YOUR NATIONAL WEATHER SERVICE SPOKANE QUARTERLY REPORT

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The Weather Watcher

of the Inland Northwest

www.weather.gov/Spokane

INSIDE THIS ISSUE:

Brace for another La Nina Winter!?!

The National Weather Service's Climate Prediction Center announced that La Nina is expected to continue through the Northern Hemisphere winter 2011-12. A La Nina Advisory remains in effect. This means that there is an increased chance of below-average temperatures and above-average precipitation for the Inland Northwest.

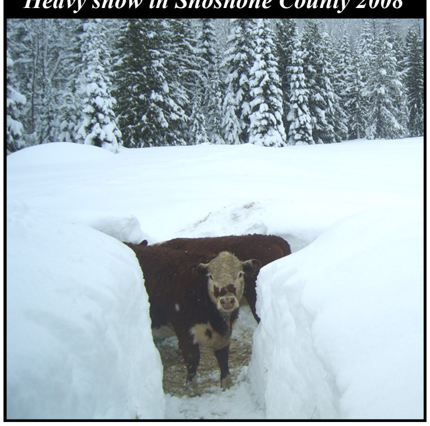
One of the most popular climate variation terms talked about today is the El La Nina Southern Oscillation (ENSO). La Nina is the cold phase and is characterized by colder than average sea surface temperatures in the equatorial eastern Pacific. This oscillation in sea surface temperatures across the eastern equatorial Pacific affects our weather in the Inland Northwest. Each phase of ENSO typically lasts for 6 to 18 months. Another climate variation is known as the Pacific Decadal Oscillation (PDO) and has phases just like ENSO with very similar characteristics. The difference with the PDO is that each transition of warm to cool phase is on the order of 20 to 30 years; it operates on a much longer time scale than ENSO.

The cool phase of ENSO (La Nina) typically results in colder and wetter conditions during the winter across the Inland Northwest. The phase of the PDO is synonymous to that of ENSO but the magnitude in any given year is much less than that of ENSO. After examining temperature data at various locations across the Inland Northwest through the mid 1900s, the PDO does seem to have an influence. Our studies indicated that both ENSO and the PDO seem to have an effect on extended winter cold snaps, specifically with high temperatures at or below 20°F for at least four days in a row!

Besides the ENSO, there are other atmospheric/oceanic oscillations that effect the weather patterns. One important one for the Inland Northwest is the Arctic Oscillation (AO) which refers to opposing atmospheric pressure patterns between the middle and high latitudes.

In the AO, a negative phase is depicted by relatively high pressure over the polar region and low pressure at northern mid-latitudes (about 45ºN), while a positive phase has this pattern reversed. Under the positive phase, higher air pressure at mid-latitudes drives the storm track farther north, and changes in the circulation pattern bring wetter weather to Alaska, and drier conditions to the western U.S. In the negative phase, the weather patterns are generally opposite to the positive phase, allowing for drier weather in Alaska and a more active storm track on the western U.S. The transition from positive to negative is a shorter time scale and can last a few weeks to months. This can impact the current ENSO conditions by enhancing or suppressing the weather conditions.

Heavy snow in Shoshone County 2008



Overall, near to above normal snowfall is the most likely scenario for this upcoming La Nina winter. Although additional circulations and oscillations may come into play and affect the outcome of our winter precipitation and temperatures. Nonetheless, keep your snow shovels handy for the next several months!

For more information on the winter outlook, ENSO and the AO, please see the NWS Climate Prediction Center at http://www.cpc.ncep.noaa.gov/ ☼

Steven Van Horn and Jeremy Wolf

Editor's Notes

We have had a little taste of winter with some light snow and chilly temperatures. But more is soon to follow! The first day of Winter falls on December 21st at 9:30pm PST, marking our shortest day of the year.

Many folks will be out on the roads in the coming months, either escaping the cold or playing in it. It's vital to keep your vehicle in good running condition and prepared for winter travel. Remember your emergency kit!

We are always looking for new ideas, pictures and stories for our publication. If you have any to share, please contact us at (509) 244-0110 or email nws.spokane@ noaa.gov.

This newsletter and past issues are available online on our NWS Spokane web page. If you would like a paper copy, please contact us and we will be happy to put you on the mailing list.

The main purpose of this publication is to keep our readers informed about NWS services and programs, and recognize those who help us with our mission, including weather spotters, observers, media, emergency managers, and government agencies.

All articles are written by the NWS staff. A special thanks to Ron Miller, Jeremy Wolf, Steven Van Horn, Mark Turner, and Anthony Cavallucci for their contributions.

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Pennies from Heaven

Thinking pennies, dimes and dollars make us precipitation measuring scholars!

Precipitation (which includes rain, snow, hail, sleet, and other forms of liquid, freezing or frozen water falling from the sky) is measured in units over a given time period. In the U.S., precipitation is measured in some fraction of an inch per 24-hour period. For example, liquid precipitation is measured to the nearest 1/100th of an inch (0.01), new snow fall is measured to the nearest 1/10th of an inch (0.10) and snow that accumulates on the ground is measured to the nearest whole inch (1.00).

