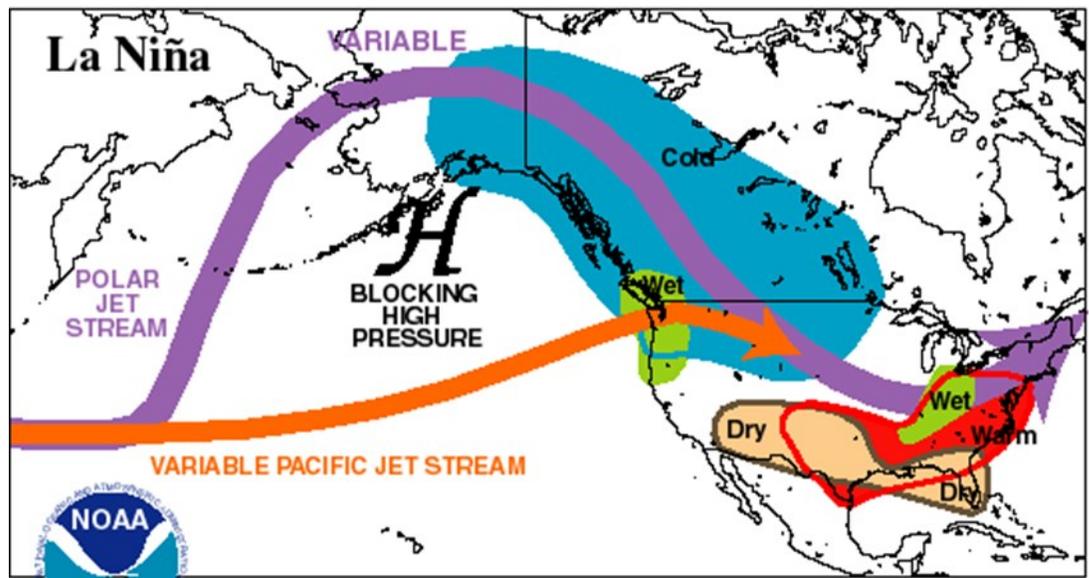


## 2016 Winter Outlook

*Contributed by Meteorologist Trent Smith*



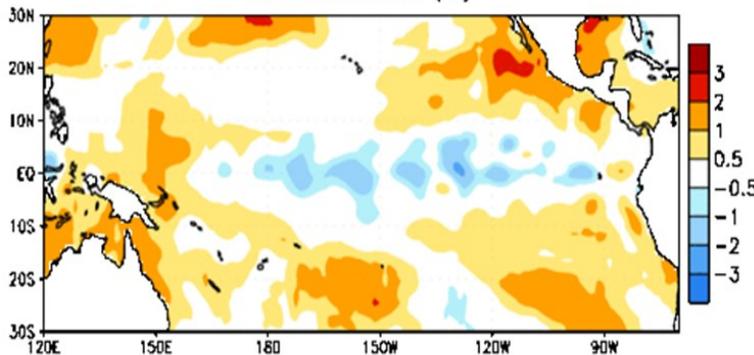
The water temperatures of the equatorial Pacific has slowly been trending cooler over the past few months. Current long range forecasts indicate that this region of the ocean should remain slightly below normal, meaning that the world will be in a weak La Nina regime this winter. A broad and general consensus of La Nina means that the Northern Rockies will be under northwesterly flow.



Climate Prediction Center/NCEP/NWS

The Climate Prediction Center is forecasting that the Northern Rockies have an increased chance for above normal precipitation, while the

Week centered on 09 NOV 2016  
SST Anomalies (°C)



temperatures are of equal chance. This is just a broad indication of what the weather should be over the next three months, while the actual daily and weekly

