Office of the Washington State Climatologist

October 3, 2012

September Event Summary

In this Issue

September was warmer than normal for most of the state and extremely dry statewide - a continuation of the very dry conditions experienced since late July. A frontal passage on September 8 and 9 brought numerous lightning strikes to eastern WA that sparked over a dozen fires. The State Emergency Operations Center was activated on the 9th to aid in fighting the fires. The weather did not cooperate, however, and that in combination with the dry fuels lead the fires to grow and burn throughout the month. At the time of this writing, firefighters are still fighting many of them. Updates on their progress can be found at the Northwest Interagency Coordination Center (NWCC; http://www.nwccweb.us/index.aspx). Homes and businesses were threatened, especially near Wenatchee and Cle Elum, and evacuations were ordered. Another unfortunate side effect of the multiple fires was very poor air quality; the state released Air Quality Alerts for eastern WA locations throughout the month. The smoke produced hazy conditions west of the Cascades as well, especially during periods of easterly flow. A notable example was the morning of September 13, when there was enough smoke to be smelled in the Puget Sound lowlands.

Dry August/September

Light rain in early September broke the run threatening the all-time record number of consecutive dry days for many western WA locations. A measly 0.01" of rain on September 9, for example, ended the dry stretch at SeaTac Airport, making this year the 2nd-longest stretch of dry days (48) since records began there. The September 9 rain was heavier in other western WA locations.

But otherwise, the two-month period of August and September was extremely dry. How else can that be quantified other than looking at consecutive dry day stretches? Table 1 shows the rankings of this year's August/September period compared to other years for selected WA locations. At many locations around the state, this has been the driest August-September period on record. At SeaTac, for example, the 0.03" of precipitation measured in August and September is the driest on record. 1993, 1974, and 2002 rank 2nd, 3rd, and 4th with 0.19", 0.22", and 0.46", respectively.

Aside from the wildfires, there does not seem to be many serious impacts of the recent lack of rain. After all, the normal precipitation amounts are not very high for August and September. According to the Weekly Crop Bulletin released by the US Department of Agriculture, the soils are dry, but there is adequate water supply for irrigation. The most recent bulletin does include mention of some negative impacts: water availability for cranberry harvesting in Kitsap County is not quite adequate and pasture conditions are only poor to fair in many locations, especially in Douglas County where the land has also been impacted by fires. These impacts are worth monitoring as we expect the next couple of weeks to remain dry, meaning a late start to the onset of fall rains.

Station	Aug/Sept Total Precipitation	Ranking	Records Began	Examples of Drier Years
Omak	0.01	1	1909	-
Pullman COOP	0.02	1	1941	-
SeaTac	0.03	1	1948	-
Olympia AP	0.04	1	1948	-
Everett	0.31	1	1894	-
Hoquiam Bowerman AP	0.34	2	1953	1993
Quillayute AP	1.09	2	1966	1998
Yakima AP	0.04	3	1946	1987, 1974
Spokane AP	0.13	3	1881	1928, 1888
Wenatchee	0.09	16	1931	1974, 1987, 1970, 1939, 2011, etc.
Ellensburg	0.33	29	1893	1974, 1993, 1970, 2011, 2002, etc.

Table 1: The total August and September precipitation for several WA locations. The ranking (in terms of the driest), period of record, and example of years that have had drier two-month periods are also listed for each station.

1st Annual WA vs. OR CoCoRaHS Challenge

Happy New (Water) Year! A water year is defined from Oct 1 through Sept 30 to correspond with the start of the wet season. Even though the Pacific Northwest has been extremely dry the past two months, this will not continue indefinitely, and we are competing with Oregon to see which state can get the most new CoCoRaHS volunteers during October. This is a friendly competition similar to the nationwide CoCoRaHS March Madness contest; we choose October as a better time to compete here in the Northwest.

