Mid-December Snow Update and Comparison to Analog Years

Now with snow starting to accumulate in the mountains, let's look at the start of this winter's snowpack and compare it to the analog years we've been talking about.

Here's a recap of Pete Parsons, Oregon Dept of Ag, Seasonal Climate Forecast from November 21, 2024 Update. The same analog years are same ones used in October. This table shows the **Current Analog Years** which are for the **Winter Of** and referred to as **Water Year XXXX**.

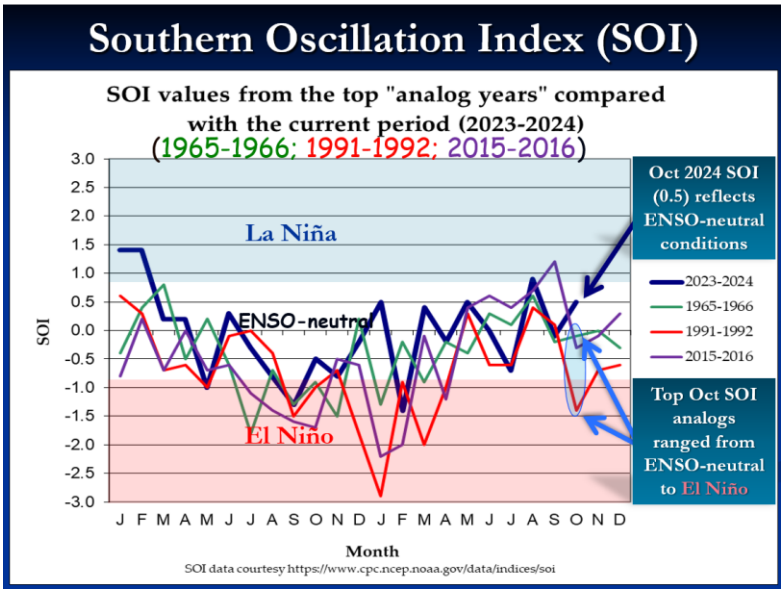
Current Analog Years	**Winter Of**	**Water Year**
1965-66 =>	1966-67	**1967**
1991-92 =>	1992-93	**1993**
2015-16 =>	2016-17	**2017**

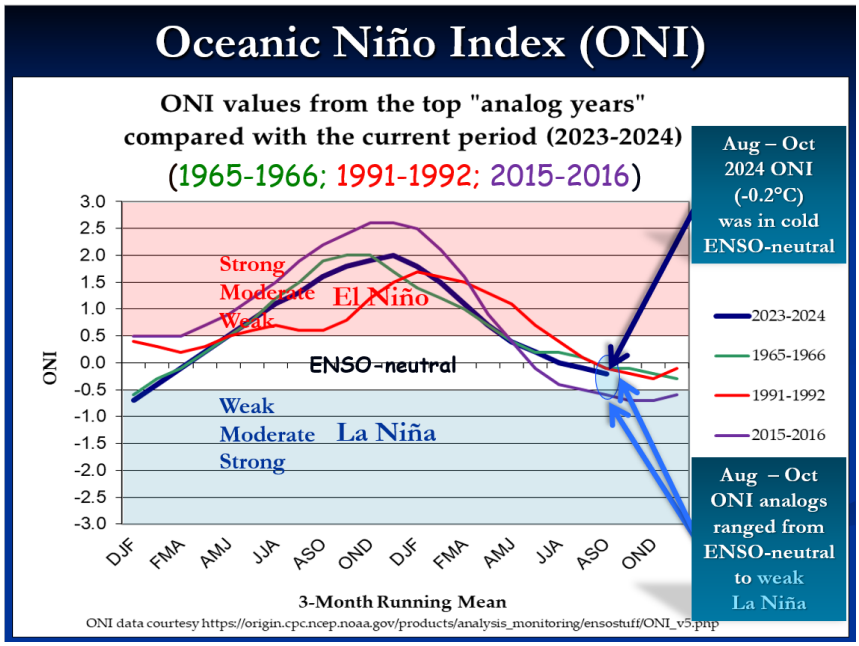
If you like details, check out Pete's full report that also has three month forecasts based on the analog years: https://www.oregon.gov/oda/programs/NaturalResources/Pages/Weather.aspx?utm_medium=email&utm_source=govdelivery I mainly use the Season Climate Forecasts to look at the big picture and the analog years to get an idea what this winter may look like. Key is using the past to predict the future, and if we can still do this as we live and learn about the changing climate we live in. I use his monthly forecasts to whet my appetite about short-term weather patterns and look for agreement with other forecasts and get excited when they all come together.

Pete selects the best past years that compare to current conditions based on SOI, ONI and PDO. Now with the ocean and atmosphere nearly set for this winter, these analog years are set for now, but he notes, they may require an update later as ENSO conditions change.

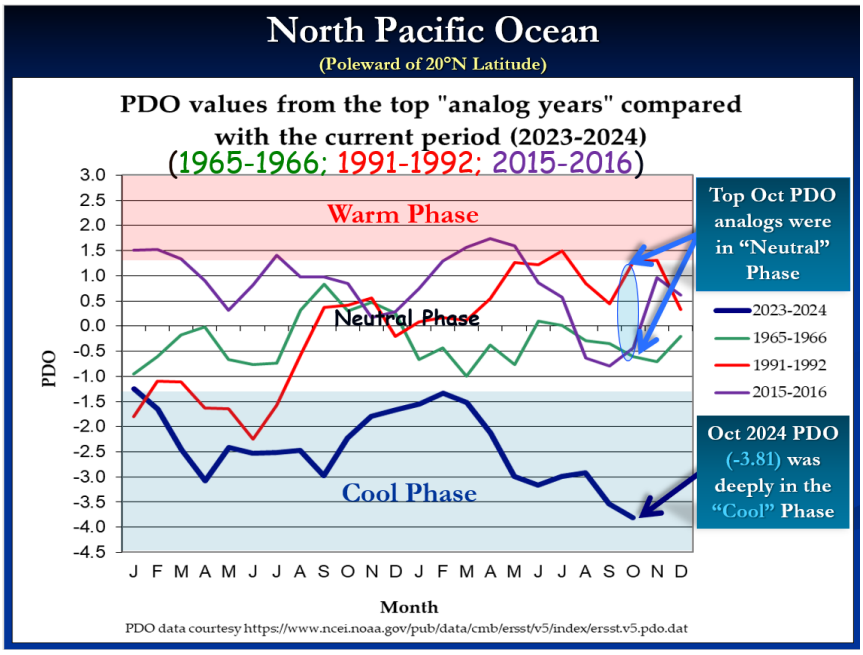
So, let's have some fun and look at how this year's snowpack is starting to accumulate and compare with the analog years. We'll look for similar snow accumulations patterns and as we progress deeper into winter, we'll see if one year stands out more than the others and use it to provide some insight about next summer's river flows.

Here's Pete's most recent graphs that help to show the analog years selected.

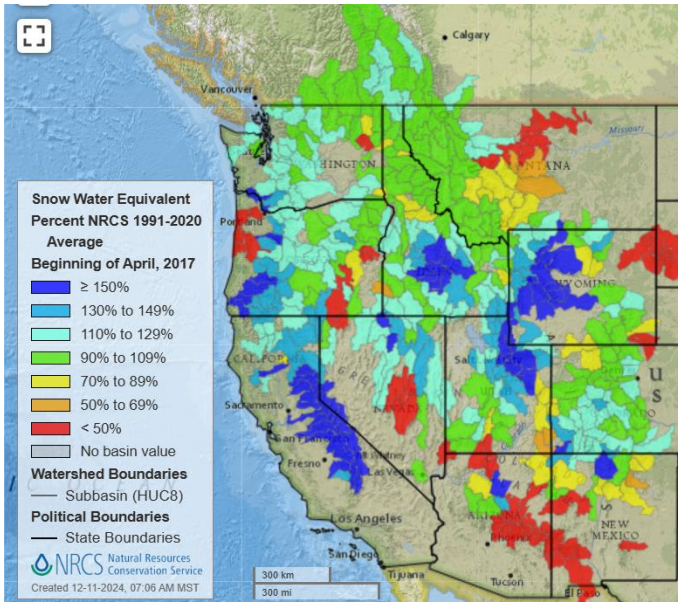


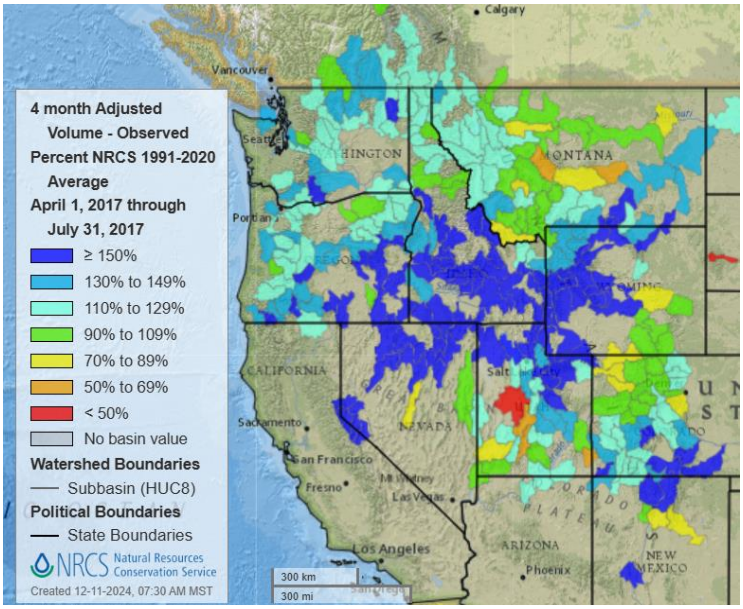


The PDO below is where it gets interesting being deeply in the “Cool” Phase compared to the other analog years. Time will tell its impact on this year.