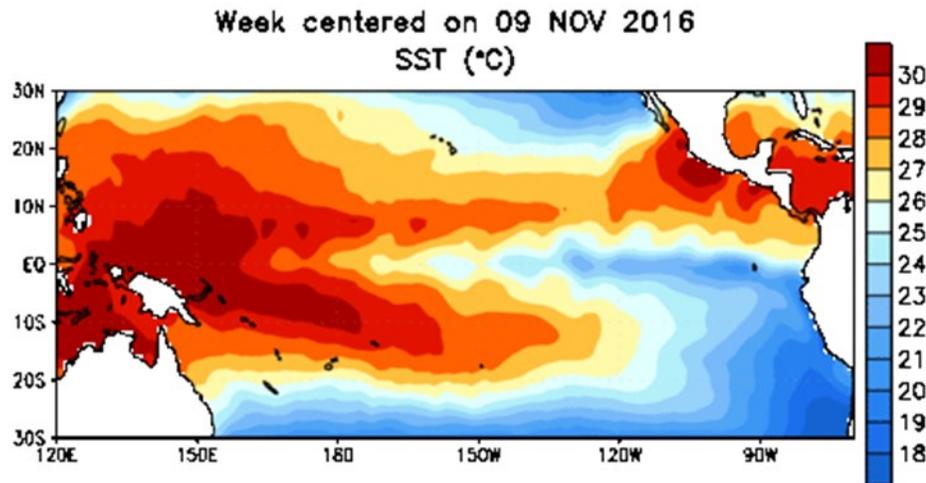
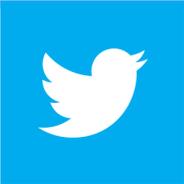
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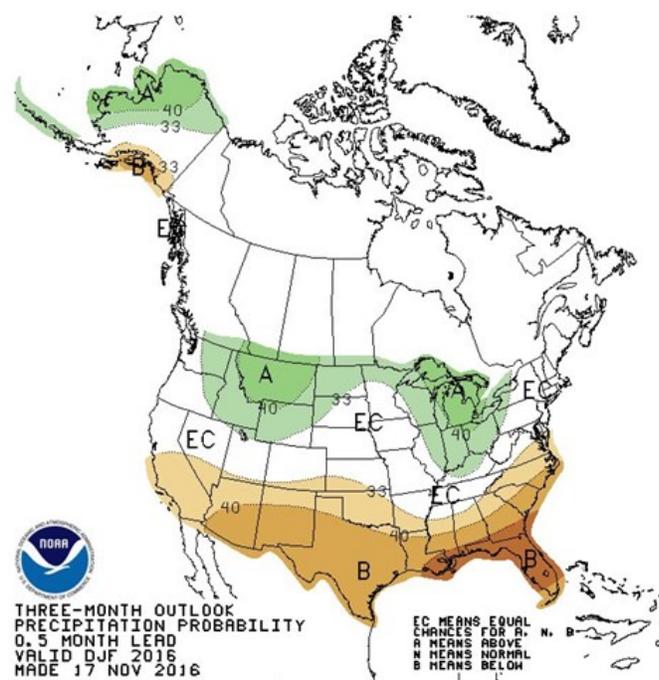
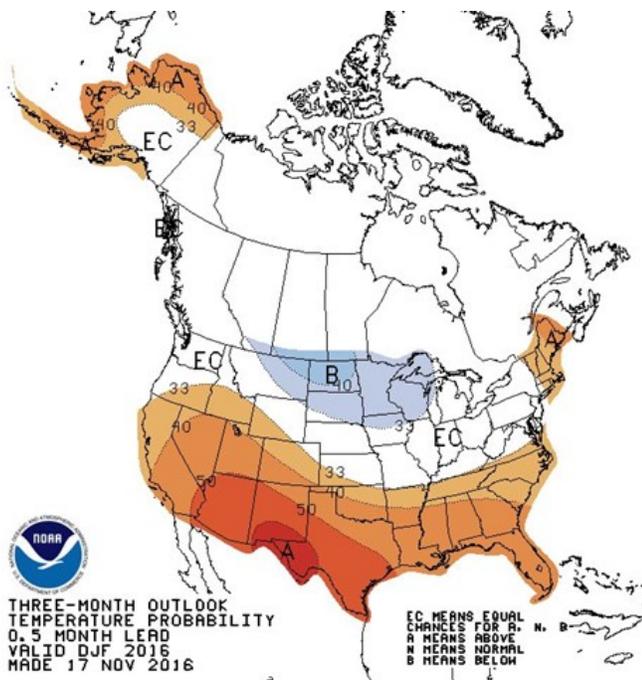


Be Aware! Look for severe weather alerts on twitter for this winter season!

