Vintage 2011 – Current Climate Summary and Outlook **June 1, 2011**

As everyone has clearly seen, this spring has been one for the record books! Very cool and wet spring conditions in 2011 come after a cool spring in 2010 and reflect the broader atmospheric and ocean conditions over the North Pacific and western US. These conditions were broadly predicted by the Climate Prediction Center and others as early as January, but have been more extreme than most forecasts indicated.

Monthly temperature departures from normal for McMinnville, Milton-Freewater, Roseburg, and Medford from November 2010 through May 2011 show a relatively cool November last year, which was followed by a much warmer than average December and January statewide (Figure 1). However, since February temperatures have been much below normal across the state and the western US. Following the cool spring of 2010, the 2011 spring will likely end up being the coolest in over 25 years or more at most weather stations across the west.

Growing degree-day (GDD) accumulations for these four locations in Oregon from April 1st to May 31st are at historic lows. Current GDD values range from 85 for McMinnville, to 178 for Roseburg, to 199 for Medford, and to 210 for Milton-Freewater (as of May 31st). These values represent 20-45% less heat accumulation compared to the cool 2010 spring and 50-67% lower than the 2000-2010 average GDD.

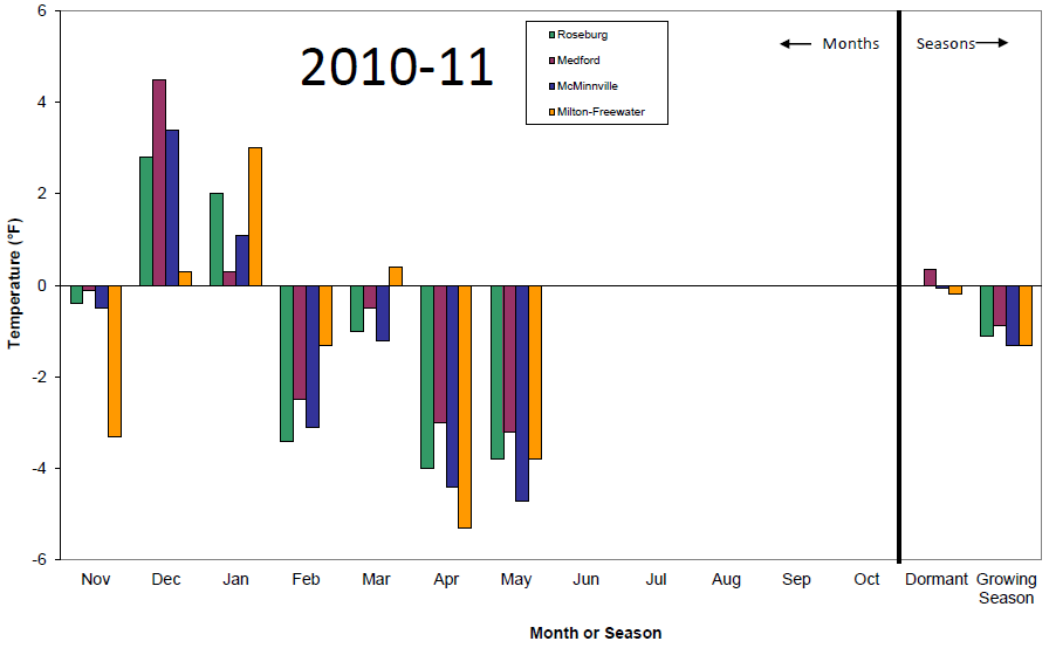
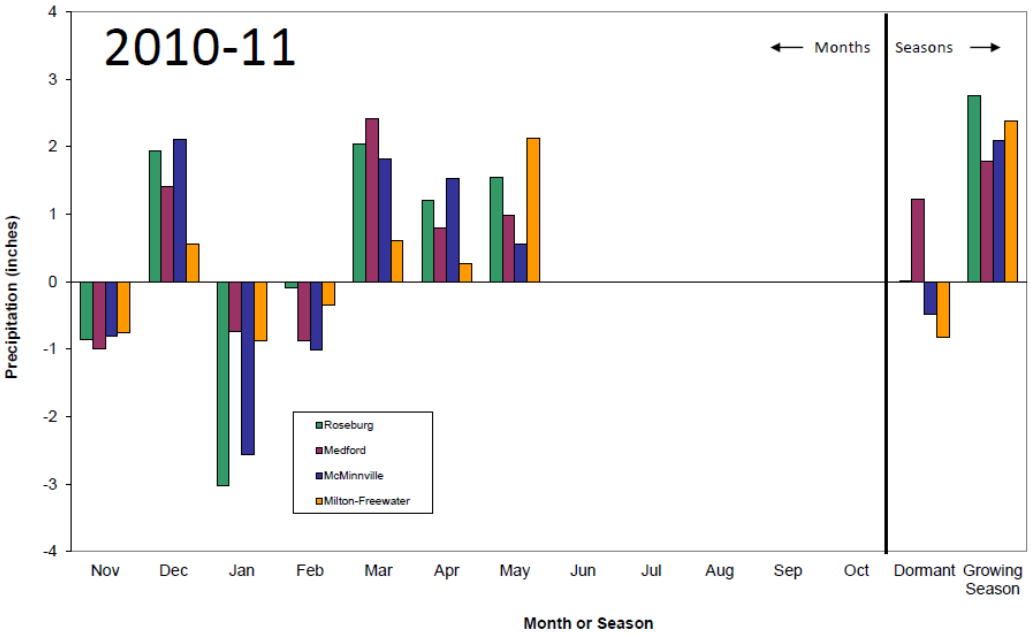