These cool maps from NRCS provide a quick snapshot of snow and flow for the 2017, 1993 and 1967 analog years. The **Left map is Beginning of April snowpack** as percent of average and uses SNOTEL and snow course measurements. The **Right map is Apr-Jul Adjusted Runoff Volume** as percent of average.

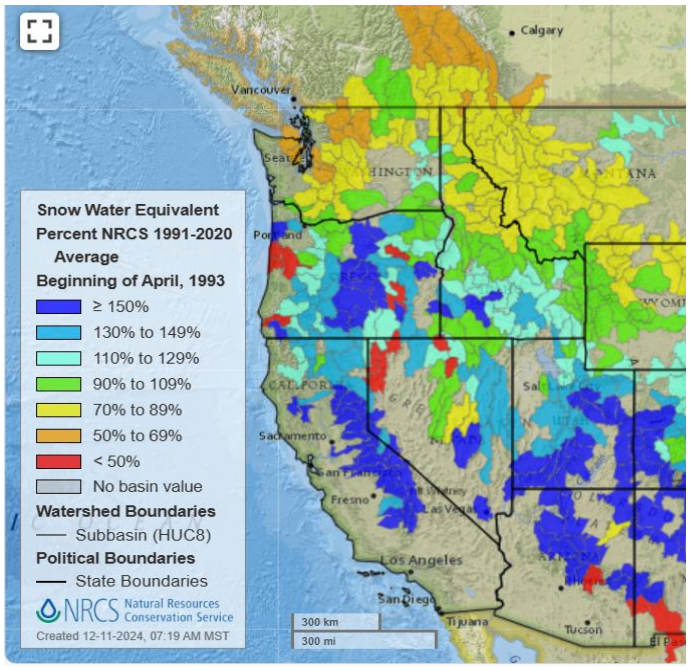


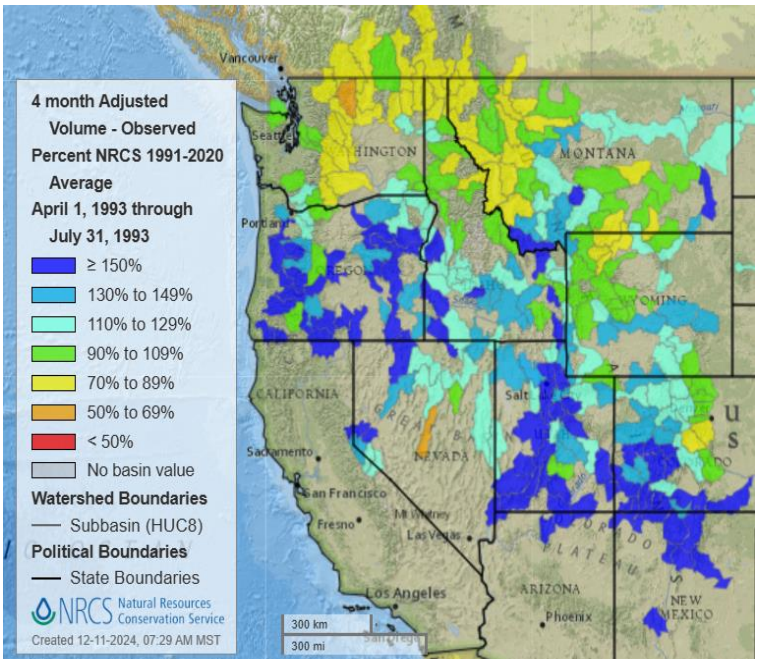


April 2017 was a good year for most of the West, Snowmageddon as many call it here. Cold temps kept snow on the valley floor for an extended period and caused storage barns to collapse. It's interesting how the storm pattern benefitted much of the West with only a few basins below 70%. **Flows were well above average in the Snake River basin**.

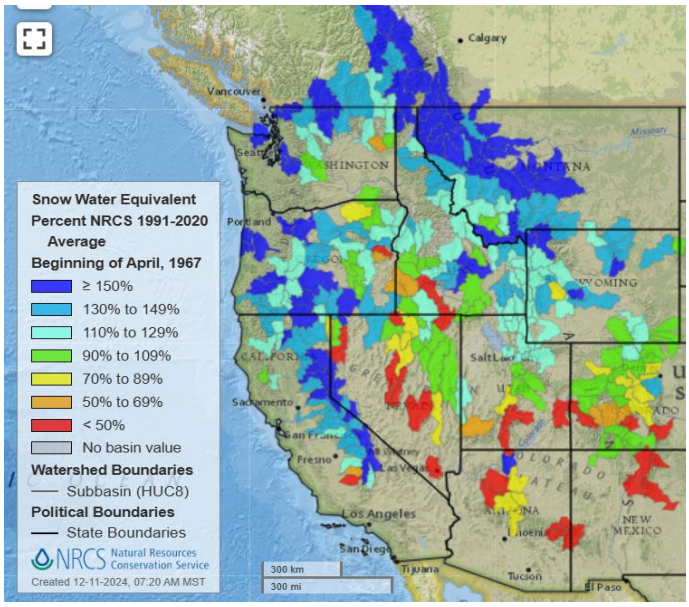
April 1993 snowpacks were higher in SW and average to below across the Canadian border. Keep in mind, this winter was probably impacted by Mt Pinatubo eruption June 15, 1991. *Nearly 20 million tons of sulfur dioxide were injected into the stratosphere in Pinatubo's 1991 eruptions, and dispersal of this gas cloud around the world caused global temperatures to drop temporarily (1991 through 1993) by about 1°F (0.5°C).* from https://pubs.usgs.gov/fs/1997/fs113-97/

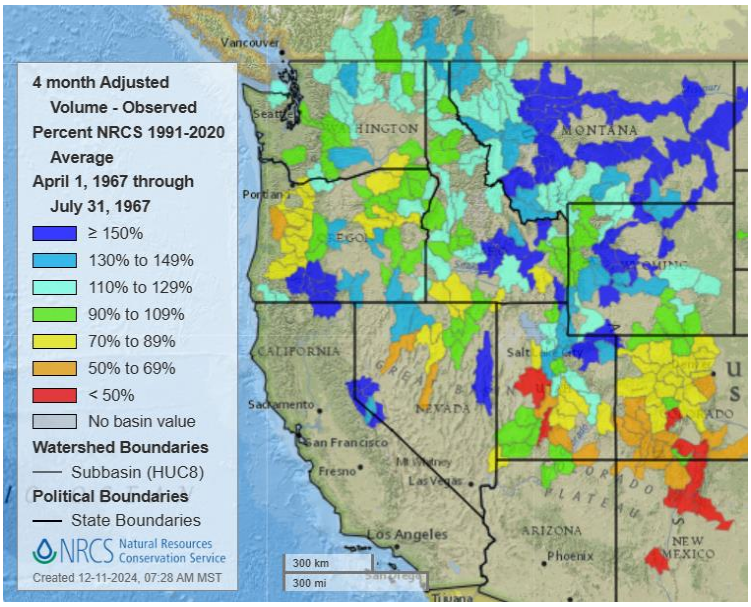
1993 runoff was above average from Oregon to southern Colorado and probably many basins in between, just don't have the data handy to show it.





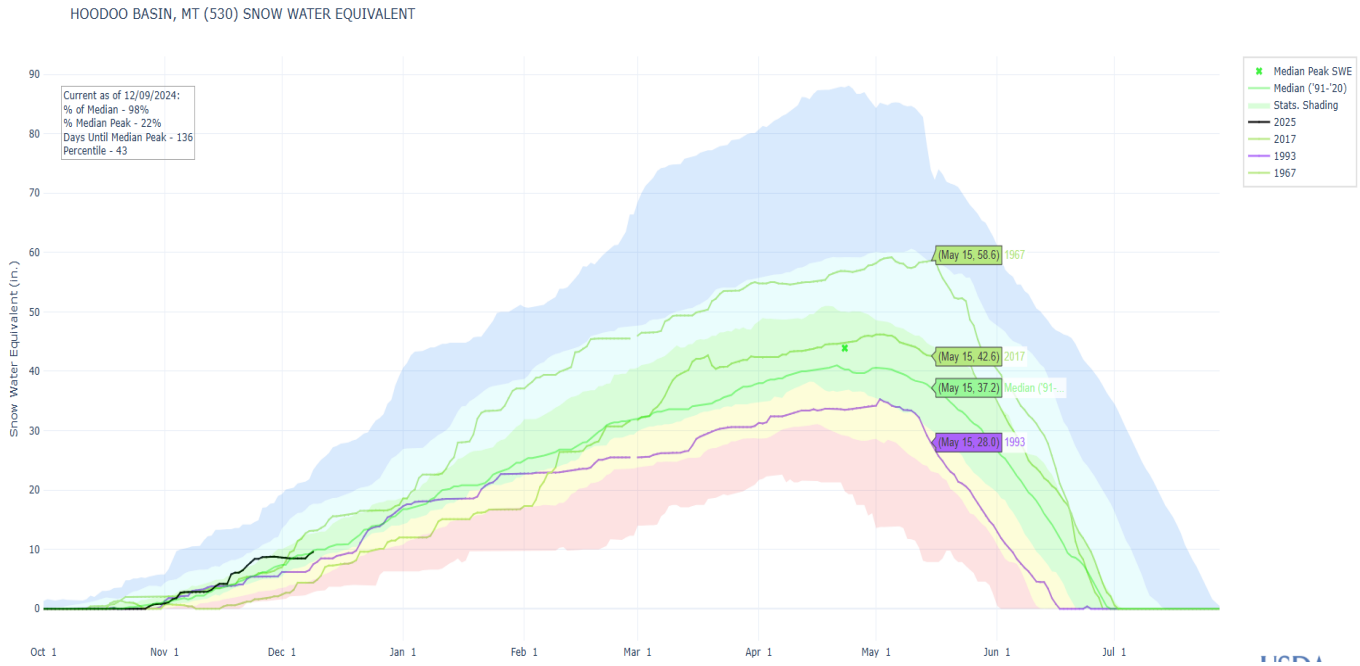
April 1967 snow coverage looks like a typical La Nina pattern with better snow in the north and less in the south. Summer runoff in 1967 mirrored this and I'd bet Montana had good spring precipitation to boost its runoff. It's hard to find a water year 1967 annual precipitation map. If you have a source, please share.



