

TMS Weather and Forecasting, LLC

Winter 2020-21 Forecast

Winter of 2020-21 looks like it will be a La Nina winter since the Tropical Pacific currently meets the threshold for La Nina. The current index shows we are in a weak La Nina, but it is looking like we may drop into the moderate phase for a period of time this winter. The last time we were in the moderate phase was during the winter of 2011-12, but that came after a strong La Nina during the winter of 2010-11. Sea surface temperatures continue to be very warm across much of the planet, especially north of the Equator. That is what makes this forecast tougher. The past several times we had La Nina conditions this strong the oceans were significantly cooler. But, with La Nina we usually get an active Jet Stream through the Midwest and Ohio River Valley so we should get a decent amount of precipitation. Temperatures look warmer than average through winter, but with precipitation above average we should get some decent wintry precipitation and will likely finish near to slightly above average for snowfall.

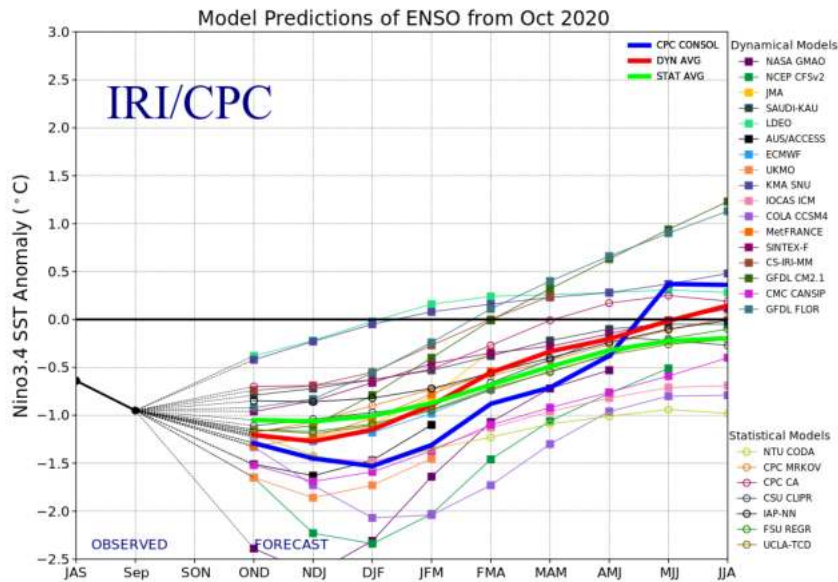


Fig 1: ENSO Index, showing a moderate La Nina (-1.0 to -1.5) is likely this winter

Moderate to strong La Nina's usually bring a decent amount of wintry precipitation with them. This, of course, isn't always the case. The last 2 La Nina's we were in, 2016-17 & 2017-18, were very disappointing, but these were also on the weaker side. It is looking like this La Nina will be a little bit stronger, closer to 2010-11, 2011-12, and 2007-08. The great multi-year La Nina of 1998-2001 is an outlier right now because it lasted for 30+ months, but I did put the Nov-March period of 1998-1999 average into my composite data set as that was the start of that cycle. Averaging those years bring near average total liquid precip, a few good wintry precip year, and warmer

than average temperatures. I believe this is a good baseline for the upcoming winter. Other short-term factors, like what we saw last winter with the record strength of the Arctic Oscillation, can have big impacts for stretches of time. Those indexes can change rapidly with little warning, so it is very hard to forecast them more than a week or 2 out.