The contest will culminate on October 27, the day of the football game between the University of Washington Huskies and the Oregon State University Beavers. OWSC and the Oregon Climate Service are located at UW and OSU, respectively, making that day a perfect end to the CoCoRaHS Challenge. Standings will be posted every Friday for the next 3 weeks on the OWSC home page (http://www.climate.washington.edu/), the WA CoCoRaHS page, and the OWSC Facebook page.

Finally, all of the new October volunteers will be entered into a drawing to win an OWSC coffee mug - 3 winners will be randomly chosen at the end of the competition to sweeten the deal. So, please spread the CoCoRaHS word. New observers can sign up at www.cocorahs.org.

Early Fall Storms in the Pacific Northwest and their Connection to Western North Pacific Typhoons

A message from the State Climatologist

This month marks the 50th anniversary of the Columbus Day storm, by many measures the strongest extratropical storm to hit the lower 48 states in the past century. The Columbus Day storm formed out of the remnants of Typhoon Freda. Similarly, one of the strongest storms in recent memory for Europe was the "Great Storm" of October 1987, which grew out of the remnants of a tropical cyclone in the Atlantic. Forecasters have appreciated that the predictability of the weather for the North Pacific and North America can be compromised by the uncertainty associated with typhoons undergoing extratropical transition in the western Pacific (e.g., Torn and Hakim 2009). The greatest flooding and wind events in Alaska are often associated with this kind of disturbance. Could the same thing actually be the case for our neck of the woods? This question inspired a look back at other early fall storms, taking advantage of the marvelous resource represented by Wolf Read's website on past storms in the Pacific Northwest (http://www.climate.washington.edu/stormking/).

The Storm King website was used to identify the events for analysis. All of the October storms listed were examined; also examined was a notable event that impacted Vancouver Island in October 1984, and a more recent event that occurred in British Columbia and southeast Alaska in late September 2007. This yielded a set of 7 cases (itemized in Table 2), which may be enough to make some tentative statements. The evolution of these events, and in particular their potential connection to tropical cyclones in the western North Pacific, was as-

sessed through inspection of 6-hour composite maps of 500 hPa geopotential height, sea level pressure, and precipitable water from NCEP Reanalysis data sets (available from the following website: http://www.esrl.noaa.gov/psd/data/gridded/reanalysis/). The intent here was not to carry out a diagnostic analysis but rather to simply trace the history of the disturbances that have lashed the Pacific Northwest in early fall.

Date	Associated Typhoon; End Date	Regional Weather Impacts
21 October 1934	Typhoon of 6-12 Oct; 12 Oct	Winds in western WA
26-27 October 1950	Petre (Typhoon #13); 23 Oct	Heavy rainfall; Winds (patchy)
12 October 1962	Freda; 10 Oct	Granddaddy of them all
2 October 1967	Typhoon #26; 26 Sept	Winds in western OR
11-12 October 1984	Ogden; 9 Oct	Surprise wind storm
18 October 2007	Lingling; 14 Oct	Coastal winds
27 September 2011	Roke; 21 Sept	Winds/flooding in BC & SE AK

Table 2: Notable early season storms in the Pacific Northwest.

All seven storms that were checked had a connection to a typhoon in the western Pacific, with tracks shown in Figure 1. In two cases this linkage appears to be less than direct. An example here is October 1934, during which a west Pacific disturbance, after extratropical transition, underwent considerable change in morphology into a large quasi-stationary low in the Gulf of Alaska. A secondary low that developed to the southeast of that center became our storm. A similar sort of scenario seems to have occurred for the October 1967 case, and these two cases have hatched lines on Figure 1 to represent that. But for the other 5 events, the cyclones appear to have maintained their identities from their tropical phases in the western Pacific, through their transitions to extratropical lows, to making landfall in the Pacific Northwest. It should be emphasized that these disturbances were not strong during their entire trip across the Pacific. Instead, as discussed by Wolf Read and others, (e.g., Reed and Albright 1986; Mass and Dotson 2010), powerful storms in the Pacific Northwest typically undergo a stage of intensification shortly before landfall.