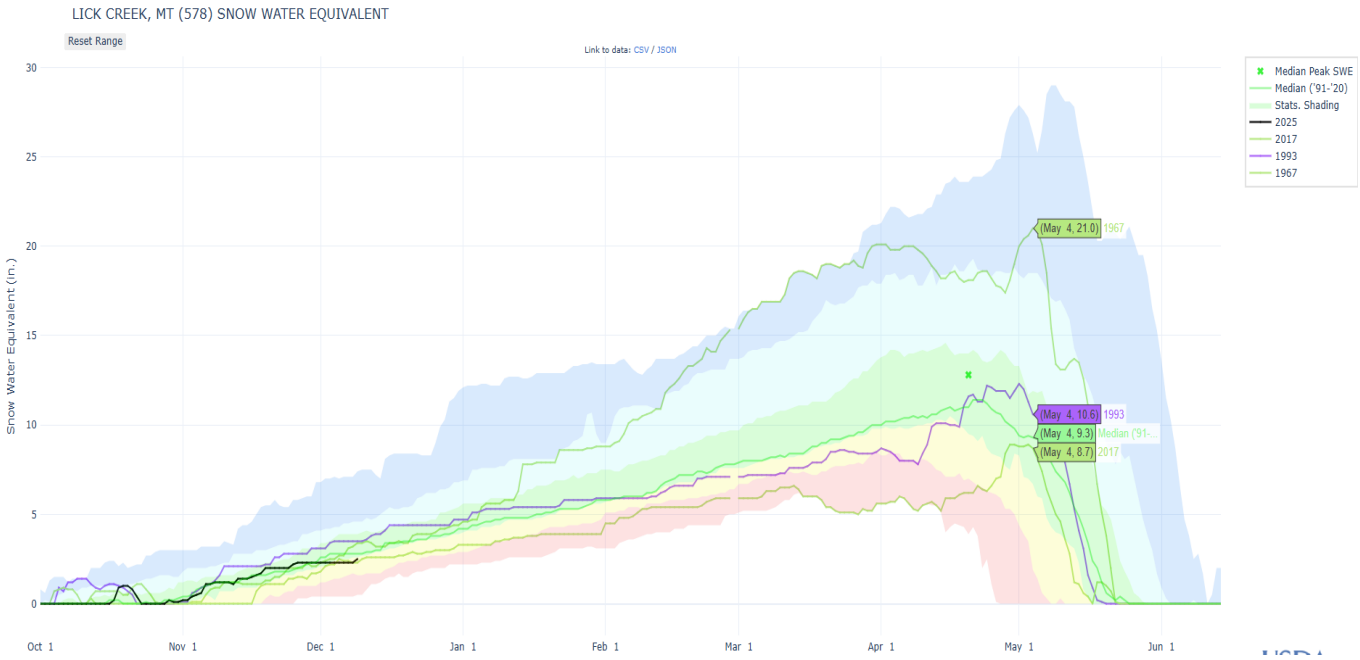


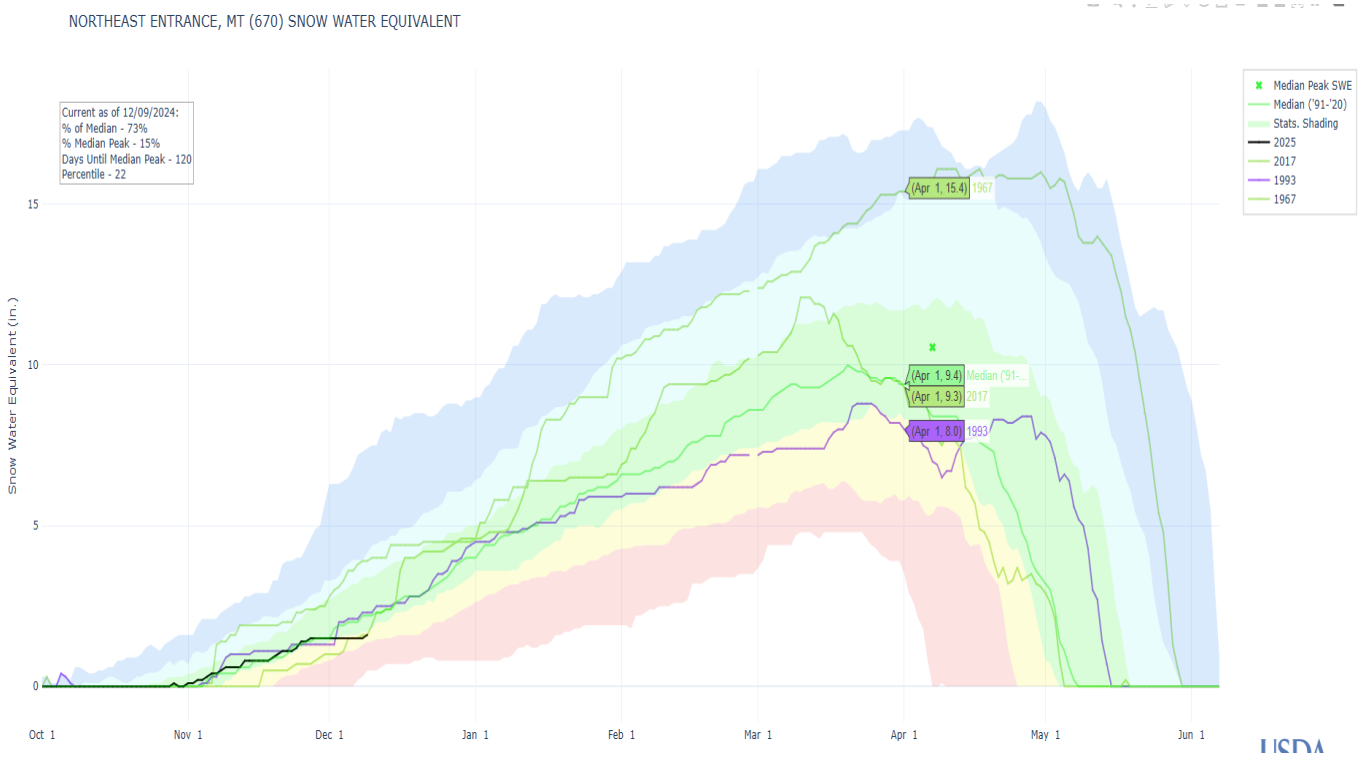
Let's look at some individual snow sites and indexes to see how this winter is starting to stack up and see where the SWE peaked at for these analog years.

Lucky for us, Jerri Lynn & MT crew collected, edited and archived daily SWE data that was collected from Stevens punch recorders with daily data starting in the mid-1960s. **Hoodoo Basin** sites at 6050 ft in the NF Clearwater headwaters along ID/MT border. It's interesting to see the SWE range for these analog years and this year is right between 'em, but it's early.

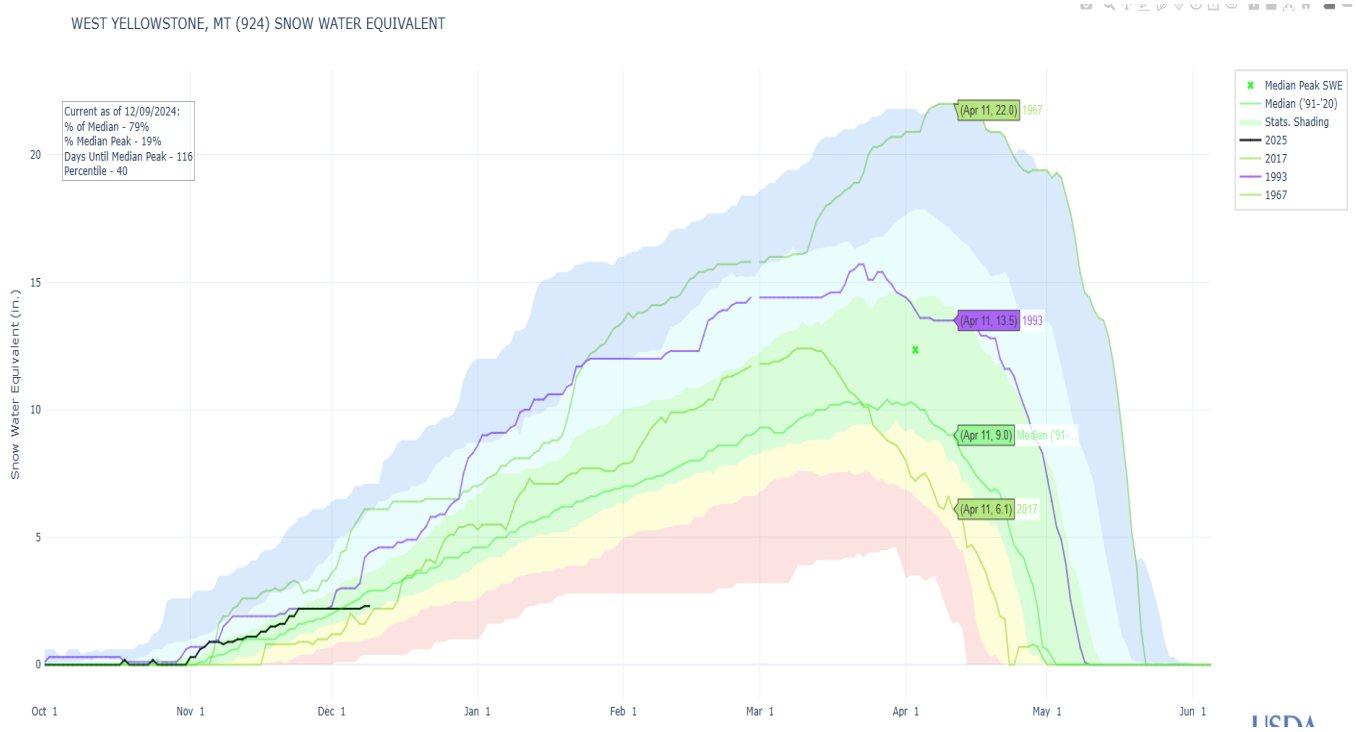


For our Bozeman Friends, here's Lick Creek that sits at 6860 ft and shows how wet the 2nd half of 1967 winter was in Montana and the reason for the good flows mentioned above.