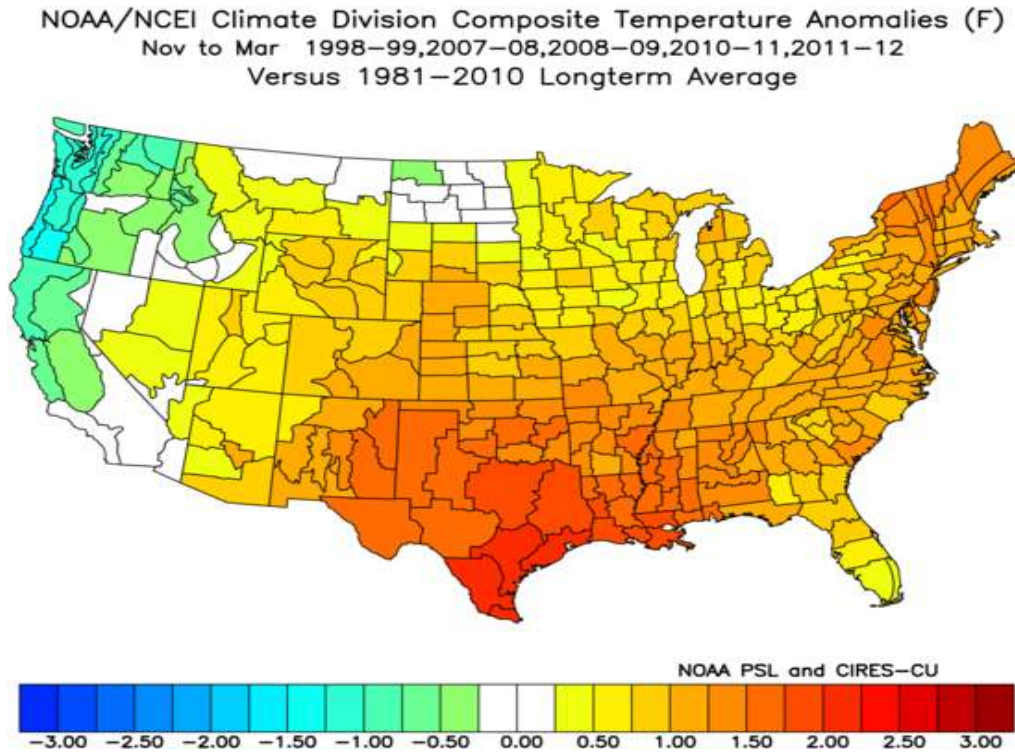


Fig 2: November-March composite temperatures for winters 1998-99, 2007-08, 2008-09, 2010-11, 2011-12. Much of the nation had above average temperatures combining these La Nina years

November is one of those months that can be boom or bust. Sea ice is currently freezing up, but it is freezing at an incredibly slow rate. As of October 24th, sea ice is by far at its lowest rate ever for this date, about 500,000 square kilometers lower than the previous record set just last year. As we move into November, it'll likely continue to set record low daily extent which will keep the Arctic region incredibly warm compared to average. Due to this, any strong troughs of low pressure that move into Alaska and Canada and then south into the United States will send shots of cold air into our region. We are seeing that this coming week with winter storm watches and advisories all the way down to the Mexican-Texas border. Due to this, I would not be surprised at all if we get accumulating wintry weather in November once again. I think temperatures will be near or slightly above average as it does look a little warm and dry to start the month. Total wintry precipitation I think will be near average. We do average a little snow per year in November so unless we get a large storm I don't think we'll be above average.

NOAA/NCEI Climate Division Composite Precipitation Anomalies (in)
Nov to Mar 1998-99,2007-08,2008-09,2010-11,2011-12
Versus 1981-2010 Longterm Average