The point we wish to make here is that the tropical origins for our early fall storms may be more common than previously appreciated. This finding raises a couple of questions. The western North Pacific is a hotbed for tropical cyclones, and plenty of them recurve into the westerlies. So what is special about the few that survive the trek across the Pacific? In addition, the tropical cyclone season in the west Pacific usually lasts into November, as the mid-latitude storm track is really cranking up. Do our November storms also frequently have connections to west Pacific typhoons or are there factors, perhaps associated with the background flow, that work against it? As a bit of an aside, the storm of 2 November 1958 was also examined, since it was rather early in the season, and because of Wolf Read's analysis, which indi-

cated it had signatures of a warm-core tropical storm system. The interesting result here is that it was the only case examined that appeared to lack a linkage to a west Pacific typhoon. The bottom line is that we think our results are intriguing but emphasize they are also tentative. It does motivate keeping an eye on what is happening west of the dateline.

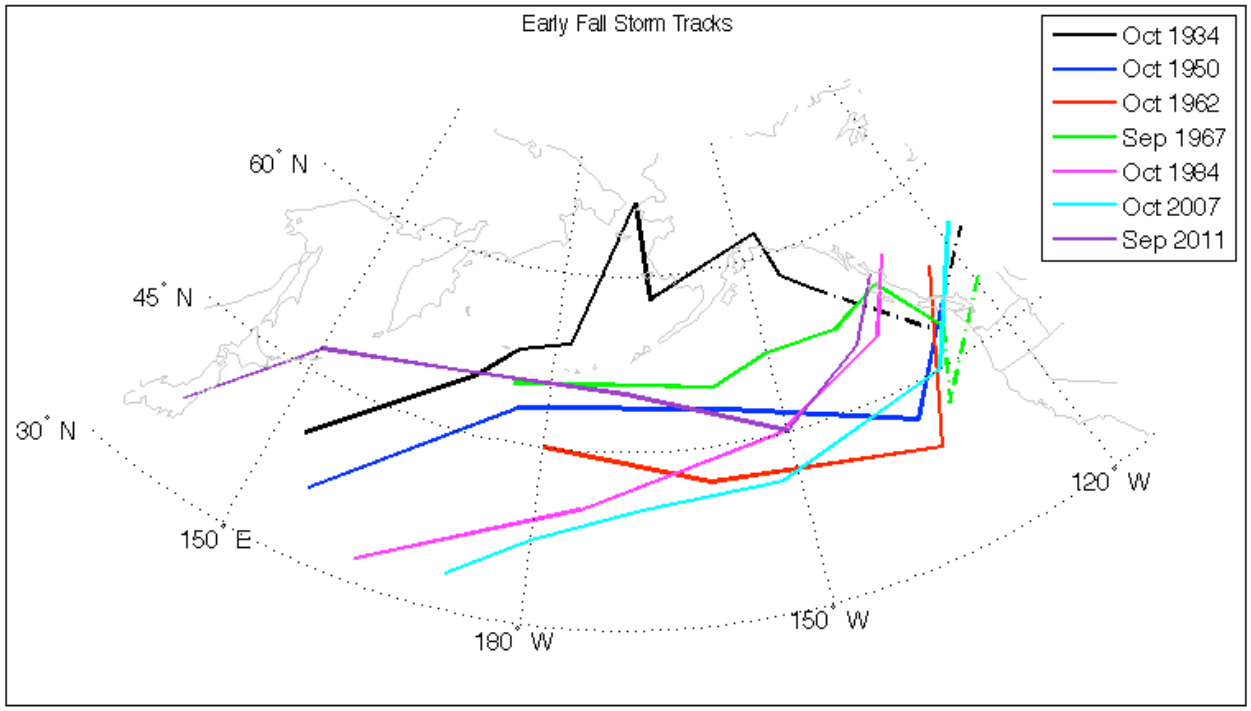
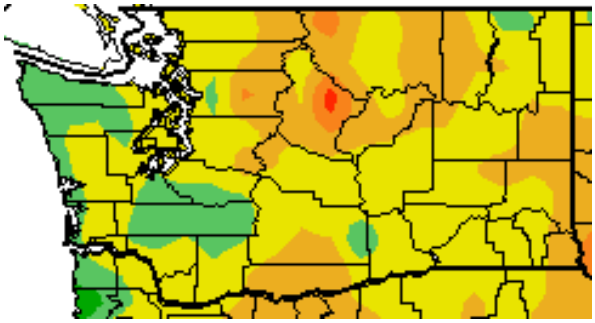