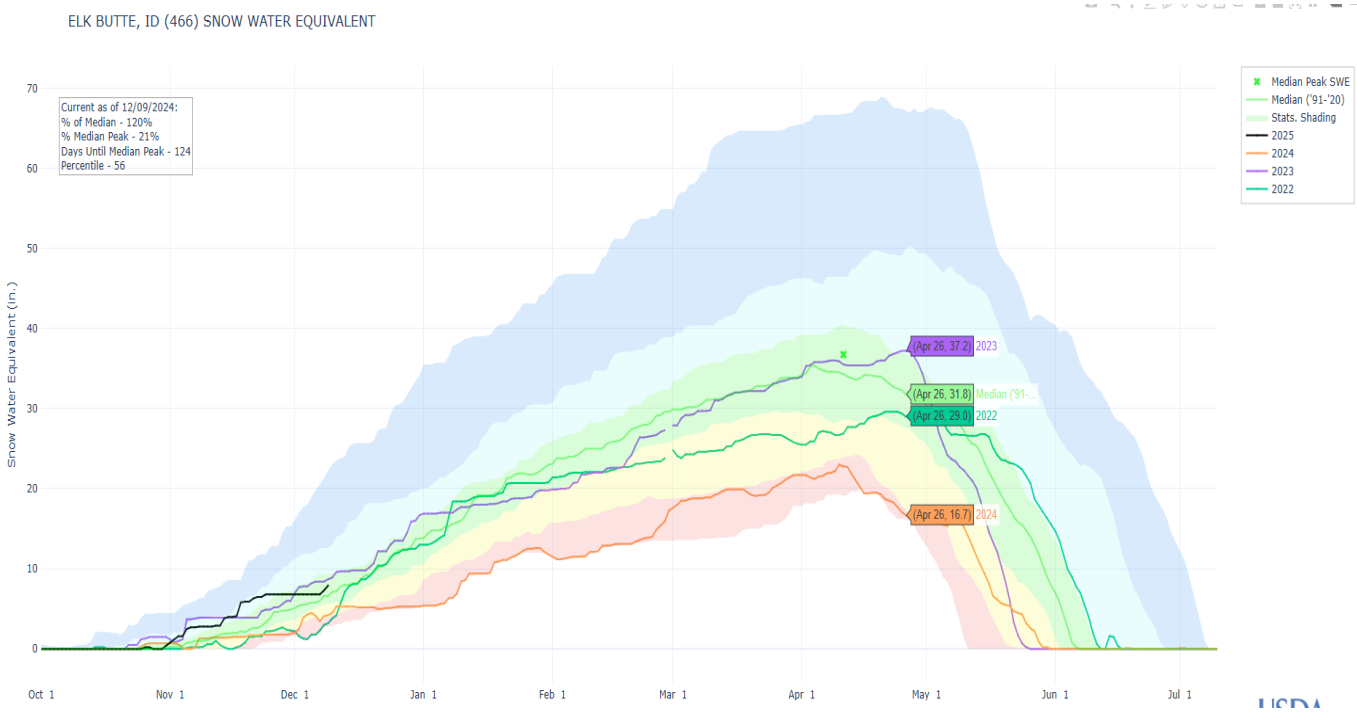




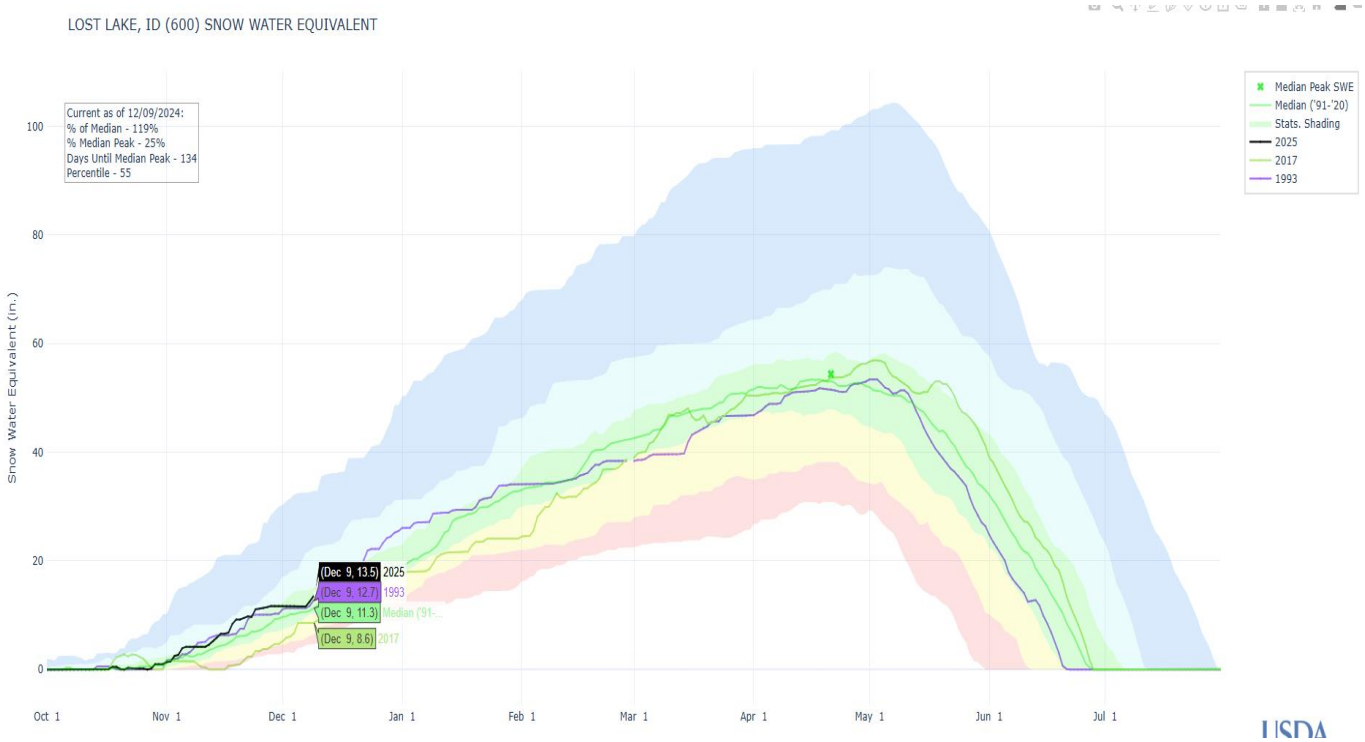
Northeast Entrance and West Yellowstone sites show how November's Atmospheric River event didn't push as much moisture into the upper Snake/YNP area. Wow, what a winter it was in 1967; wish I was there!



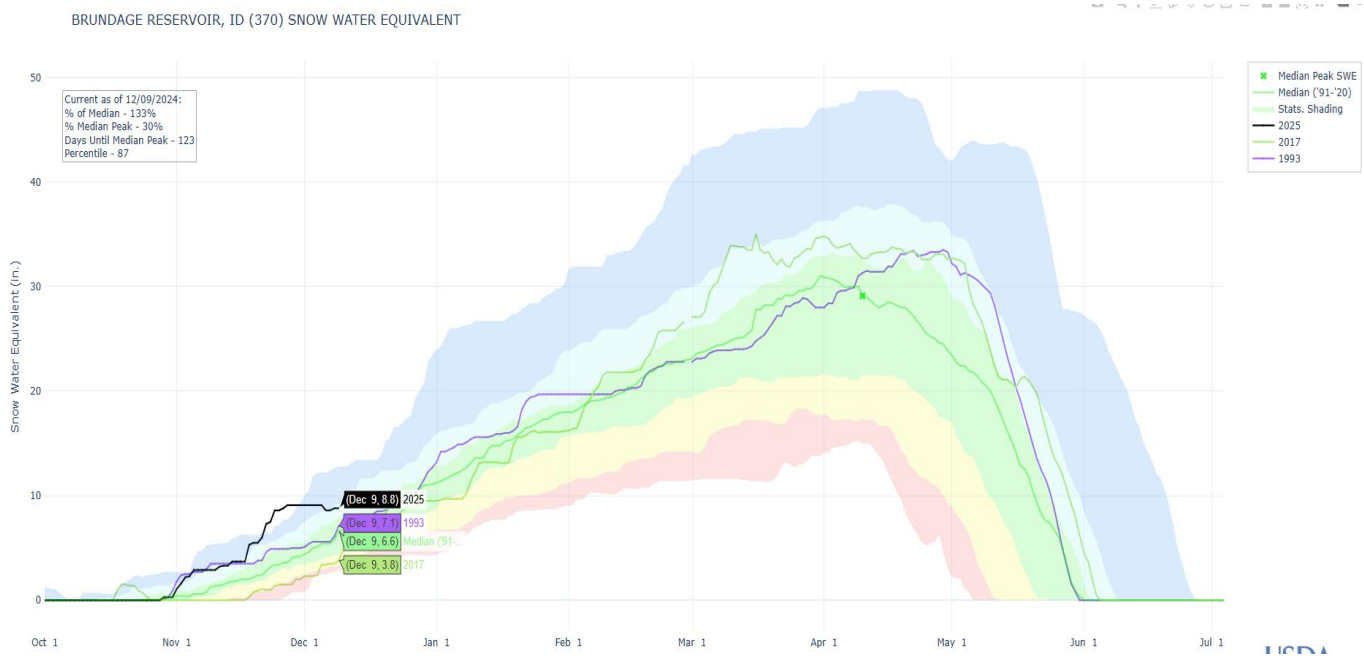
Back to Idaho and the NF Clearwater Basin – **Elk Butte graph** shows this year and recent SWE years.



