

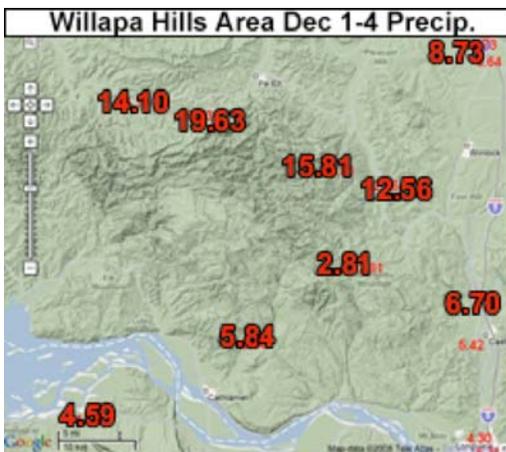


Office of the Washington State Climatologist Newsletter

January 31, 2008

December Flooding Continued...

On January 10th, a state senate committee convened to assess the role that logging may have had in the December flood event. Representatives from Weyerhaeuser, the State Department of Natural Resources, and others including the State Climatologist, Philip Mote gave presentations concerning the significance of this event to previous events. Preliminary assessments of the flood event by us concluded that precipitation around the Centralia and Chehalis areas was not of record magnitude and that the 3-day total precipitation amounts of 4 to 7 inches were nothing out of the ordinary. However, Weyerhaeuser's private rain gauge network, of which we were



unaware, recorded 3-day totals near 20 inches in the Willapa Hills. This prompted us to do an in-depth analysis on the magnitude of the precipitation that resulted in the floods. As additional precipitation totals were made available, we were able to conclude that for the lower elevations around the Chehalis valley, precipitation amounts recorded for stations which have 30 years or more data, did not even rank in the top 15 in terms of 1-day, 2-day and 4-day maximum precipitation events. However, both satellite and radar estimated precipitation suggested an enhancement of precipitation over

the Willapa Hills in the magnitude of about 2-3 times the 4-7 inches observed at lower elevations. Also, two additional gauges (Frances and Wildwood) confirm that precipitation amounts reported by Weyerhaeuser are not unrealistic. Unfortunately, the data from all four gauges are not suitable for long-term climate analysis due to their short record, and in the case of Frances, its data record is very much incomplete.

Precipitation totals and further details will soon be added to the summary at:

<http://www.climate.washington.edu/events/dec2007floods>

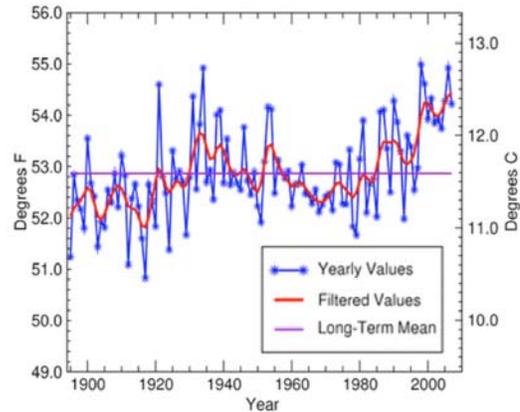
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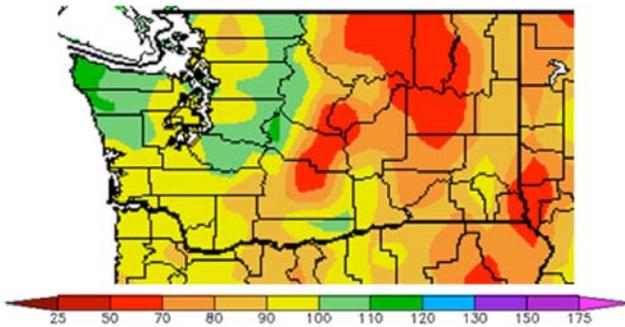
2007 In Review

According to the National Climatic Data Center (NCDC), the average global surface temperature in 2007 was the fifth warmest on record. For the contiguous United States, 2007 was the 10th warmest on record with an average temperature of 54.2°F, 1.4°F warmer than the 20th century (1901-2000) mean. Visit the NCDC Climate Monitoring website for the [National 2007 Annual Review](#).

While many states experienced above average temperatures in 2007, Washington temperatures were near normal. The statewide average temperature of 48.5°F ranked 39th (1 being the warmest) out of 113 years. The warmest and coldest departures from normal were July and October, respectively.