Figure 1: This chart represents a summation of daily temperature departures by month, the dormant period (Nov-Mar) and the growing season (Apr-Oct) from the four NWS stations (www.noaa.gov).

Monthly precipitation amounts for the same four locations in Oregon show moderate swings between a dry November, a wet December, and dry January and February (Figure 2). However, March through May have been much wetter throughout Oregon and are also reflected in the general pattern of 125-200% of normal mountain snowpack across the Pacific Northwest and much of the western US (Figure 3).



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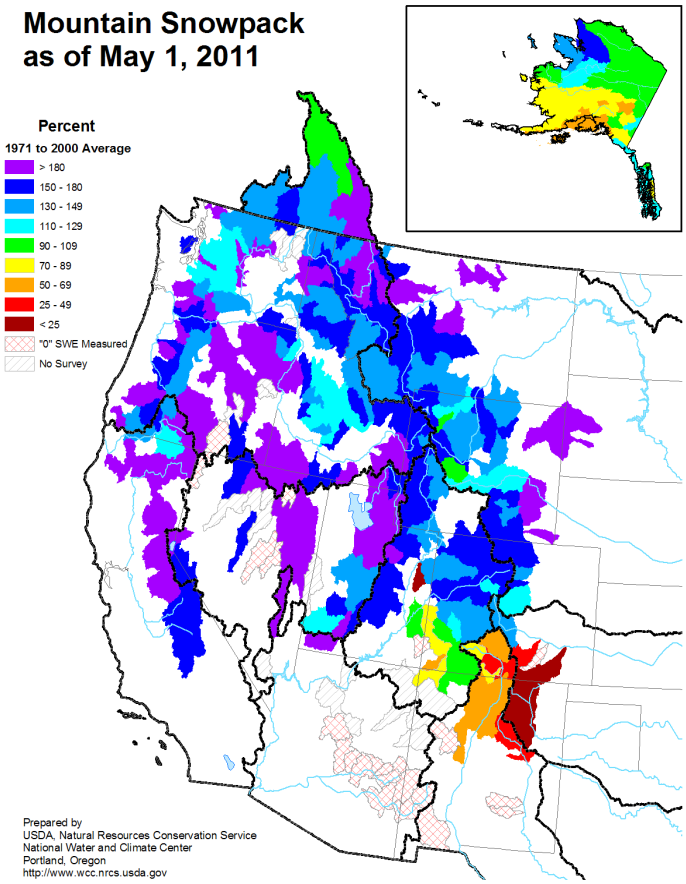

Figure 3: Map of watershed snowpack conditions over the western US as of May 1, 2011 (Source: NRCS).

What is Causing these Cool Springs:

The short term weather and longer term climate structure over the western US is tied to regional climate variability mechanisms. These include the Pacific Decadal Oscillation (PDO), the El Nino/La Nina Southern Oscillation (ENSO), and the Pacific/North American pattern of the atmosphere (PNA). Below is a very general overview of these mechanisms.

