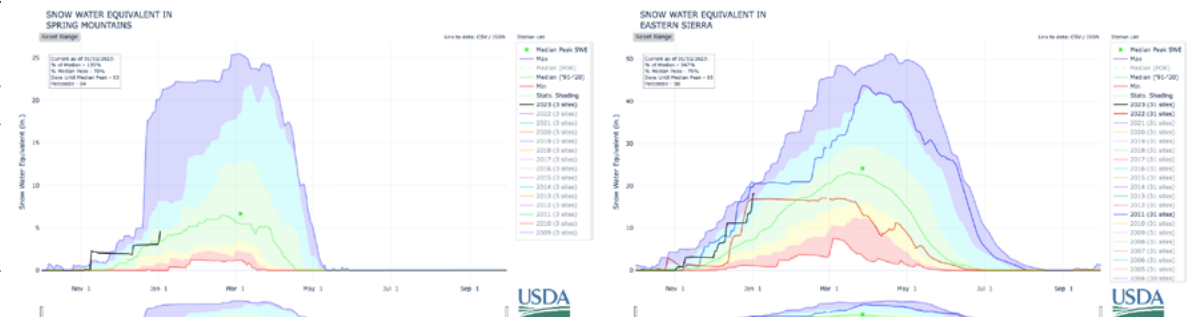


Fig. 6. Daily snowpack in WY 2023 (black line, as snow water equivalent) relative to the usual snowpack in the Spring Mountains (left) and Eastern Sierra Nevada (right). In the right plot, WY 2022 (red) and 2011 (blue) are highlighted. Figures from the [Natural Resources Conservation Service](#).

Soil Moisture

By late December, storms delivering rain, as well as snow, left surface soils wet to very wet in many parts of northern and eastern Nevada (Fig. 7, left). In some places, like central Washoe and southern Lander counties, the wet surface soils overlie drier subsoils (Fig. 7, right). In much of southern Nevada, both surface and deeper soils remained dry.

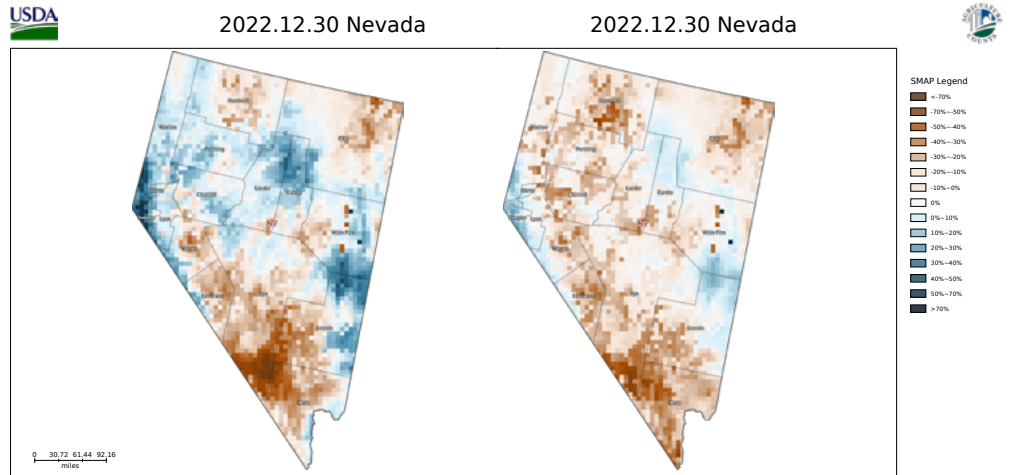


Fig. 7. Topsoil (left) and subsoil (right) moisture anomalies from 9km SMAP for December 30, 2022. Maps from [Crop-CASMA](#).

Water Resources

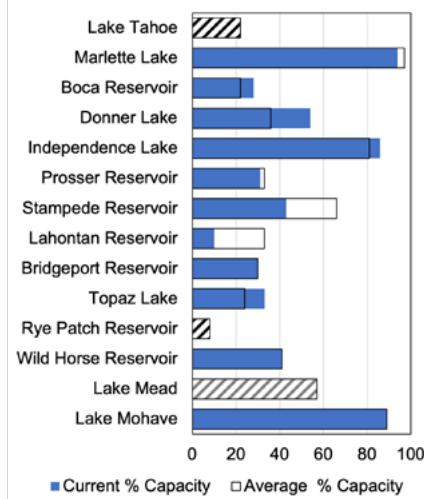


Fig. 8. Current and average percent capacity in Nevada's reservoirs at the end of December 2022. Diagonal lines indicate that no data was available. Data from the [Natural Resources Conservation Service](#).