An easy way to remember this is to think "pennies, dimes and dollars".

- A penny, like liquid precipitation, is 1/100th of a dollar ($0.01)
- A dime, like snowfall, is 1/10th of a dollar ($0.10) and
- A dollar, like snow depth, is a dollar ($1.00).

Why don't we just make it simple and measure everything to the nearest 1/100th of an inch? The reason is in how we measure these different elements.

Weather observers use sophisticated instruments, known as rain gauges to measure liquid precipitation, but they come in different sizes and styles. For instance a National Weather Service "Standard" Rain Gauge is a 24" tall and 8" diameter straight sided container, while a CoCoRaHS gauge is 12" tall and 4" in diameter.

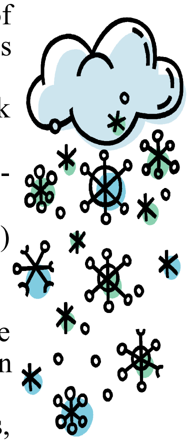
Rain gauges have wide openings at the top to catch precipitation. The rain is funneled into a narrow tube, one-tenth the diameter of the top of the gauge. Since the tube is thinner than the top of the funnel, we can obtain a precise measure to the nearest 1/100th of an inch. When less than 1/100th of an inch of rain falls, this is known as a "trace" of precipitation.

Another common type of rain gauge is known as a tipping bucket. It has a funnel, like a simple rain gauge, but the funnel leads to two tiny "buckets." The two buckets are balanced (somewhat like a sea-saw) and each holds 1/100th of an inch of water. When one bucket fills, it tips down and is emptied while the other bucket fills with water. Each tip of the buckets causes the device to record an increase of 1/100th of an inch of precipitation. This instrument electronically records precipitation in some sort of data logger. Tipping bucket rain gauges are typically used at remote or automated locations.

One more type of rain gauge uses a weighing mechanism to determine precipitation amounts. Since we know the weight of water, even frozen precipitation can be measured with a weighing rain gauge. These types of gauges are less common because they are expensive and difficult to maintain.

Snowfall is measured by collecting the new snow on a flat surface called a "snow board" using a ruler graduated to 1/10ths of an inch. It is a simple measurement of the greatest accumulation of new snow on this surface over a given time period. As you can imagine, measuring snow on the ground with a stick to a greater precision than 1/10th of an inch would be nearly impossible! After the measurement is taken, the snow board is cleared off and reset atop the old snow, ready to catch the next falling snow flake.

Snow depth is measured to the nearest whole inch, our coarsest precipitation measurement. To measure snow depth we use a tall stake marked in whole inches (like a yardstick) placed in an area deemed to be representative of the greater area. Wind, buildings, trees, and snow moving operations can affect the amount of snow that accumulates in an area, so snow depth tends to be measured away from these obstructions. In order to preserve the pristine snow measurement area, we try not to trample on the snow we are trying to measure! With this whole inch measure we can determine snow depth while not disturbing the snow.



So, when reporting your precipitation to us here at the NWS, think pennies, dimes and dollars! ☼ *Mark Turner*

Autumn 2011 in Review

Answer: In Spokane, average snowfall during a La Nina winter is 61.8". That is 126% of a normal snowfall of 49"!

The weather in the Inland Northwest continued to be about a month behind schedule. For the spring and early summer, this meant colder than usual (for example, May felt more like April). But for the latter half of the year, it meant the opposite (for example, September felt more like August). Mild and dry weather was the rule for this autumn. August had ended the string of colder-than-normal months, and **September** continued this trend. Average temperatures were nearly 5º above normal for the month. Temperatures from the 7th through the 14th were in the upper 80s and 90s, which is 10-15º above normal for that time of year. Numerous daily records were broken at a number of locations. After a mid-month short cool spell brought very light rainfall, temperatures once again rebounded back into the 80s and 90s. Lewiston and La Crosse both hit 100º on the 24th, the latest ever that they have hit the century mark. Lewiston averages four days of 90 or better in September. They reached that mark 13 times this year, which hadn't been done since 1943. Thunderstorms on the 27th brought the only appreciable rain for the month. Some of these were rather heavy. A weather spotter near Diamond Lake received 0.42" of rain in 20 minutes.

October saw the typical increase in storm activity. Rain fell on most of the first 11 days of the month. Rainfall along with some thunderstorms kept the temperatures on the cool side. The high in Spokane on the 6th only reached 48º, the first sub-50 day of the season. Kellogg received 0.67" of rain on the 5th, a record for the day. A tornado touched down near St. John on the Palouse. By the middle of the month, the weather pattern had turned drier with temperatures warming back into the 60s. This culminated on the 22nd as a cold front moved through the area. Rare late-season thunderstorms developed during the evening bringing small hail to some locations.

