AgWeatherNet and WA Climate

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Meteorologist and Associate in Research
AgWeatherNet

January 13, 2016
Direct Seed Association Cropping Systems Conference; Kennewick, WA
Contents

- AgWeatherNet Background
- WA Climate: Past, Present, and Future
- Summary/Questions
**Background**

- **AWN**: Began as Public Agriculture Weather System (**PAWS**)—1989
- **171** weather stations and growing

- Updated every **15 min**
- Captures **microclimates**
What’s available on AWN?

- **Website:** [www.weather.wsu.edu](http://www.weather.wsu.edu)
- **Mobile site** → access data - phone
- **Measured** Weather data (T, RH, etc.)
- **Derived Fields** (GDD, etc.)
- **Decision Support System**
- **Tools/Publications**
Measured Weather Data

- Surface (5 foot) Air Temperature (°F)
- Relative Humidity (%)
- Rainfall (Inches)
- Wind speed (mph)/Direction
- Solar Radiation (W/m²)
- Soil Temperature (8” depth)
- Air Pressure
- Leaf Wetness
Decision Support System - GDD

Growing Degree Days
WSU Prosser (WSU HQ), Prosser, Benton County
Apr 01 - Oct 19; Temperature Base: 50.0°F
Source: WSU AgWeatherNet

Accumulated GDD (>50.0°F)

Date

2015 (2123 GDD)
2014 (2067 GDD)
2013 (2892 GDD)
2012 (2618 GDD)
2011 (2279 GDD)
2010 (2309 GDD)
2009 (2647 GDD)
2008 (2411 GDD)
Average of 2008-2014 (2595 GDD)
Decision Aids

- Set **Alerts** (Low Temperature)
- “Push” Technology
- Desired information arrives via email or text

- Crop/Disease Models
- Powdery Mildew, Cold Hardiness, etc.
Irrigation Scheduler
Frost Risk

AgWeatherNet Frost Risk

The Frost Risk Page is updated daily in the morning. The AgWeatherNet team continuously monitors the weather and checks the weather forecasts and will issue e-mail alerts and post a message on the AWN Warnings page in the event of extreme or unusual weather conditions. For additional information regarding the expected weather conditions, please see the weekly Weather Outlooks in the AWN Outlooks link.

Please note that the date refers to the morning time period, and preparations for frost protection should be taken on the previous day. While the daily low temperature generally occurs during the morning, it is possible in rare instances that frost protection could be required before midnight for the morning in question.

<table>
<thead>
<tr>
<th>Washington</th>
<th>Tuesday November 10</th>
<th>Wednesday November 11</th>
<th>Thursday November 12</th>
<th>Friday November 13</th>
<th>Saturday November 14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yakima Valley</td>
<td>High</td>
<td>Moderate</td>
<td>High</td>
<td>Moderate</td>
<td>Low</td>
</tr>
<tr>
<td>Columbia Basin</td>
<td>High</td>
<td>Moderate</td>
<td>High</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Tri-Cities/Walla Walla</td>
<td>Moderate</td>
<td>Moderate</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Wenatchee area</td>
<td>Moderate</td>
<td>Moderate</td>
<td>High</td>
<td>Moderate</td>
<td>Low</td>
</tr>
<tr>
<td>Omak area</td>
<td>High</td>
<td>Moderate</td>
<td>High</td>
<td>Moderate</td>
<td>Low</td>
</tr>
<tr>
<td>Eastern Washington</td>
<td>Moderate</td>
<td>Moderate</td>
<td>High</td>
<td>Moderate</td>
<td>Low</td>
</tr>
<tr>
<td>Western Washington</td>
<td>Moderate</td>
<td>Low</td>
<td>Moderate</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>

The Frost Alert Levels are provided as a general guidance only. For more specific forecasts and predictions, please check the National Weather Service or private providers such as Clearwest.
Weather Prediction

AWN Forecasts

Select Forecast Init Date:
Select Type:
Select Time:

REAL-TIME WRFv3.5.1

Surface Temperature (F)
Wind (mph)

Washington State Surface Maps
2015-11-10

WRF
Forecast vs Observed
Graphs
Weather Summaries

AgWeatherNet September 2015 Weather Review for Washington

Finally: Cooler Than Normal Temperatures in September

Nit Loyd, Meteorologist, 509-786-9357
Gerrit Hoogenboom, Director, 509-786-9171

Overview

Although September often seems like a time of endings in terms of summer heat and the growing season, last month felt much more like a time of beginnings for healing and renewal. Following a long, parched summer, many locations received their first rainfall and first stretch of cool weather since the spring, as Washington inched closer to the start of the cold season. Mercifully, September 2015 was Prosser’s coolest since 2005, and also the state’s first cooler than normal month since last November.