Figure 1: Tracks of strong early fall storms for the Pacific Northwest. Tracks begin at 1200 UTC on the day of extratropical transition; locations are at 24-hour intervals. Dashed lines for the 1934 and 1967 events connect the parent low center to the secondary low that impacted the region.

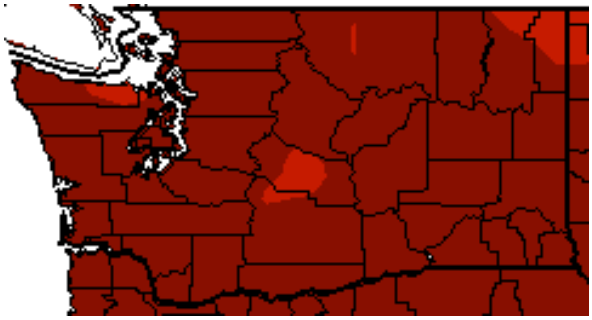
Climate Summary

Continuing the August trend, the average September temperatures were generally above normal throughout the state, as illustrated by the High Plains Regional Climate Center (HPRCC) temperature departure from normal map below. Spokane and Yakima were warm spots, both 3.2°F above normal for the month (Table 3). On the other hand, the coast, northern Olympic Peninsula, and an area of southwest WA was on the cooler side during the month. Quillayute, for example, was 0.4°F below normal for September (Table 3).

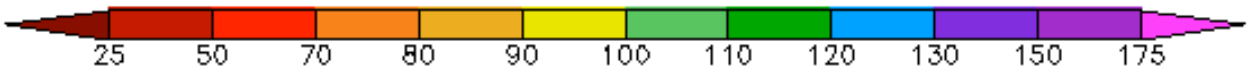
September was extremely dry across the state, with many locations not receiving any precipitation during the month (Table 3). The percent of normal precipitation map below doesn't show much, other than that all of WA received less than 25% of normal precipitation (except for a small area in central WA). The total precipitation (inches) map is included as well to differentiate between locations that received a little versus no September precipitation.

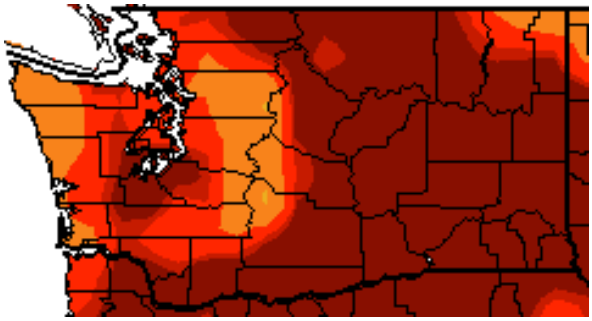


Temperature (°F)

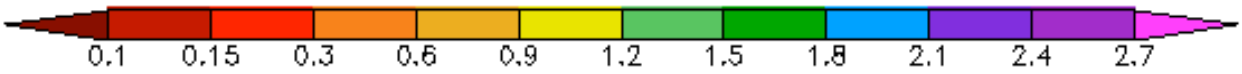


Precipitation (%)





Total Precipitation (inches)



September temperature (°F) departure from normal (top), September precipitation % of normal (middle), and September total precipitation (bottom).
(High Plains Regional Climate Center (http://www.hprcc.unl.edu); relative to the 1981-2010 normal).