- The PDO is the predominant source of inter-decadal climate variability in the Pacific Northwest. The PDO is characterized by changes in sea surface temperature, sea level pressure, and wind patterns over the North Pacific Ocean and PNW. The PDO is described as being in one of two phases: a warm phase and a cool phase. During a warm phase of the PDO the conditions favor anomalously warm sea surface temperatures along the coast of North America and anomalously cool sea surface temperatures in the central North Pacific. Warm PDO phases are nearly always associated with warmer winters and summers and typically drier conditions in the PNW. During a cool phase of the PDO the opposite occurs with cool SST along the coast of North America and warmer SSTs in the central north Pacific. Cool PDO phases tend to result in cooler and wetter conditions over the entire year in the PNW.
- ENSO is characterized by a coupling of sea surface temperature variations in the tropical eastern Pacific Ocean and air surface pressure variations over tropical Pacific basin (the Southern Oscillation). Warming or cooling of the tropical eastern Pacific Ocean is known as El Niño and La Niña respectively. ENSO variations cast a wide net, influencing the weather and climate of the region and many distant locations across the globe. El Niño conditions typically are associated with warmer and drier conditions over the PNW, while La Niña conditions bring cooler and wetter conditions over the PNW.
- The Pacific/ North American atmospheric pattern (PNA) is one of the most prominent modes of low-frequency circulation variability in the Northern Hemisphere mid-latitudes. The PNA pattern is associated with strong fluctuations in the strength and location of the jet stream as it meanders across the Pacific from Asia to the western US. During positive PNA conditions the PNW typically experiences warmer and drier conditions, while during negative PNA conditions the PNW experiences below average temperatures and above normal precipitation as the storm track dips farther south into California.

These three mechanisms operate on different time scales, which can result in their conditions being ‘in phase’ or ‘out of phase’. When ‘out of phase’ the resulting weather and climate in the PNW is mixed, often with no dominant temperature or precipitation pattern. However, when they are ‘in phase’ the typical conditions tend to be enhanced or extreme.

Conditions have generally been ‘in phase’ since last March with a strong cool phase of the PDO, moderate to strong La Niña conditions, and a negative PNA pattern. This has led to very cold water along the western US coast (up to 4-8°F cooler than normal) coupled with warmer water out over the North Pacific. The warmer than normal water further out in the Pacific has induced a stronger than normal trough carrying storms further south over the western US during the spring (negative PNA). As the airflow pattern travels over the warmer water in the middle of the north Pacific, it also brings higher moisture levels over the cooler waters producing a more prolonged marine layer and higher humidity along the coast and inland. Also, the colder than normal waters off the west coast have moderated temperatures along the western US (making it cooler overall).

These ‘in phase’ conditions have produced the ‘perfect storm’ so to speak for the weather and climate conditions over much of the western US of the past two years. Fortunately these conditions tend to peak in spring and be much less prominent during the summer.

Climate Variability and Weather Outlook:

The current conditions and forecast for the weather/climate variability mechanisms in the Pacific shows that very cool SST off the west coast are likely to be with us through the summer and potentially over the next few years. A transition from La Niña conditions to ENSO-neutral conditions is underway across the equatorial Pacific, but atmospheric circulation anomalies associated with La Niña and the cool PDO remain significant (negative PNA). ENSO-neutral conditions are expected to continue through the Northern Hemisphere summer 2011.

Although the summer effects of these mechanisms are less prominent than during the winter and spring, historically, cool PDO with neutral-ENSO conditions bring slightly cooler to slightly warmer summers across the PNW (± 0.4°F), with slightly wetter coastal areas and drier inland (± 10% of average).

All weather/climate outlooks from the Climate Prediction Center (NOAA) and elsewhere are pointing to a continued cooler than normal period through June (first half cool, second half normal). Long lead temperature forecasts from July through October show either normal conditions or slightly warmer than normal conditions for the PNW. Precipitation amounts are forecasted to be average during June and below average from July through October. However, there are still some indicators that point to the PNW experiencing a greater likelihood than average of wide swings between warm/dry to cool/wet periods. Also note that the seasonal forecasts given by the Climate Prediction Center should be interpreted as the tilting of odds towards general categories of conditions, and should not be viewed as a guarantee that the specified conditions will be realized.

For More Information:

Climate Prediction Center: 6-10 and 8-14 day to monthly and seasonal temperature and precipitation forecasts (http://www.cpc.ncep.noaa.gov/products/predictions/)
Climate Prediction Center: ENSO discussion and forecast (http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ensodisc.html)
Climate Prediction Center: PNA overview and current conditions (http://www.cpc.ncep.noaa.gov/data/teledoc/pna.shtml)
Climate Impacts Group: PDO, ENSO, and seasonal forecasts for the PNW (http://cses.washington.edu/cig/fpt/seasonalfc.shtml)

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