While last month represented the most significant positive step relative to drought and heat relief in a long while, there is still much work to be done.

Below normal daytime temperatures were observed for much of early to mid September, with a brief hot spell around the 12th separating two cool and unsettled periods of occasional rain and wind. The latter part of the month was generally calmer and warmer, especially relative to normal, although a few cold nights occurred near the end of September.

In early September, Mt. Vernon recorded rainfall on 8 consecutive days (August 28th to September 4th) for the first time since early February. September 5th was a notable day for Pullman, as the largest daily rain total (0.66 inches) since February 4th was recorded. The rain-chilled high temperature of only 54 degrees was their coolest since May 13th. However, heat returned a week later, as Omak soared to 94 degrees on the 12th. Still, many areas saw a rapid temperature decline thereafter. From the 12th to the 14th, Omak’s high temperature decreased by 31 degrees (from 92 to 61 degrees) in only two days, before a frost occurred on the morning of the 15th. In other words, Omak shifted from 90s to frosty conditions in about 60 hours. Similarly, Vancouver’s highs fell from the 90s to the 50s in just three days from the 11th to the 14th.

Warmer and drier days generally resumed during the latter part of September. However, a few cool and calm nights were very cold at month’s end. On September 28th, Pullman fell to 26 degrees. The last time that station was colder than 26 degrees was March 4th. Overall, Prosser’s September mean high temperature was a modest 1.3 degrees below normal. Even so, this was their largest cool departure from normal for a monthly high since February 2014, which is yet another testament to the unusual lack of prolonged cool periods during the last year and a half.

### September 2015 Average Temperatures (°F)

<table>
<thead>
<tr>
<th>Location (Period of Record)</th>
<th>Maximum</th>
<th>Anomaly</th>
<th>Minimum</th>
<th>Anomaly</th>
<th>Mean</th>
<th>Anomaly</th>
<th>Soil Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prosser (WSU IAREC: 1989-2015)</td>
<td>77.0</td>
<td>-1.3</td>
<td>46.0</td>
<td>-1.9</td>
<td>60.9</td>
<td>-1.6</td>
<td>65.3</td>
</tr>
<tr>
<td>Moses (1989-2015)</td>
<td>76.7</td>
<td>-2.0</td>
<td>39.3</td>
<td>-2.7</td>
<td>57.6</td>
<td>-2.2</td>
<td>65.0</td>
</tr>
<tr>
<td>Mt. Vernon (WSU NWREC: 1994-2015)</td>
<td>66.5</td>
<td>-1.7</td>
<td>48.3</td>
<td>-0.6</td>
<td>57.2</td>
<td>-0.9</td>
<td>61.2</td>
</tr>
<tr>
<td>Wenatchee (WSU TFREC: 1994-2015)</td>
<td>76.3</td>
<td>-2.4</td>
<td>48.2</td>
<td>-0.9</td>
<td>61.9</td>
<td>-1.3</td>
<td>68.6</td>
</tr>
<tr>
<td>Tri-Cities (1985-2015)</td>
<td>79.7</td>
<td>1.4</td>
<td>50.2</td>
<td>1.4</td>
<td>64.8</td>
<td>1.3</td>
<td>73.7</td>
</tr>
<tr>
<td>Yuma Valley (1993-2015)</td>
<td>76.1</td>
<td>-1.3</td>
<td>50.2</td>
<td>-1.2</td>
<td>62.4</td>
<td>-1.6</td>
<td>70.4</td>
</tr>
<tr>
<td>Moses (1899-2015)</td>
<td>76.1</td>
<td>-2.2</td>
<td>46.4</td>
<td>-0.6</td>
<td>61.1</td>
<td>-1.4</td>
<td>70.6</td>
</tr>
<tr>
<td>Omak (Pogue Flat: 2006-2015)</td>
<td>75.2</td>
<td>N/A</td>
<td>48.5</td>
<td>N/A</td>
<td>61.5</td>
<td>N/A</td>
<td>67.6</td>
</tr>
<tr>
<td>Royal City East (2008-2015)</td>
<td>75.1</td>
<td>N/A</td>
<td>49.6</td>
<td>N/A</td>
<td>61.4</td>
<td>N/A</td>
<td>69.6</td>
</tr>
<tr>
<td>Pullman (2008-2015)</td>
<td>70.6</td>
<td>N/A</td>
<td>41.6</td>
<td>N/A</td>
<td>56.1</td>
<td>N/A</td>
<td>61.2</td>
</tr>
<tr>
<td>Long Beach (WSU Long Beach: 2005-2015)</td>
<td>66.9</td>
<td>N/A</td>
<td>47.2</td>
<td>N/A</td>
<td>56.8</td>
<td>N/A</td>
<td>61.4</td>
</tr>
<tr>
<td>Sequim (2008-2015)</td>
<td>67.1</td>
<td>N/A</td>
<td>45.2</td>
<td>N/A</td>
<td>56.2</td>
<td>N/A</td>
<td>59.4</td>
</tr>
<tr>
<td>Seattle (2011-2015)</td>
<td>68.6</td>
<td>N/A</td>
<td>51.1</td>
<td>N/A</td>
<td>59.2</td>
<td>N/A</td>
<td>65.4</td>
</tr>
<tr>
<td>Vancouver (WSU RE: 2008-2015)</td>
<td>72.3</td>
<td>N/A</td>
<td>48.4</td>
<td>N/A</td>
<td>60.1</td>
<td>N/A</td>
<td>63.6</td>
</tr>
</tbody>
</table>
Publications