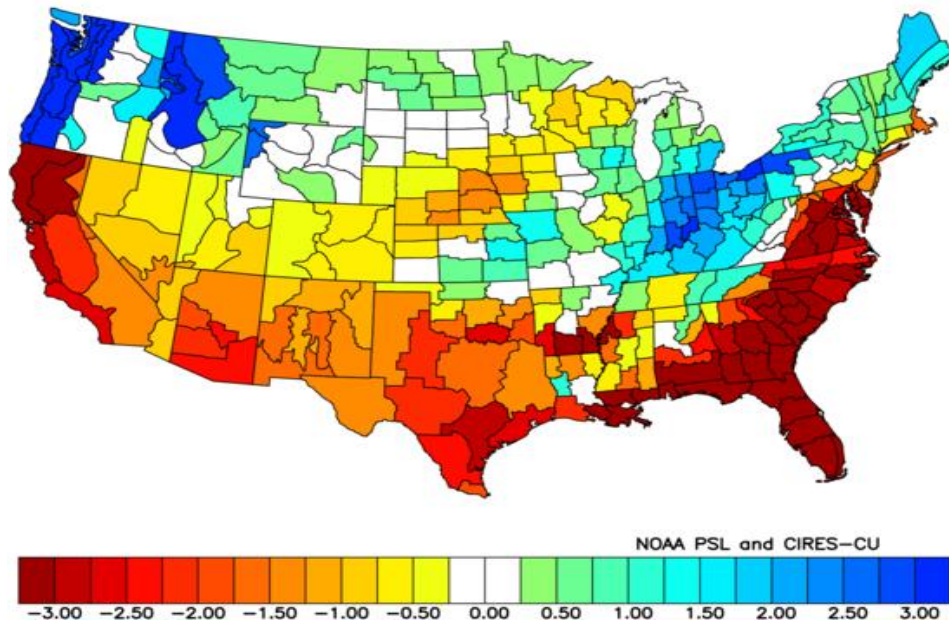


Fig 3: November-March composite total precipitation for winters 1998-99, 2007-08, 2008-09, 2010-11, 2011-12. We were near average for total precipitation combining these years

December looks like a month that'll be above average for temperatures with near to slightly below average for precipitation. The Arctic will begin to really cool as sea ice freezes up, and the Jet Stream looks to be just to our north and northeast. This doesn't mean we can't get wintry weather of course. Last year December finished significantly warmer than average but we still had that large storm in the middle of the month that brought 4-10" of snow. La Nina's usually bring warmer than average Decembers, and with the current state of the atmosphere, I don't see this changing this year.

January and February are usually interesting in moderate La Nina's. Usually in the first year of a moderate La Nina, such as 1999, 2009, and 2011 we usually get periods of wintry weather and snow. I don't see this changing in January this year. Precipitation looks to be above average I think, and I think wintry precipitation will be near or slightly above average. This will be the same in February. I think we could get stretches of a week or 2 each month of active weather with several storms. The composite temperatures for January and February are above average with February being significantly above average. I don't see why this winter would be any different, so thinking temperatures will be above average both months. There will be stretches of cold, but I think there will be a lot of warmth between these cold stretches.

March, like most years, will likely be a boom or bust month. Even during moderate La Nina winters, we can have very little or a lot of snow. For instance, in 1998-99 we only had 0.5" in March, but in 2007-08 we had 10.0" in March. Thus, March is going to be a boom or bust. We haven't had a good winter storm in March in

several years so we are do. I do think we'll get something in March, and it could be a good size storm. Our last 2 moderate La Nina's have brought above average snowfall in March. Total precipitation has been above average in the composite years showing that we have gotten a lot of precipitation, and that brings me more confidence that we could have a good wintry month in March. Temperatures look to be above average as well.

Overall, I believe wintry precipitation will be near to above average. I just think we will get a solid storm or 2 like most moderate La Nina years, and then we'll get at least a few storms on top of that. This will bring us to average for snowfall. Average is ~19" for the year, and I believe we'll be 18-22". If we get a couple bigger storms that'll push that total higher. Temperatures look to be above average. There will be stretches of cold, like all winters, but there look to be intense warm periods as well that will overwhelm the cold we get. These warm periods will push temperatures above average for the winter, and I think we could average 2-3 degrees Fahrenheit above normal from November through March.

SUMMARY:

- **La Nina winter, and we could dive into the moderate La Nina phase for a period of time**
- **We could get a storm or 2 in November, especially in periods of cooler weather**
- **December looks to be warmer than average, but wintry weather is possible**
- **January and February usually are active in moderate La Nina winters, and I fully expect that this year**
- **March is boom/bust in La Nina years, and this will be no exception**
- **Temperatures look above average from January through March**
- **The entire winter looks above average for temperatures, and wintry precipitation looks near or above average**