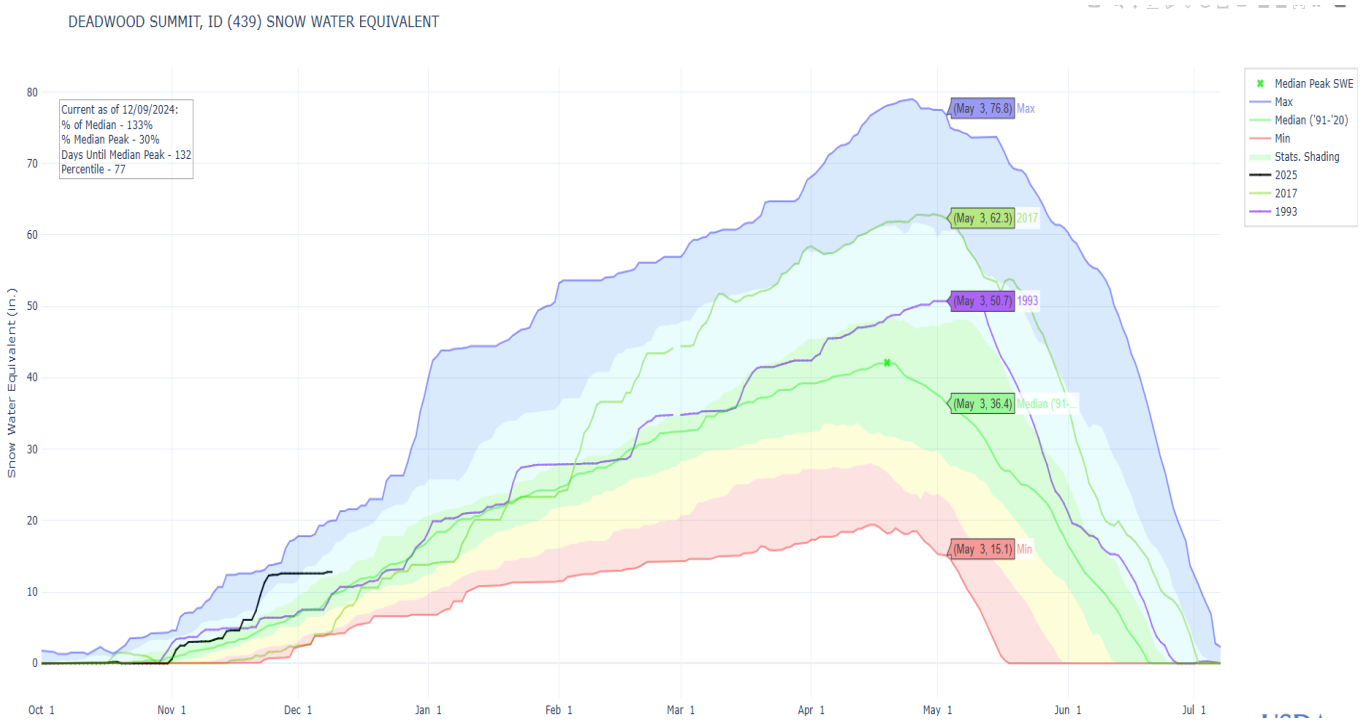
Lost Lake, at 6160 ft sits along the NF Clearwater/St Joe divide, one of the prettiest SNOTEL sites in Idaho, accessed mostly by helicopter and in one of the deeper snow zones in the state, is tracking 1993 and 2017, but it is still early. Both analog years peaked near normal. Sorry, no daily SWE data before 1983.



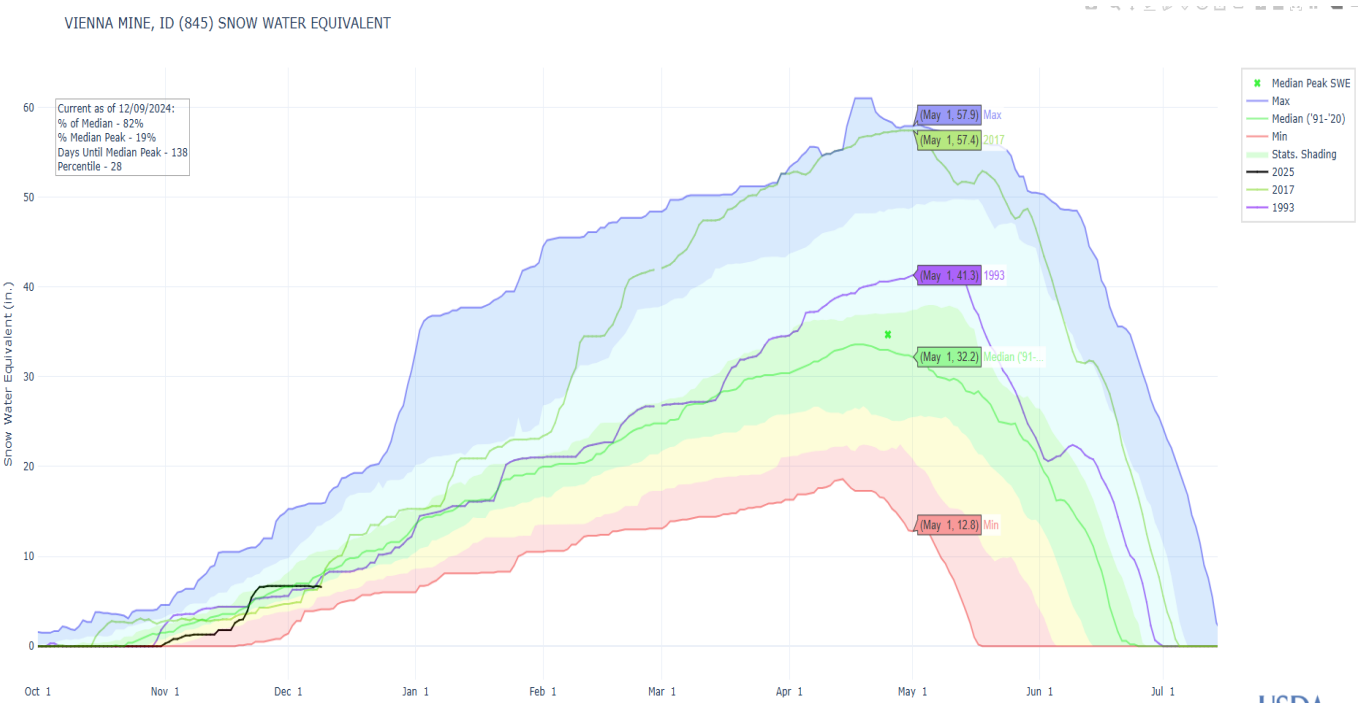
Brundage Reservoir really benefitted from November's Atmospheric River to help the ski resort with its earliest opening since 2005. The recent dry weather shows the flat SWE line and SWE is now tracking similar to 2017 and 1993.

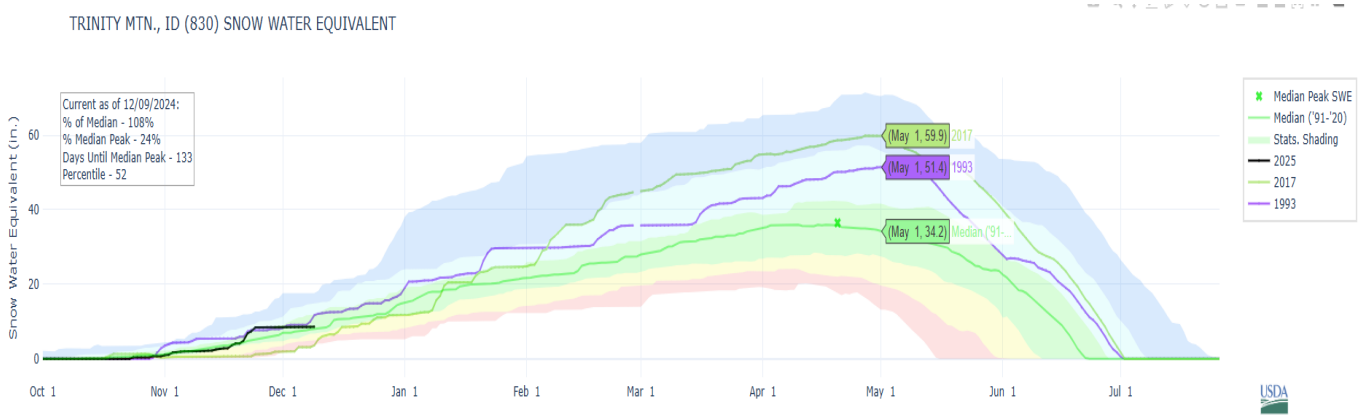


Moving east towards **Deadwood Summit**, the AR event really stands out with the large SWE increase followed by the current dry spell. SWE is still above normal and the 2017 and 1993 levels.