As of late December, most reservoirs in the state were near or above normal capacity (Fig. 8). Lahontan Reservoir remains at only 10% of capacity when it would normally be at 33%. Stampede Reservoir is at 43% of capacity rather than the usual 66%. As of writing, capacity data were not available for Rye Patch Reservoir, Lake Mead or Lake Tahoe. Provisional data from the USGS indicates that [Lake Tahoe](#) was just below 6,224' elevation on December 31.

Across the state, December streamflow varied from just above normal to much above normal (Fig. 9). The Humboldt River had many gages with below or much below normal flow.

The 24-month study for December is quite similar to last month's (Fig. 10). Not even the most optimistic projection places Lake Mead back into normal condition. Under the most likely scenario, water levels will fall below 1,025' some time during the summer and not rise substantially above that within the forecast window.

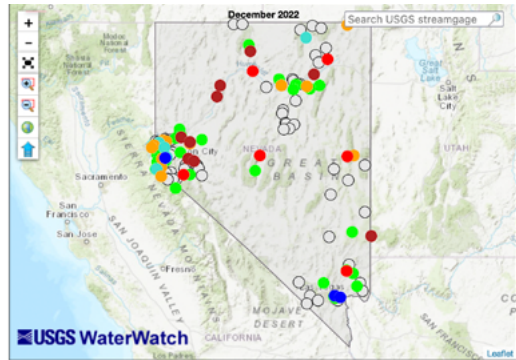


Fig. 9. December average stream flow relative to usual conditions. From [USGS Water Watch](#). More information on [percentile classes from the USGS](#).

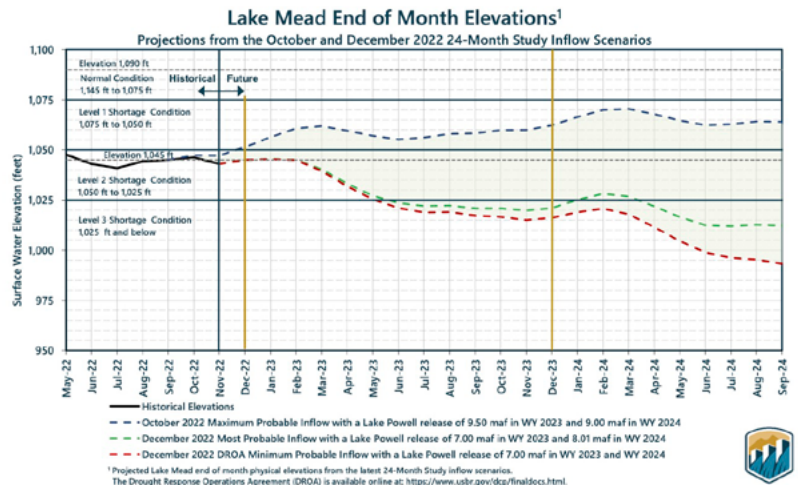


Fig. 10. Projected Lake Mead elevations from the [Bureau of Reclamation's](#) December 24-month study.

Looking forward

Provisional data for the 2023 water year to date (October 1 though December 31) show a few wet spots in Nevada, a lot of near-normal precipitation, and a decent swath of southern Nevada that is, again, drier than usual (Fig. 11).

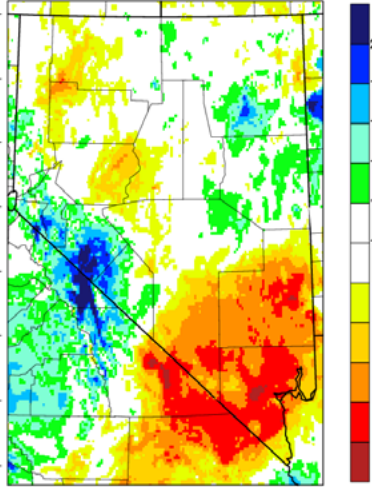


Fig. 11. Percent of average (1981-2010) October - December precipitation in 2022. PRISM from [Westwide Drought Tracker](#).

We are currently in a wet pattern. More precipitation is expected later this week (January 4-5). Although there is some disagreement about the exact latitudes and probabilities, both the ECMWF and GFS weather model ensembles suggest more waves of moisture are

likely (Fig. 12) in the coming weeks. Relying on some of the same information, the Climate Prediction Center estimates that there better than 40% chances of wetter than usual conditions through mid-January (Fig. 13).