<https://twitter.com/NWSMissoula>



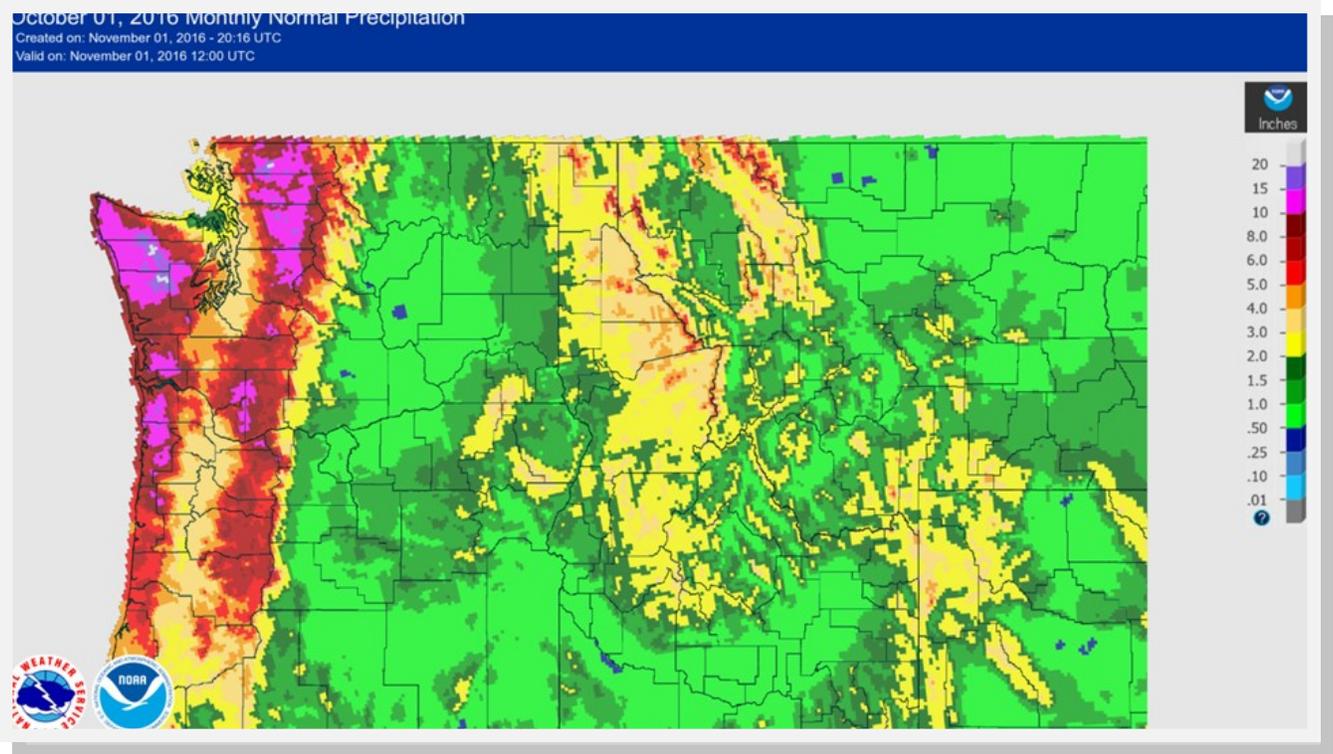
weather will be quite variable. Confidence is high that the Northern Rockies will have an above normal snowpack by winter's end, while moderate to high confidence exists that the valleys will receive at or above normal amounts. The Northern Rockies should have a few more arctic cold fronts this winter compared to the 2015/2016 season.