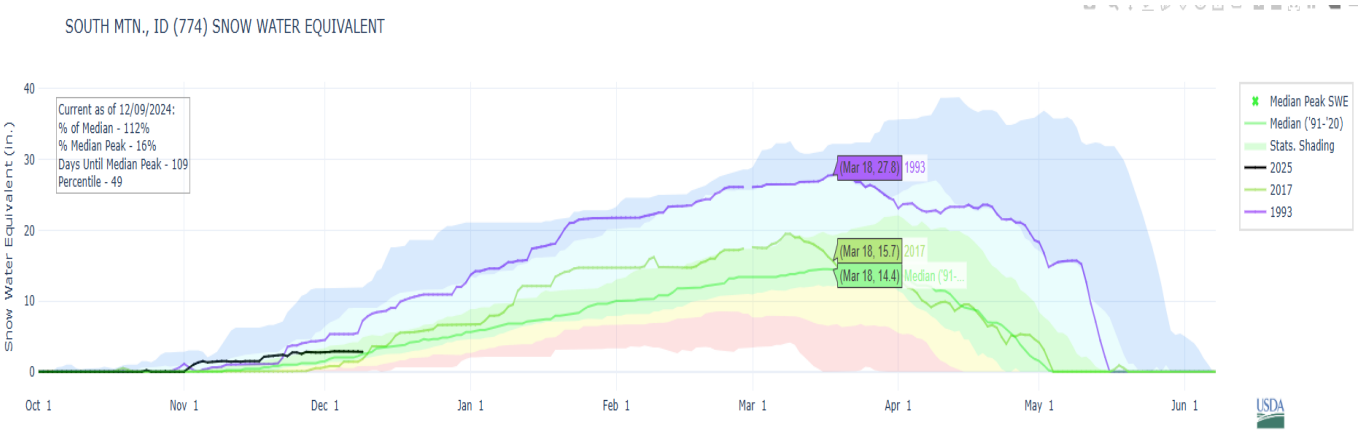


And a few sites in central and south Idaho. **Vienna Mine** is in the headwaters of Big Wood and Salmon rivers. This weekend's mid-December storm should benefit these regions with 10-20 inches forecast.

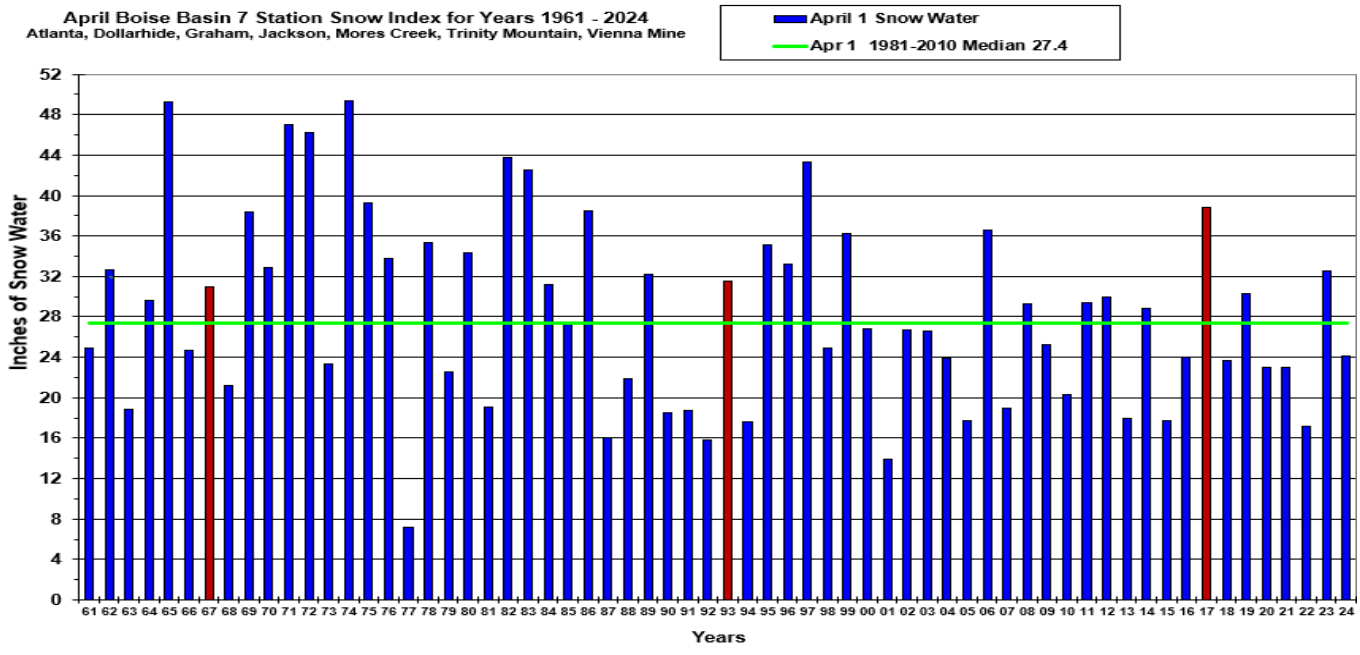




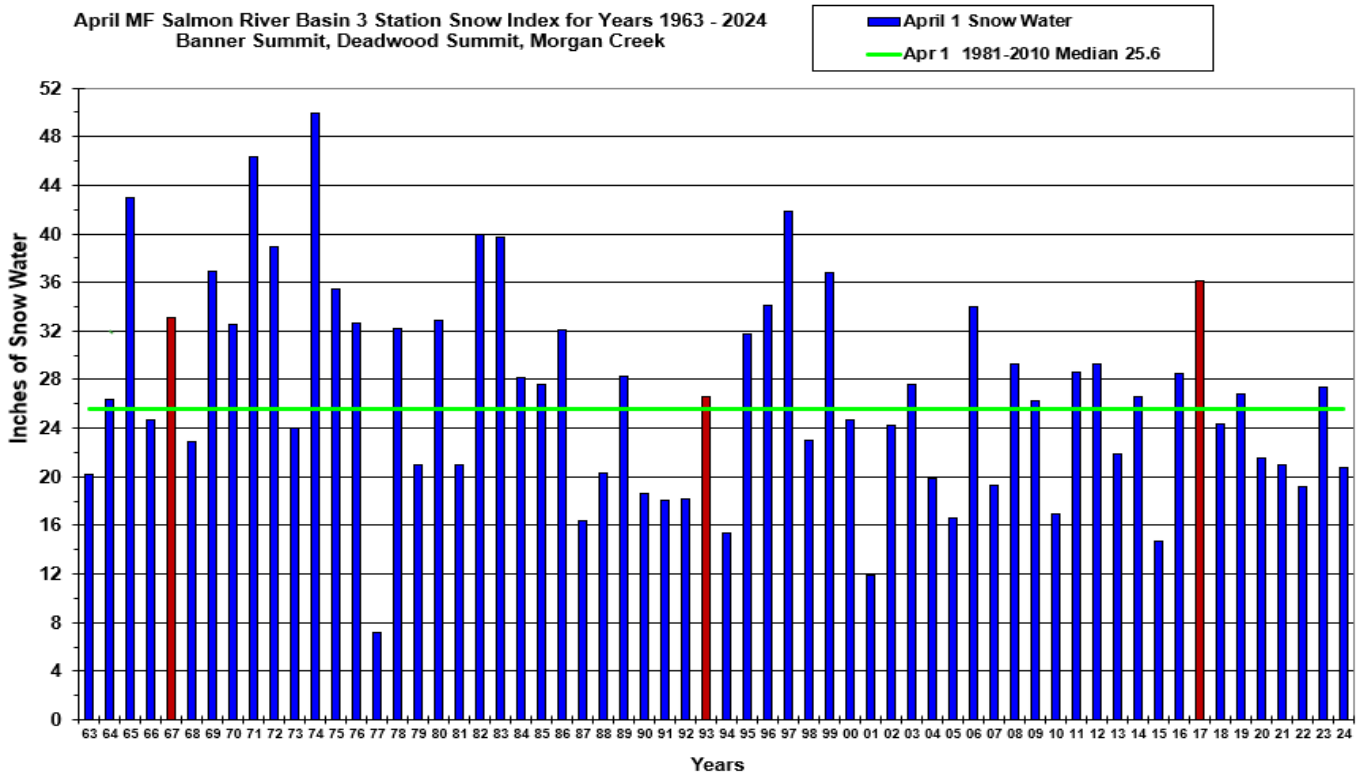
Trinity Mtn in the Boise basin and **South Mtn** in the Owyhee basin are both above average and need more snow. Sorry graphs are skinny, Full Screen option didn't work.