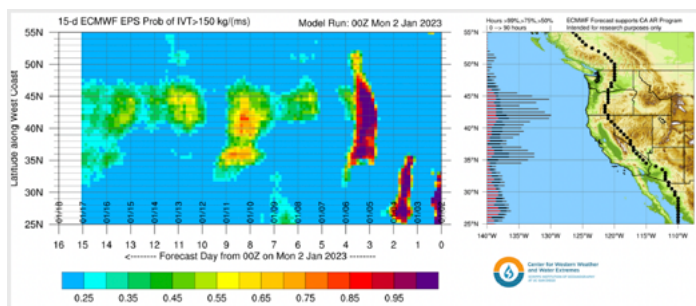


Fig. 12. Atmospheric river forecast from the [Center for Western Weather and Water Extremes](#) based on the ECMWF weather model.

The three-month outlook, however, indicates equal chances of normal, wet or dry conditions over much of the interior West for January - March. For most of Nevada, there are also roughly equal chances of cooler, normal or warmer conditions. There are slightly better than even odds that southern Nevada

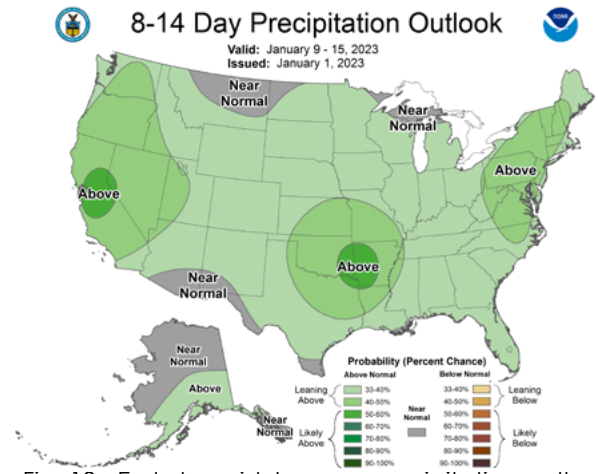


Fig. 13. Early to mid-January precipitation outlook. From the [Climate Prediction Center](#).

will be drier and warmer than usual (Fig. 14). Courtesy of the cold weather in November and December, followed by a series of storms and the forecast for more precipitation, the Climate Prediction Center's Drought Outlook suggests that, although drought won't resolve, it will improve (Fig. 15).

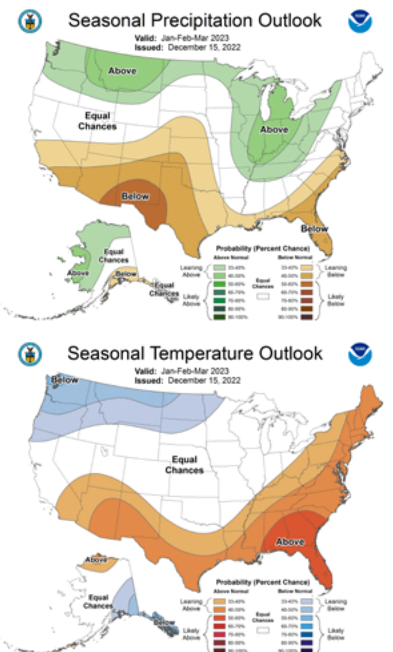


Fig. 14. Precipitation (top) and temperature (bottom) outlooks for January - March. From the [Climate Prediction Center](#).

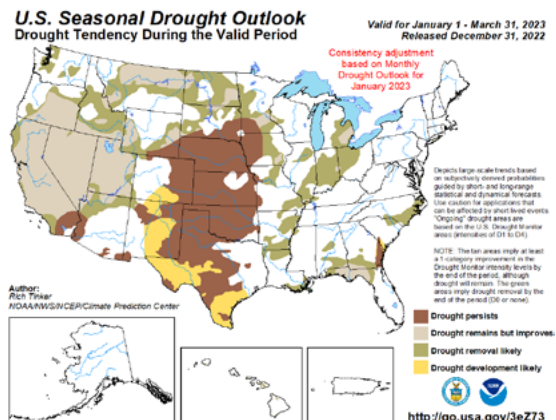


Fig. 15. January - March Drought Outlook. From the [Climate Prediction Center](#).