*Contiguous U.S. Temperature 1895-2007.
Source: NCDC / NESDIS / NOAA*



*January - December 2007 Percent of Normal Precipitation.
Source: High Plains Regional Climate Center
<http://www.hprcc.unl.edu>*

Statewide, 2007 annual precipitation was near normal with above normal (90-110%) precipitation on the western side of the state and below normal (50-90%) to the east. The wettest regions were along the north coast and central and northern Cascade Mountains; while the driest areas were central Washington, particularly the Okanogan area. See the climate summary table below.

January

The active weather of November and December 2006 carried over into the new year as the first windstorm occurred January 2. In the Puget region, gusts of 45-65 mph were observed along with heavy rainfall. A few days later, another system brought strong winds and heavy rain that resulted in landslides, urban flooding, and over 2 feet of snow in the Cascade Mountains. As the strong frontal system moved through, a strong east-west pressure gradient along the Cascades resulted in high winds on the lee of the Cascades. Peak wind gusts around Wenatchee and elsewhere exceeded 70 mph. Days later, as arctic air moved south into the region, up-to 10" of snow fell around western Washington with subzero temperatures east of the Cascades. By the end of the month, a strong ridge built over the region, ending the stormy weather of the last 3 months.

February

High pressure dominated the region in February with slightly warmer than normal temperatures and below normal precipitation statewide.

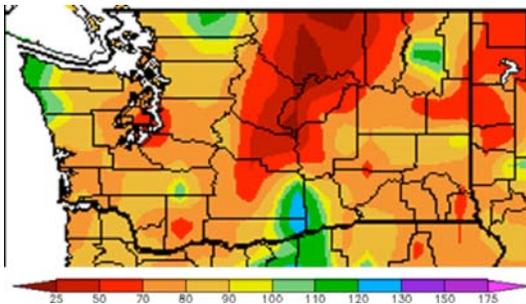
Towards the end of the month a cold upper-level low brought low-land snow around western Washington and heavy snow in the Cascades and eastward. With the heavy snow in the Cascades, a series of collisions involving as many as 50 cars and several semi-trucks closed I-90 at Snoqualmie pass for about 6 hours.



The morning of March 1 in Kenmore taken by Deanna Hence, U.W. Atmospheric Sciences Dept.

March

During the beginning of the month, warm moist tropical air made its way via the “pineapple express” bringing heavy rain, which led to flooding in several area rivers in western Washington. In the days leading up to the event, record high temperatures near 70°F were observed for many Puget Sound area stations. As the storm moved eastward, record high temperatures in the low to mid 70’s were prevalent throughout the inland northwest. By the end of the month as a similar system came through, western WA ended up with above normal precipitation (greater than 150% of normal in the Cascades and north coast), while precipitation in eastern WA was below normal (less than 50% of normal along the lee side of the Cascades) and would continue to be through summer.



April 2007 Percent of Normal Precipitation.
Source: High Plains Regional Climate Center
<http://www.hprcc.unl.edu>

April

The first April showers came in the form of snow before giving way to record heat. Along the coast temperatures approached 70°F and inland around Puget Sound, 80°F. The heat wave was short lived and temperatures were near normal across the state. Precipitation on the other hand was much below normal in many areas, especially the Okanogan region - 6th driest April in Seattle, 10th driest in Chelan.

May

Other than the lack of precipitation, the weather this month was fairly typical for western Washington with the usual heat waves giving a glimpse of the summer weather to come. The heat wave at the end of the month set maximum temperature records at many locations including Hoquiam, which reached 87°F on May 29th. The eastern half of the state was also very dry, with the exception of two locations, Wenatchee and Spokane. They were the only places to receive 100% or more of their normal precipitation, thanks to some thunderstorm activity. Wenatchee observed its wettest 2-day rain event for the month of May ever since records began in 1959, with a total of 1.51” May 20th through the 21st.



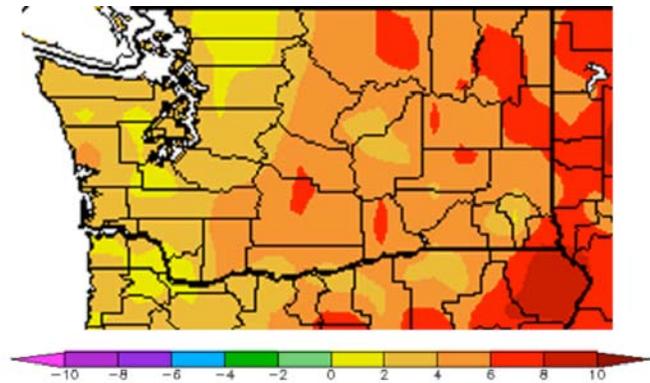
Crystal Mtn. Webcam 6/25/07

June

June was relatively calm, there were no significant heat waves around the state and no major thunderstorms in eastern Washington to alleviate the drought. However, temperatures were cool enough June 25th for some rare snow accumulations in the Cascades.