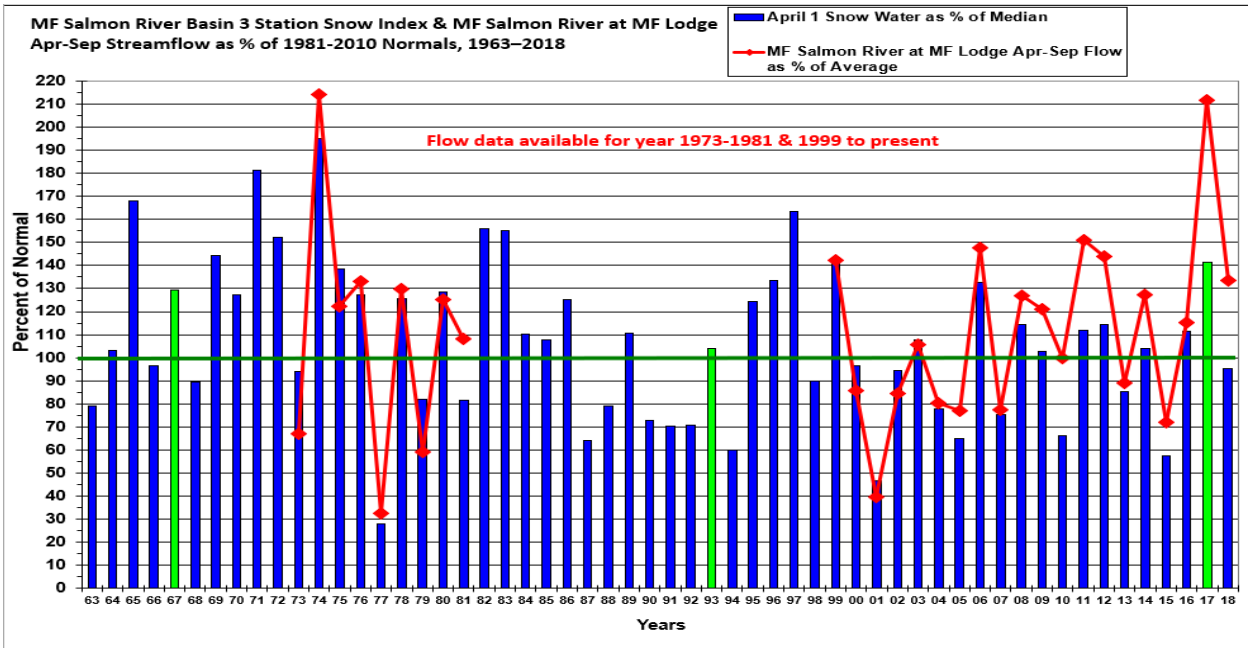
Here's a longer-term snow index graph for the **Boise Basin. The April 1 Snow Index** is compiled from historic data that was used for years/decades to forecast rivers. It's interesting and good to see all three analog years peaked above normal.



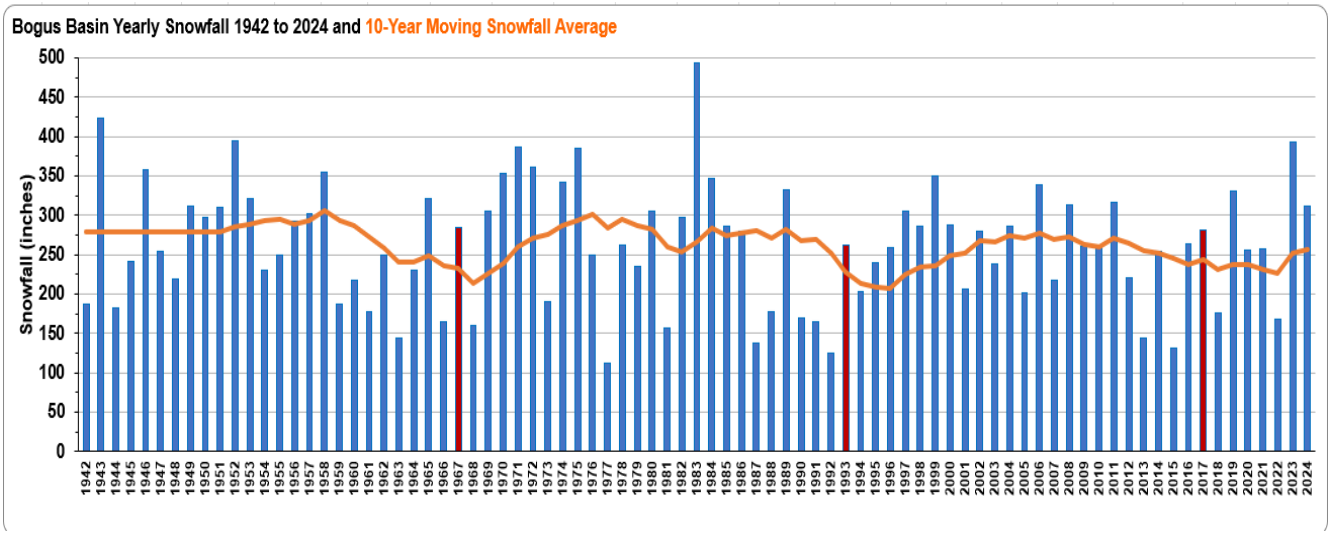
A similar long term April 1 snow index graph for the **MF Salmon** shows the same trend.



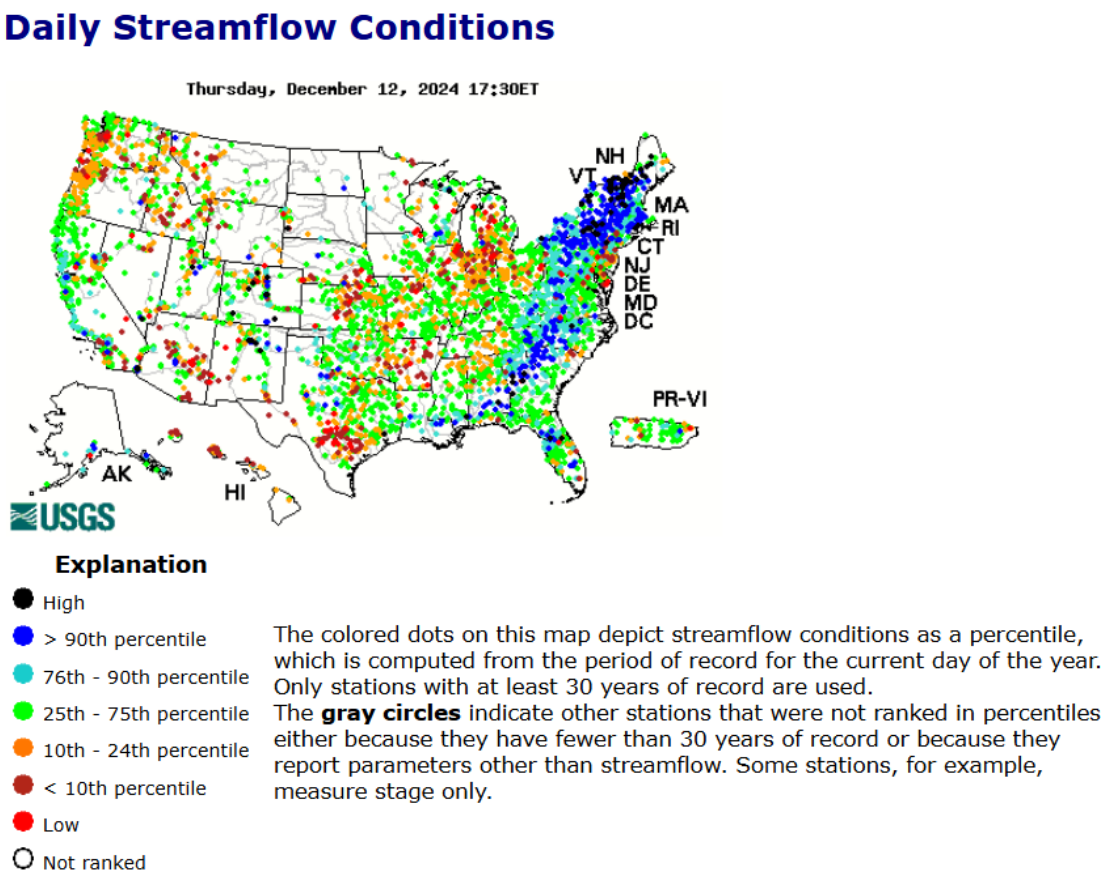
To visualize what the flow was in these years and to better see the relationship between snow and flow, the **Apr-Sep Runoff Volume as a Percent of Normal** was added. The green bars are the analog years, but the flow isn't available for two of them. Remember the good old days, when they would measure the daily river level by dropping a weight off the bridge to the river's water surface. Do the conversion and call in the gage height. CFS is not available for these years, only gage height. This is probably the reason river runners still talk about their river trips in gage height rather than CFS.



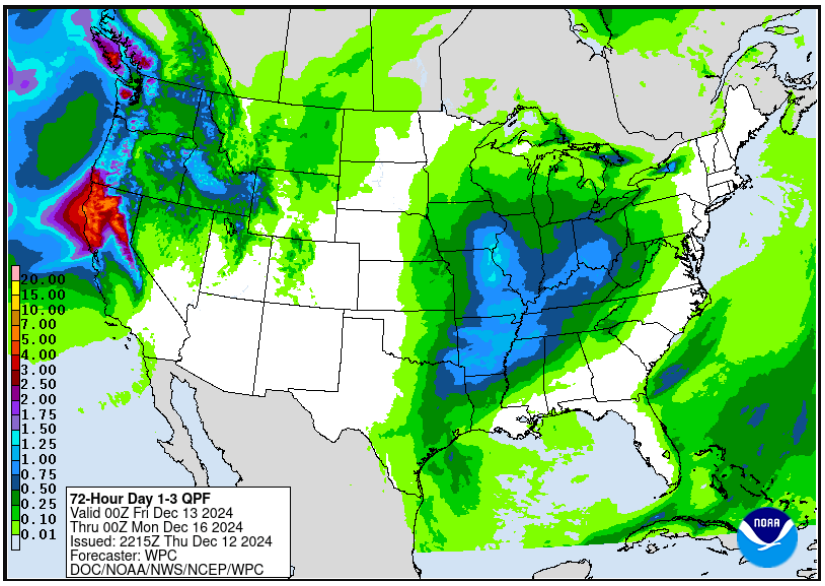
And a local favorite, **Bogus Basin's** average annual snowfall with the analog years highlighted in red:



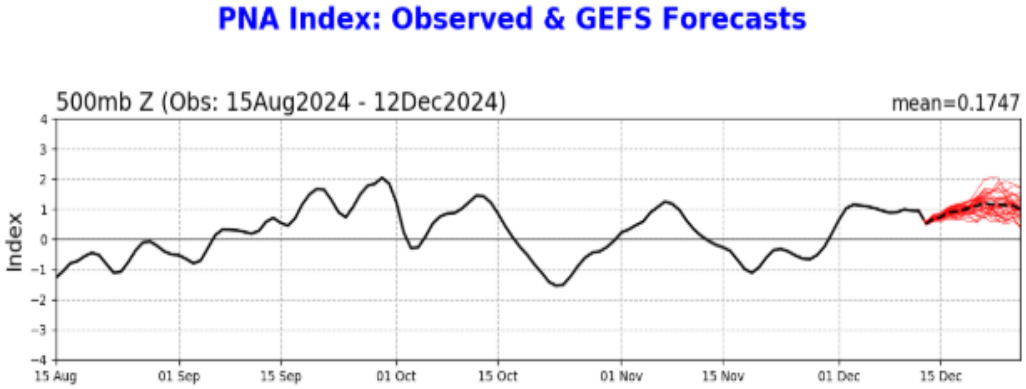
Here's a follow-up from the last blog and shows the **current streamflow conditions across the nation**. You can see those **lucky dogs back east** that benefited from that amazing Great Lakes Lake Effect Storm while the West was high and dry under high pressure.