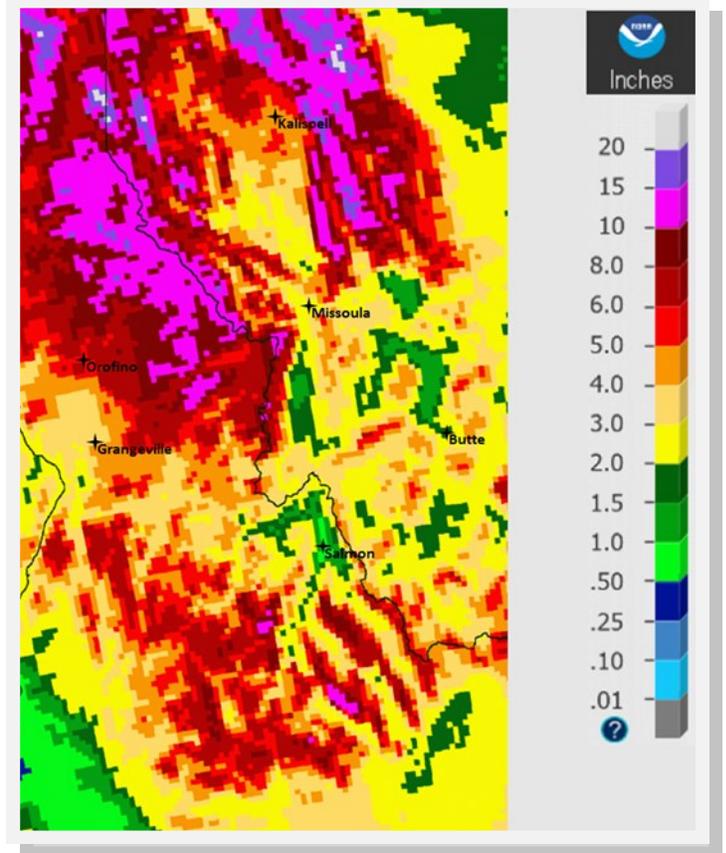


# Record Breaking Rain Event

Contributed by Meteorologist Trent Smith



This past October was one for the record books as a very unusual weather pattern developed over the Pacific Northwest. Thirty days of fairly continuous westerly flow pumping in a significant amount of moisture into the region. This weather pattern was related to the active typhoon season on the other side of the Pacific once. The moisture remnants of typhoons Megi, Chaba, Songda, Sarika and Haima were ushered across the Pacific and slammed into the western United States. This tropical moisture caused periods of steady precipitation with heavy rainfall at times across the Pacific Northwest. The Northern Rockies, especially northwest Montana, was impacted by this surge of moisture as many locations received 4 times as much rainfall for an October period.



continued →

# Record Breaking Rain Event continued

This ample moisture caused many weather observation sites to break monthly and yearly records. Just in the Northern Rockies, 19 weather stations were within the top 10 wettest Octobers on record. Fourteen of those stations had the wettest October ever with 7 sites being in the top 10 wettest month on record. Finally 3 weather stations recorded having their wettest total month ever with the period of record.

### Wettest Month On Record West Glacier, MT

Rank	October Precipitation	Year
1	10.60	2016
2	6.19	2012
3	5.87	1950
4	5.18	1995
5	5.08	1955
6	5.05	1990
7	4.92	1951
8	4.62	2005
9	4.30	2004
10	4.17	1975

Rank	Total Month Precipitation	Month/Year
1	10.60	10/2016
2	7.90	06/2012
3	7.72	12/1980
4	7.67	01/2006
5	7.53	11/1995
6	7.52	11/1959
7	7.42	12/1964
8	7.07	01/1953
9	6.99	06/2005
10	6.94	06/1995

Photo By: WWS Missoula Observations Began: July, 1948

### Wettest Month On Record Hungry Horse Dam

Rank	October Precipitation	Year
1	12.34	2016
2	7.34	1995
3	7.32	2012
4	6.80	1950
5	6.56	1951
6	6.53	1990
7	6.30	1955
8	5.89	1975
9	5.78	1967
10	5.04	2005

Rank	Total Month Precipitation	Month/Year
1	12.34	10/2016
2	10.84	11/1973
3	9.33	12/1996
4	8.21	12/1964
5	8.00	11/1989
6	7.85	01/1969
7	7.75	06/2012
8	7.73	05/2016
9	7.55	11/2006
10	7.50	01/1974

Photo By: WWS Missoula Observations Began: June, 1947

### Wettest Month On Record Troy, MT

Rank	October Precipitation	Year
1	8.11	2016
2	5.25	1985
3	4.55	1975
4	4.25	1967
5	3.59	1968
6	3.48	1990
7	3.47	1999
8	3.23	1997
9	3.19	2005
10	3.15	1961

Rank	Total Month Precipitation	Month/Year
1	8.11	10/2016
2	7.87	11/1973
3	7.84	03/2012
4	7.76	01/1974
5	7.60	12/1996
6	7.25	12/1980
7	7.09	05/1998
8	6.82	01/1990
9	6.77	11/1960
10	6.22	01/2006