July

The 5th hottest July out of 113 years. The hottest of days were mid-month when record high temperatures and record high minimum temperatures were set throughout much of the state. In western Washington, Seattle approached its all-time record high of 100 degrees on July 11th, but fell short at 98°F. However, both Hoquiam and Bellingham set all-time record highs of 99°F (July 10th) and 94°F (July 11th), respectively. In eastern Washington, temperatures reached and surpassed the triple digits multiple times. For Spokane and Lewiston, July 2007 was the 2nd hottest month of any month of the year ever (July 1906 is first). Despite the heat, Seattle recorded its 5th wettest July with 1.44" of precipitation, as subtropical moisture brought 7 consecutive days of rain to the region. While eastern Washington remained dry, Spokane received 57% of its normal precipitation, making it the second wettest July in 10 years.



July 2007 Temperature Departure from Normal.

Source: High Plains Regional Climate Center

<http://www.hprcc.unl.edu>

August

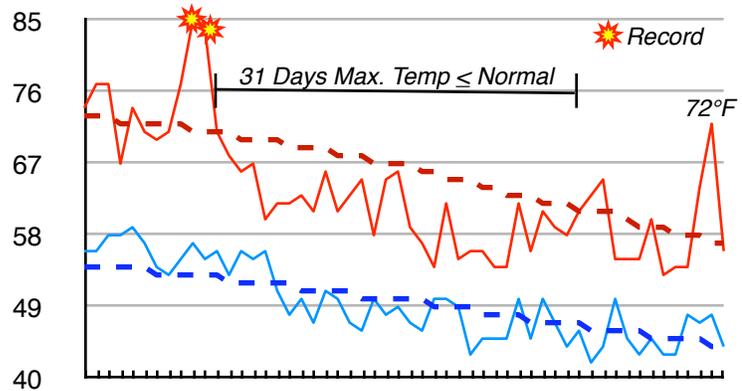
After a hot July, August cooled off and temperatures were near normal across the state and other than a few isolated thunderstorms in some areas, precipitation was much below normal throughout the state. As summer drew to a close, many people believed that the 2007 summer season was cooler than normal, but temperatures were actually near to slightly above normal statewide for June-July-August.

September

For the first half of the month temperatures were warm across the state. Seattle recorded two consecutive maximum temperature records before temperatures dropped below normal for 31 consecutive days, abruptly ending summer. September 13th was the last day temperatures were 70°F or greater in Seattle. As a cool October got underway, it appeared that this would stand as the second earliest end to 70+ weather, but Nature still had a trick up her sleeve...

October

Remnants of tropical storm Lingling were swept north where it developed into a deep extra-tropical cyclone in the central Pacific, which later crossed over the Olympic peninsula. The deep low pressure system produced strong wind gusts up to 80 mph throughout much of western Washington, cutting power to about 300,000 electrical customers. Towards the end of the month, a break in the storm pattern allowed Washingtonians to reminisce of the warm summer weather of the previous months as temperatures climbed into the 70's on October 23rd. Ritzville set a new record high of 78°F and Seattle reached 72°F, ending the prospect of 2007 having the second earliest onset of cool weather.



Seattle maximum (red) and minimum (blue) temperatures compared to normal (dashed line) from September 1st - October 24th.

November

The second windstorm of the season tracked over the northern tip of Vancouver Island, producing strong winds along the coast and northwest interior on the 12th. Wind gusts were in excess of 70 mph in these areas. Also, wind gusts of 92 mph and 97 mph were recorded by two trained spotters in Sekiu and 5 miles east of I-5 on the Mt. Baker Highway. Had the center of the storm tracked farther south, wind gusts would have been much stronger than the 40-50 mph gusts observed from Everett south to Tacoma.

When the Fall season (September through November) had ended, temperatures were slightly cooler to near normal around western Washington and slightly above to near normal in eastern Washington. This pattern closely resembled the suggested probabilities by the Climate Prediction Center's (CPC) 3-month outlook produced at the end of August, which called for equal chance conditions in western Washington and an increased probability of above normal temperatures east of the Cascades. With the anticipation of an upcoming La Niña, the CPC forecasts resembled the classic La Niña pattern calling for above normal precipitation in Washington. By the end of the year, this pattern became a reality.