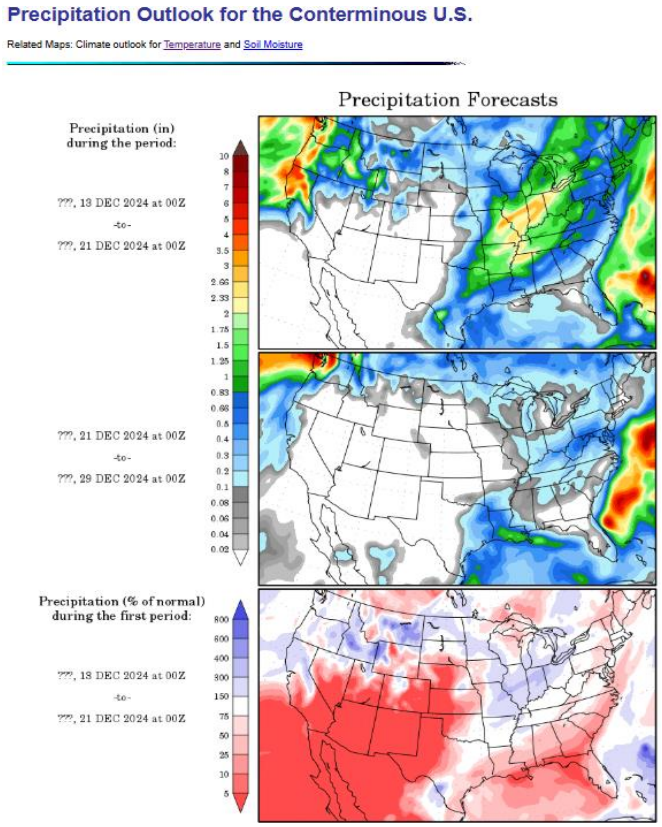
This weekend brings a nice storm, so enjoy the new snow while you can. High pressure moves back in next week. Here's the 3-day total precip prediction for Dec 13-16:

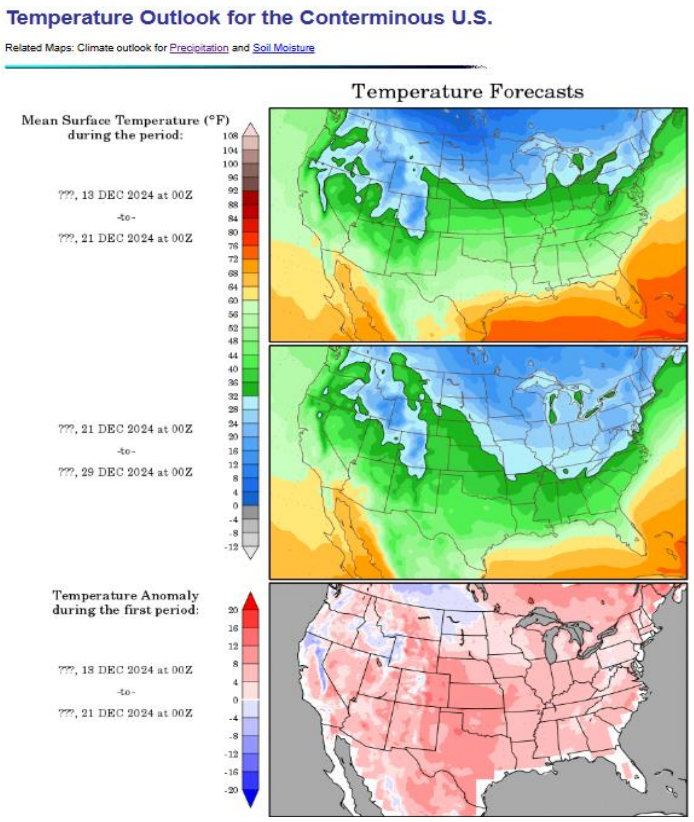


In addition, **the PNA is positive and flat** for next couple of weeks which usualy means calmer weather.



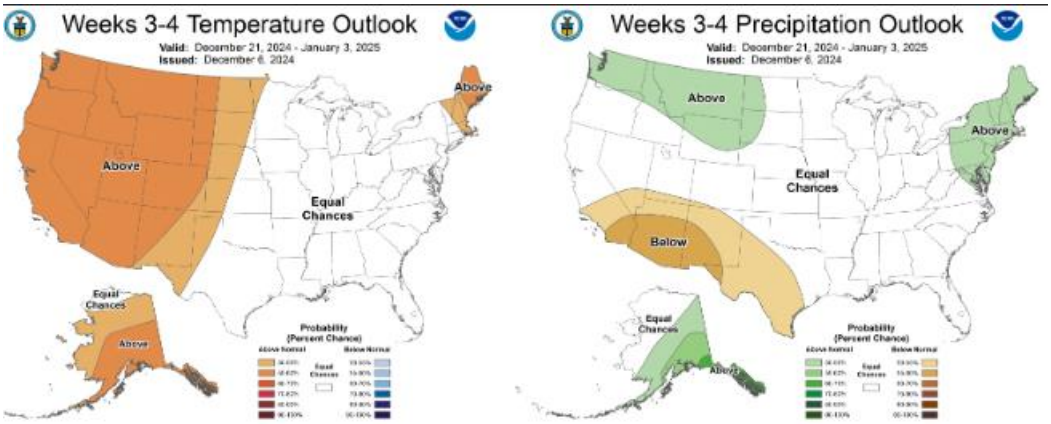
These **two 7-day forecasts** show this weekend' precipitation for the first 7 days, Dec 13-21, and not much after that for the next 7 days, Dec 21-29 but need agreement in these predictions for several runs / days in arow. So we'll keep our figers crossed the second week improves as we get closer.





No need to look at NOAA's 6-10 and 8-14 day outllooks for the high and dry weather, so here's the **3-4 Week Outlook** which shows moisture moving back into the PNW while still favoring above normal temps.

Dec 21 – Jan 3 Outlook



Enjoy this weekend! One outlook, the Powder Buoy, shows the next stormy period could be between the holidays.

If you're still having fun and reading this, here's your chance to be a snow hydrologist.

WWA has a challenge for you to predict the snow levels in your local mountains. Thanks, WWA for what you do and educating all those kids about our critical natural resource in the West – snow and water!

From Winter Wildlands Alliance:

Take the National Snowpack Prediction Challenge
Snow is our source of water! Do you have what it takes to be a snow hydrologist? We want to know your prediction for how much snow you think there will be in your local mountains during winter 2024-25! Whoever makes the most accurate prediction wins! Predictions are due by February 7th 2025 to be in the Early Winter Division. Predictions are due by March 7th 2025 to be in the Late Winter Division.
Participating is easy:
https://winterwildlands.org/national-snowpack-prediction-challenge-2/

Good timing, this was just released:

EL NIÑO/SOUTHERN OSCILLATION (ENSO) DIAGNOSTIC DISCUSSION

issued by

CLIMATE PREDICTION CENTER/NCEP/NWS
12 December 2024

ENSO Alert System Status: La Niña Watch

Synopsis: La Niña conditions are most likely to emerge in November 2024 - January 2025 (59% chance), with a transition to ENSO-neutral most likely by March-May 2025 (61% chance).

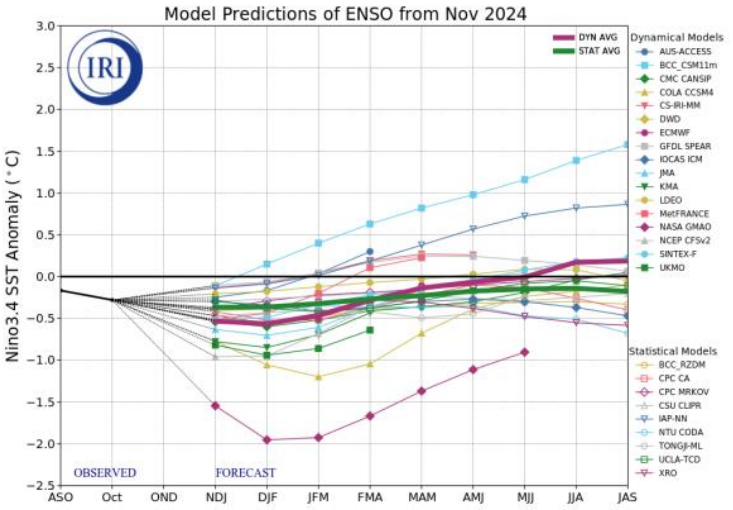


Figure 6. Forecasts of sea surface temperature (SST) anomalies for the Niño 3.4 region (5°N-5°S, 120°W-170°W). Figure updated 19 November 2024 by the International Research Institute (IRI) for Climate and Society.