Photo By: WWS Missoula Observations Began: September, 1960



# 1954 Weather Event at Rogers Pass

*Contributed by Meteorologist Corby Dickerson*

One half mile west of Rogers Pass and just south of the Continental Divide, a humble cabin was nestled next to a fledgling gold mine. The cabin sat within a small, ‘saucer-shaped depression’ in the landscape. It was 1954. The weather had been unrelenting: heavy, intense snow had fallen near continuously for seven days, totalling over five feet in depth by 5pm on the 19th of January. And the temperature that morning had been a frigid -37F. But, unbelievably, these measurements themselves would ultimately pale in comparison to what would occur later that night.

Meteorologically, conditions had been ideal for a prolonged heavy snow event. A steady feed of relatively warm and very moist Pacific air had been, for several days, rested over a comparatively dry and very persistent arctic air mass from Canada. As the sun set on the horizon, the snow had already ceased and the wind, which had been biting from the northeast for days now, was notably weaker. After settling in for another night of trying to stay warm in his family’s primitive surroundings, official U.S. Weather Bureau observer H.M. Kleinschmidt was resolved to stay awake much of the night due to the “loud and frequent ‘popping’ noises in the cabin, and that about 2am on the 20th he had observed his [unofficial] thermometer (exposed outside an insulated window several inches from the building) about -68F.”<sup>1</sup> Mr. Kleinschmidt, despite the extreme and dangerous cold, ventured outside to check the official instrument shelter where he found the minimum thermometer to read colder than -65F, which was as far down the scale as the government-issued thermometer could read. Later that day at observation time, he recorded the minimum temperature as -68F, completely unaware that this would come to set a record for the coldest reading ever taken in the United States! Thereafter, the Kleinschmidts went about their business as rugged Montana miners, while the weather gradually returned to more normal January conditions.

Although this record temperature occurred on January 20th, the Weather Bureau remained unaware of it until the observation form arrived at its Helena office on February 3rd. In reviewing this data, program manager and State Climatologist R. A. Dightman immediately noted the remarkable reading. Believing it to be a potential record, Dightman contacted the observer, requesting he send in the minimum thermometer for evaluation. The Kleinschmidts had been noted as doing “very well and keep[ing] a good record”<sup>2</sup> as observers. (It is standard practice to send instrumentation to the U.S. Weather Bureau lab in Washington, D.C. for calibration and verification when such extreme records are possible.) Yet Kleinschmidt, the good observer he was, actually did one better and sent in *both* the official minimum thermometer and his personal minimum thermometer for evaluation.



*Thermometer used for observations*



*continued* →



## 1954 Weather Event at Rogers Pass continued

While in the lab, scientists recreated the extreme conditions and observed the official and unofficial thermometers just as Kleinschmidt had described: the marker floating in the official liquid thermometer retreated back into its bulb and remained stuck there, pinned at an angle against the glass. This made it impossible for an actual reading much below the scale of this ther-

moremeter. But through additional laboratory analysis along with the verified reading on the unofficial minimum thermometer, the U.S. Weather Bureau was able to declare the coldest temperature observed that morning as  $-69.7^{\circ}\text{F}$ . Now confirmed as a valid observation, this reading was cross-checked against additional nearby stations (which had recorded  $-57$  and  $-59$  that same day) for reasonable consistency. After passing this final test and by knowing that they were good observers who were unaware of the potentially record-breaking nature of this observation, the U.S. Weather Bureau on March 16th, 1954 accepted the  $-70^{\circ}\text{F}$  reading as the official all-time record low for the United States. Seventeen years later a reading of  $-79.8^{\circ}\text{F}$  was observed at Prospect Creek Camp in Alaska, established a new record for the country. However, to this day, the reading at Rogers Pass is still the coldest ever observed throughout the conterminous United States--a reading that astounds as much as it reveals about the limitlessness of nature.



<sup>1</sup> Dightman, R.A.  $-70^{\circ}\text{F}$  in Montana. *Weatherwise*. December 1963, 272.

<sup>2</sup> Dightman, R.A.  $-70^{\circ}\text{F}$  in Montana. *Weatherwise*. December 1963, 272.