	Mean Temperature (°F)			Precipitation (inches)		
	Average	Normal	Departure from Normal	Total	Normal	% of Normal
Western Washington						
Olympia	58.5	58.9	-0.4	0.00	1.71	0
Seattle WFO	62.8	61.6	1.2	0.24	1.52	16
Sea-Tac	62.7	61.3	1.4	0.03	1.50	2
Quillayute	56.1	56.6	-0.5	0.57	3.82	15
Bellingham AP	58.0	57.2	0.8	M	1.78	-
Vancouver	64.2	63.6	0.6	0.04	1.56	3
Eastern Washington						
Spokane AP	63.4	60.2	3.2	0.00	0.67	0
Wenatchee	66.5	64.4	2.1	0.00	0.34	0
Omak	64.7	62.6	2.1	0.01	0.58	2
Pullman AP	59.3	58.2	1.1	0.00	0.78	0
Ephrata	65.7	63.8	1.9	0.00	0.36	0
Pasco AP	64.2	63.4	0.8	0.00	0.40	0
Yakima AP	64.0	60.8	3.2	0.04	0.36	11

Table 3: September climate summaries for locations around Washington with a climate normal baseline of 1981-2010. Note that the Vancouver Pearson Airport and Seattle WFO 1981-2010 normals involved using surrounding stations in NCDC's new normal release, as records for these station began in 1998 and 1986, respectively.

October is Disaster Preparedness Month

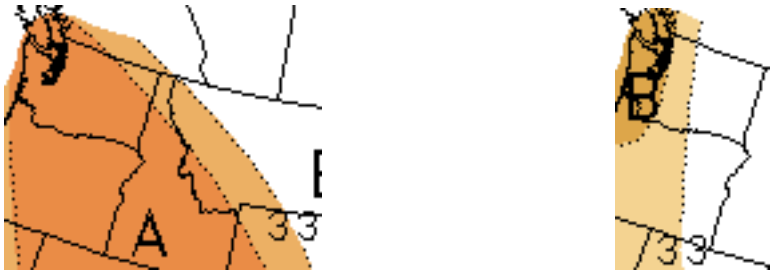
Governor Gregoire has proclaimed October as Disaster Preparedness Month. Now is the time to prepare for natural disasters and extreme weather, and this month is both the Great WA Shake Out (earthquake preparedness) and the Take Winter by Storm campaign (winter weather preparedness). You can find out more information here: http://www.emd.wa.gov/preparedness/prep_infocus.shtml.

Climate Outlook

The conditions in the equatorial Pacific Ocean continue to be ENSO-neutral, with the expectation that El Niño may develop by boreal autumn. The Climate Prediction Center (CPC) released an "El Niño Watch" in early June (updated in early September): http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ensodisc.html. In the last 4 weeks, warm sea-surface temperature (SST) anomalies have strengthened in the eastern Pacific Ocean, but weakened in the central Pacific Ocean, according to the CPC. While there is still a chance of neutral conditions lasting throughout the winter, a majority of the models continue to indicate the development of a weak El Niño. Whether it will be enough to impact our seasonal weather is an open question.

The CPC three-class temperature outlook for October suggests persistence: there are increased chances of above normal temperatures throughout the whole state. October precipitation is likely to be below normal for the western portion of the state. Eastern WA, on the other hand, has equal chances of below, equal to, or above normal precipitation for October. It is worth noting that the latest numerical weather prediction model guidance indicates a continuation of the dry conditions for at least the first two weeks of October.

The CPC 3-month seasonal outlook for October-November-December (OND) has equal chances of below, equal to, or above normal temperatures for the entire state. OND precipitation is expected to be below normal for the state.



October outlook for temperature (left) and precipitation (right) from the CPC.

October-November-December outlook for temperature (left) and precipitation (right) from the CPC.