The nice autumn weather continued into **November**. But on the 12th, the weather pattern took a turn for the colder. Several locations received their first appreciable snow, including Deary which picked up 4.3". Winds accompanying this storm front gusted into the 40-50mph range. While most of the snow quickly melted, another front on the 16th brought more widespread snow. The heaviest snow was in the Cascade valleys where Mazama had 9.4" and Leavenworth and Winthrop received 6.5". Generally lighter amounts fell across the northern valleys, although Naples picked up 7". More snow fell north of Spokane on the 17th and 18th. The area between Newport and Clark Fork received 6-14" of snow. Yet another storm moved into the area on the 23rd. Precipitation initially started as snow with the valleys north of Spokane picking up another 2-7". But this storm brought strong winds are temperatures into the 40s and 50s, melting much of the snow that had fallen over the past week. The exception to this was in the Cascades where the precipitation continued to fall as snow. Snowfall of 1-2 feet was reported in Stehekin and Mazama, with about 6" in Leavenworth. The month finished up with generally mild weather as temperatures ran 5 to 10 degrees above average for the end of November. ☼ *Ron Miller*

Autumn Weather Statistics

Wenatchee Water Plant	Sep	Oct	Nov	Total
Avg High Temp	82.1	62.5	45.9	63.5
Departure from Norm	+3.8	-1.0	-0.6	-0.7
Avg Low Temp	53.4	42.1	28.9	41.5
Departure from Norm	+1.7	+0.9	-3.3	-0.2
Total Precip	0.02	0.75	0.49	1.26
Departure from Norm	-0.38	+0.26	-0.87	-0.99
Total Snowfall	0.0	0.0	1.9	1.9
Departure from Norm	0.0	0.0	-0.5	-0.5
Lewiston Airport	**Sep**	**Oct**	**Nov**	**Total**
Avg High Temp	85.4	62.0	48.5	65.3
Departure from Norm	+7.2	-0.6	+0.3	+2.3
Avg Low Temp	53.5	44.5	32.3	43.4
Departure from Norm	+2.6	+3.4	-0.7	+1.7
Total Precip	0.14	1.00	0.93	2.07
Departure from Norm	-0.53	0.04	-0.25	-0.74
Total Snowfall	0.0	0.0	1.0	1.0
Departure from Norm	0.0	-0.1	-0.8	-0.9
Spokane Airport	**Sep**	**Oct**	**Nov**	**Total**
Avg High Temp	79.1	56.7	42.7	59.5
Departure from Norm	+6.2	-1.2	-0.5	+1.5
Avg Low Temp	50.9	39.4	27.4	39.2
Departure from Norm	+3.5	+2.2	-3.6	+2.1
Total Precip	0.14	0.73	1.73	2.60
Departure from Norm	-0.53	-0.45	-0.57	-1.55
Total snowfall	0.0	0.0	6.6	6.6
Departure from Norm	0.0	-0.3	-0.8	-1.1

Remember your Winter Spotter Checklist

Snow:
2"+ valleys & 4"+ mountains

Strong Winds:
30 mph+ or damage

Reduced Visibility:
under a mile due to snow, fog

Heavy Rain:
Showery: 1/2" + in 1 hr
Steady Rain: 1"+ in 12 hrs
or 1.5"+ in 24 hrs

Any Flooding !

Hail: pea size or larger

Any **Mixed precipitation**!

Travel Problems or
Any Damage: due to severe or hazardous weather.

Priest River Experimental Forest: 100 Years of Weather Observing

The Priest River Experimental Forest (PREF) was among the first experimental forests, set aside as a forestry research center in September 1911. One of the first projects undertaken was the establishment of an official weather station.

December 1, 2011 marks the 100th year of weather observing and reporting for the Priest River Experimental Forest. The National Weather Service marked this "Century of Science" with the presentation of a 100 year Honored Institution Award at a celebration held at the PREF in October.

In addition to daily COOP weather reports, PREF staff has recorded snow pack data from 1937 to present, hydrology in the Benton Creek watershed since 1955 and atmospheric chemistry since 2002. Congratulations to PREF on their achievements and long history! ☼ *Mark Turner*

2011 Skywarn Recognition Day

The National Weather Service in Spokane teamed up with Spokane County Amateur Radio Emergency Services/Radio Amateur Civil Emergency Service (ARES/RACES) to participate in the 2011 SKYWARN Recognition Day. The day stretched from 4 pm Friday, Dec. 2nd to 4 pm Saturday, Dec. 3rd.

This was the 13th Annual SKYWARN Recognition Day, and it's an event that recognizes the commitment made by Amateur Radio operators in helping to keep their communities safe. It also allowed the NWS and ARES/RACES to practice emergency operations and be ready when the next major disaster occurs.

During the event, volunteer Amateur Radio operators set up their radio equipment at the NWS office and made contact over the 24 hour period with as many other operators and participants as possible. This was a national event with other ARES/RACES groups and NWS offices working together. A big thanks to the Spokane ARES/RACES group for their enthusiasm and efforts! ☼ *Anthony Cavallucci*

The Weather Watcher
Of the Inland Northwest

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Trivia: What is the average snowfall during a La Nina winter?