December

Temperatures for December were near normal throughout much of the state. The average temperature statewide was 32.0°F, 0.3°F cooler than the 1901-2000 average. Due to a series of storms early in the month, December precipitation was much above average, except for central Washington which was below average. Statewide, it was the 11th wettest December out of 113 years.



*TOP: Tree blow-down in the south Nemah area near Hwy 101 (source: Wolf Read).
MIDDLE: WA DOT photo of flood waters over I-5.
BOTTOM: Seattle-Times aerial photo of landslides on a clear-cut slope near the Stillman Creek drainage area.*

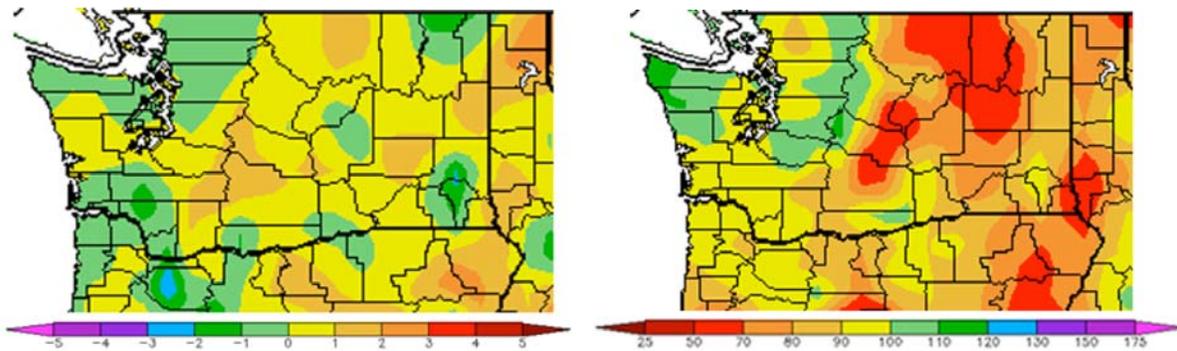
A series of storms December 1-3, produced snow, strong winds, and heavy rain that resulted in landslides and major flooding throughout much of the Chehalis valley. Strong southerly winds with

gusts up to 93 mph were observed along the coast, knocking down hundreds of trees and cutting power to about 100,000 electrical customers. Though the winds were not as strong in many areas as the Columbus Day Storm of 1962, the duration of the winds puts this event in its own class of major Pacific Northwest windstorms. The most significant of the storms brought heavy rain around the southwest interior and central Puget Sound areas. The bulk of the rain fell December 3rd, making it the second wettest day for Sea-Tac Airport. Elsewhere in Seattle, amounts were near 4", with the greatest amounts of rain towards the northern part of the city. To the west, Bremerton recorded an all-time daily maximum rainfall amount of 7.50" on December 3rd, surpassing the previous record of 5.62 inches set on December 10, 1921. Towards the south, the heavy rainfall resulted in 3 rivers reaching all-time record flood levels, which led to the closure of a 20-mile stretch of I-5 and the declaration of a presidential disaster area in the Chehalis Valley area. Storm precipitation totals in the area ranged from 4-7 inches with greater amounts in excess of 14" in and around the Willapa Hills.

2007 January - December Climate Summary for Various Locations

City	Temperature (°F)			Precipitation (inches)		
	Average	Normal	Departure from Normal	Total	Normal	% of Normal
Coast						
Hoquiam	52.5	51.1	1.4	60.36	68.48	88%
Long Beach	-	50.3	-	-	81.19	-
Quillayute	48.9	49.2	-0.3	119.80	101.71	118%
Western WA						
Bellingham	49.3	50.0	-0.7	33.54	35.45	95%
Everett	51.2	51.0	0.2	38.32	37.49	102%
Olympia	49.9	50.1	-0.2	48.80	50.79	96%
Seattle	52.0	52.3	-0.3	38.95	37.07	105%
Vancouver	52.1	51.8	0.3	35.50	41.92	85%
Cascades						
Mt. Rainier (Paradise)	38.8	37.2	1.6	109.02	119.73	91%
Ross Dam	48.6	48.5	0.1	61.12	57.55	106%
Stampede Pass	40.7	39.6	1.1	94.92	82.31	115%
Eastern WA						
Lind	50.4	49.6	0.8	5.62	9.95	56%
Republic	-	43.4	-	-	16.88	-
Spokane	48.3	47.3	1.0	13.97	16.66	84%
Walla Walla	54.5	53.7	0.8	15.49	20.23	77%
Wenatchee	51.3	50.7	0.6	5.60	8.54	66%
Yakima	49.8	49.7	0.1	5.67	8.30	68%

Normal is defined as the 1971-2000 average.