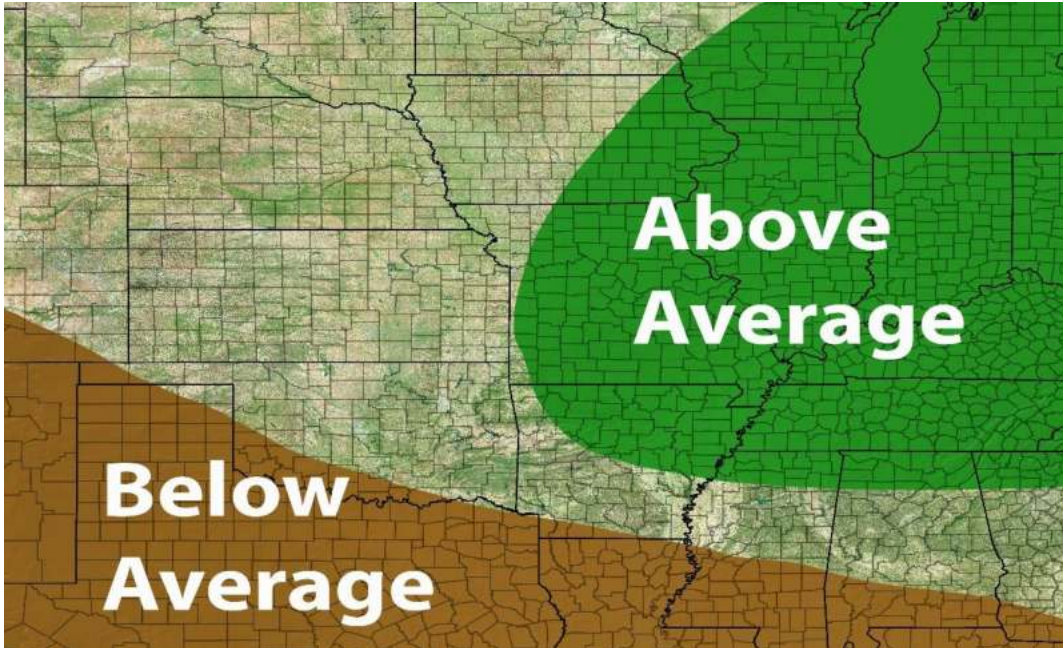


Fig 4: Winter 2020-21 Forecast Precipitation Totals

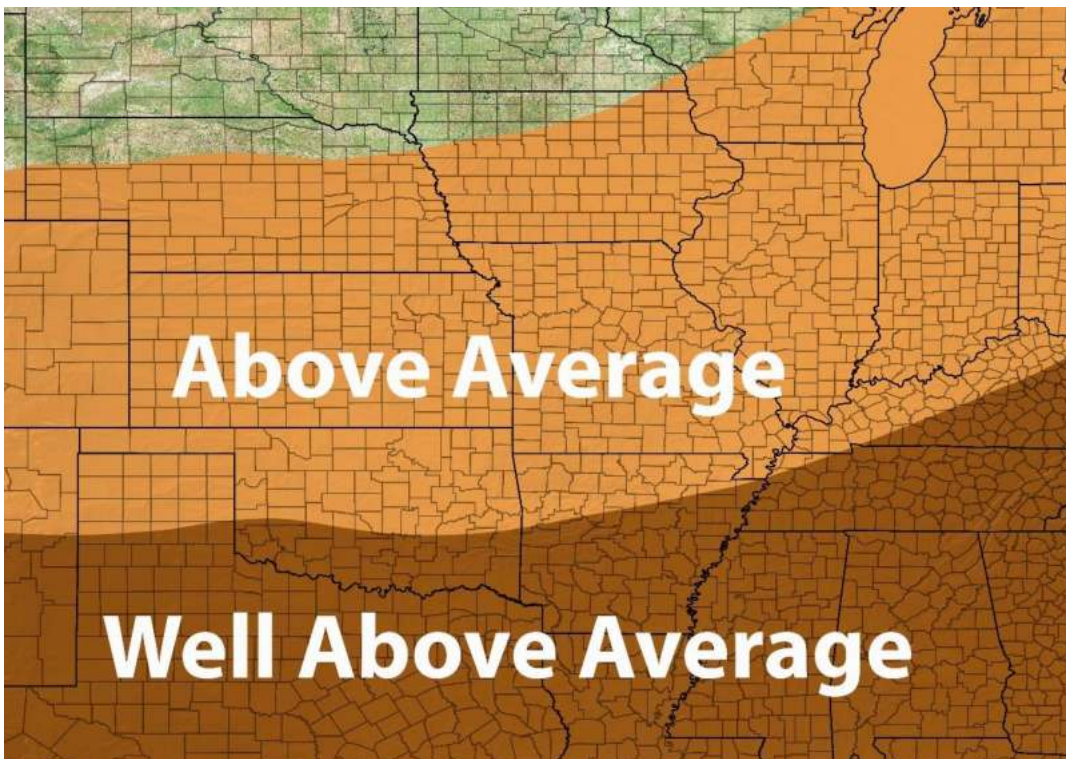


Fig 5: 2020-21 Winter Temperature Forecast