- Applications Beyond Agriculture
- WA Monthly Weather Summaries
- Weekly Outlooks

- **Warnings**: when critical conditions are expected (frost, pest and disease issues, etc.)
What are the Uses of AWN?

- Weather Monitoring / Decision Support for Public
- Research/Academia
- Frost protection
- Irrigation Scheduling
- Monitoring and Predicting Crop Quality/Yield
- Spraying
- Disease/Pest Management
- GDD/Cold Hardiness Tools
Snow This Winter!
Warm Since Spring 2014

2014 Monthly Temperature Anomalies
Prosser

Month
January February March April May June July August September October November December
Temperature Anomaly (°F)
-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6
Tmax Tmin Tavg

2015 Monthly Temperature Anomalies
Prosser

Month
January February March April May June July August September October
Temperature Anomaly (°F)
-2 -1 0 1 2 3 4 5 6 7 8 9 10
Tmax Tmin Tavg
Recent Climate

- **Unprecedented Warmth** Since Spring 2014

- **June 2015**: Warmest Calendar Month (Relative to Normal) on Record

- Very Warm October

- **2015**: By far the **Warmest for WA** (1895) (0.9 deg above #2 - 1934)

- Improved weather recently! (Ending now)
WA State Temperatures

Washington, Average Temperature, January-December

1901-2000
Avg: 46.1°F

Avg Temperature
2015 Atmospheric Circulation Pattern

NCEP/NOAR Reanalysis
500mb Geopotential Height (m) Composite Anomaly 1981–2010 climo

Jan to Dec: 2015
Early January Snowpack

Washington SNOTEL Current Snow Water Equivalent (SWE) % of Normal

Jan 11, 2016

Current Snow Water Equivalent (SWE) Basin-wide Percent of 1981-2010 Median

- unavailable *
- <50%
- 50 - 59%
- 70 - 79%
- 90 - 109%
- 110 - 129%
- 130 - 149%
- >=150%

* Data unavailable at time of posting or re-averaged due to re-measurement at this date of year.

The snow water equivalent percent of normal represents the current snow water equivalent found at selected SNOTEL sites in or near the basin compared to the average value for those sites on this day. Data based on the first reading of the day (typically 09:00).

Prepared by
USDA/NRCS National Water and Climate Center
Portland, Oregon
http://www.wcc.nrcs.usda.gov

Provisional Data
Subject to Revision
This Winter (Early 2016)

- **Strong** El Niño (record?) and **robust positive** PDO (Pacific Decadal Oscillation)

- **Warmth** very likely, precipitation less certain, likely *slightly below normal*

- **Snowpack** likely *below normal*

- Strongest/Worst effects likely starting now
Dynamical Method-Forecast
NMME Air Temperature Forecast
NMME Precipitation Forecast
Statistical Method-Composite

NCEP/NCAR Reanalysis
500mb Geopotential Height (m) Composite Anomaly 1981–2010 cliqmo

ESRL Physical Sciences Division

Current “forecast” shows potential **Neutral** conditions, perhaps as early as Autumn 2016

*Statistically*, recent abnormal warmth **bodes well** for later this decade
Weak La Niña Composite

NCEP/NCAR Reanalysis
500mb Geopotential Height (m) Composite Anomaly 1981–2010 climo

Recent unprecedented warmth may continue for the first half of 2016

Based upon large scale climate indicators, a shift away from the recent abnormal warmth seems likely next winter

Later this decade, the deck won’t be stacked against us as much as in recent years
Is this the “new normal”?  

NO  

Natural variability has likely been the primary driver of the unprecedented warmth since spring 2014.
“Just One More Thing”

- [www.weather.wsu.edu](http://www.weather.wsu.edu)
- **Weather data** available
- **171** sites across WA and OR
- **Decision Support System**

- Warm 2016 Winter
- Improved Conditions Likely Starting in 2016/2017
Questions?

- Questions and Comments are Welcome
- Nic Loyd
- Email: nicholas.loyd@wsu.edu
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- Address:
  24106 N. Bunn Road, Prosser, WA 99350

Thank you!