2007 January - December temperature departure from normal (left) and percent of normal precipitation (right).

Outlook

The 3-month (February-March-April) outlook produced by the Climate Prediction Center (CPC), continues to call for equal chances of above, below, or normal temperatures for Washington with an increased probability for above normal precipitation.

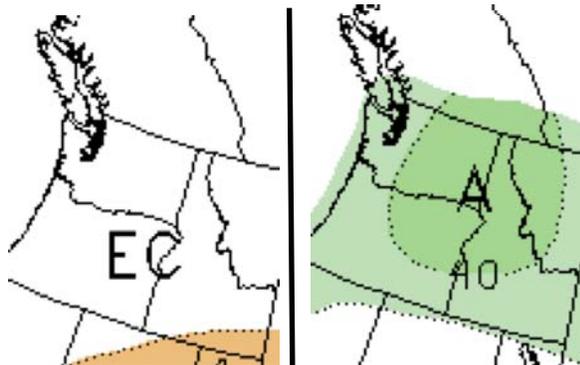
Sea-surface temperatures (SSTs) in the tropical Pacific continue to decrease, leading to the development of strong La Niña conditions. Current model forecasts indicate the continuation of La Niña through Spring. Thereafter, considerable spread exist between the models with about half suggesting the continuation of weak La Niña conditions through the summer.

Historically, La Niña conditions favor above normal precipitation for the state with cooler than average winter temperatures around western Washington. However, with the current long-term warming trend La Niña merely offsets the trend and yields near normal temperatures.

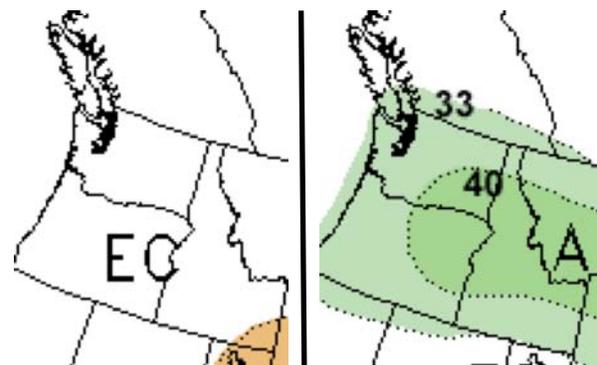
Further outlook details, including local temperature outlooks, are available at:

<http://climate.washington.edu/outlook.html>.

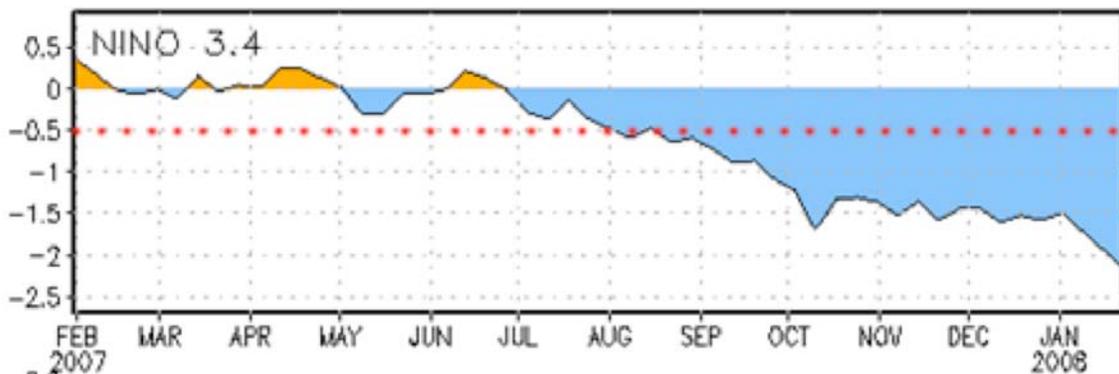
February Outlook
Temperature - Precipitation



Feb-Mar-Apr Outlook
Temperature - Precipitation



SST Anomalies



La Niña conditions are characterized by negative monthly SST anomalies less than or equal to -0.5°C.