

Vintage 2010: Rogue Valley Reference Vineyard Report

Summary:

Southern Oregon and much of the western US experienced a year of records and wide swings in weather. A near record hard freeze in early December 2009 was followed by the warmest January and February on record, the coolest spring since 1991, an average summer with few extremes, then one of the warmest Octobers on record. The result was a 2010 vintage that was significantly cooler than any other vintage in the last decade, but still significantly warmer than much of the last 80 years in the region. The cool season was influenced by much cooler than normal near coast waters in the North Pacific Ocean coupled with La Niña conditions in the tropical Pacific. The vintage saw 51% more precipitation than average during the growing season, coming largely during the cool spring and in late October, but with little bloom and ripening impacts. In terms of temperature extremes during 2010, moderate frost events occurred in both April and May while heat spikes over 100°F were less numerous than normal. Growing degree-day totals averaged 2300 for the reference vineyards, which was 12% lower than the eight year project average. Phenological timing was generally delayed by a few days to over two weeks on average with higher than normal variation across the observed sites and varieties. Harvest composition levels showed below average °Brix, higher acidity, and near average pH values while yields were down by 20% on average.

Project Overview:

With the 2009 vintage the reference vineyard project, as it was originally envisioned and implemented, came to an end. The goals of the original project were to establish a suite of reference vineyards in the Rogue and Applegate Valley AVAs with a purpose of providing an in depth look at spatial variations in important characteristics of temperature, phenology, composition, and yields in the region. As such during 2003-04, 20 reference vineyards were established in the region. Subsequent discussions with the Rogue Valley Winegrowers Association lead to a decision that aspects of the project should continue. Therefore, to lower costs but provide some continuity, the project was scaled back to include only temperature, phenology, and harvest composition from six sites (one in the Illinois Valley, two in the Applegate Valley, two in the Bear Creek Valley, and one in the Valley of the Rogue). However, for the 2010 vintage temperature data was still available at all 20 sites, while phenology and harvest numbers come from the six sites.

At each site, temperature devices record at 15 minute intervals during both the dormant season (Nov 1-Mar 31) and the growing season (Apr 1-Oct 31). The observations are then aggregated to hourly and daily average, maximum, and minimum values and summarized over the entire region. For phenological observations, the six sites submit dates for the four main events of bud break, bloom, véraison, and harvest for a range of varieties planted at each site. The phenological data are then examined for average dates and intervals between dates for the entire region. Finally, harvest composition values for °Brix, titratable acidity, and pH, along with yields are submitted by the six sites and are then summarized for the region.

Vintage 2010 Results:

Climate: Dormant Period

Overall the winter of 2009-10 (November 1 through March 31) was characterized by slightly warmer than normal conditions throughout the region (Table 1). November started out relatively normal and was followed by the coldest period of the winter during December 6-11 with temperatures up to 15

degrees below normal (Figure 1). The reference vineyard sites dropped to as low as 6.9 to 9.9°F on December 9th (Table 1). This is the second winter in a row where the coldest temperatures occurred in early to mid December. An extremely warm period followed resulting in the warmest January and February on record in many locations in Oregon and the western US. Temperatures declined into March, starting a cooler than normal spring (Figure 1). As has been typical over the last eight years, the average winter temperature varied by 1.0°F with the Illinois Valley the coolest and the Bear Creek Valley the warmest. The lowest absolute minimums were observed in the Valley of the Rogue, but the nature of the cold air outbreak during December 6-11 produced similar conditions over the entire region. The region experienced an average of 65 days below 32°F during the dormant period (20 and 30 less than the previous two winters, respectively) with the highest number coming in the Applegate Valley and the lowest in the Bear Creek Valley. While precipitation is not observed at the reference vineyards, values from the main climate stations in the region indicate that the winter was below normal for rainfall during November through March (approximately 20% down), which continued a trend toward regional drought conditions.

Table 1 – Sub-region reference vineyard dormant period (November 1-March 31, 2008-09) climate characteristics. Note that the minimum temperature value is the average absolute low temperature experienced in each region.

| <i>Region</i> | <i>Average Temperature (°F)</i> | <i>Minimum Temperature (°F)</i> | <i># of Days < 32°F</i> |
|---------------------|---------------------------------|---------------------------------|----------------------------|
| Applegate Valley | 40.8 | 8.4 | 72 |
| Bear Creek Valley | 41.6 | 9.9 | 61 |
| Illinois Valley | 40.6 | 7.3 | 64 |
| Valley of the Rogue | 41.2 | 6.9 | 64 |

Climate: Growing Season

After a warmer than normal dormant period, the growing season started out cooler than normal throughout Oregon and over the entire western US. April through June experienced some of the coolest spring conditions since the mid 1970s, punctuated by four, week or longer periods, that were 10 to 15 degrees below normal (Figure 1). As a result bud break occurred on average in the last 10 days of April and bloom was centered on July 1st (Figure 1). Temperatures returned to normal and slightly above normal in early July and continued through late August. This period saw fewer than normal and lower temperature heat spikes compared to previous years. Véraison occurred in the last few days of August through early September (see more in the phenology section that follows) and was followed by a fairly cool first three weeks in September (Figure 1). During the last week in September temperatures climbed producing ‘Indian Summer’ conditions through the third week in October, with the Medford airport station experiencing an October that was 2.2°F warmer than normal. Overall the growing season daily temperature departures observed at the Medford airport weather station were -0.1°F cooler than the 1971-2000 climate normals. Of the four main wine growing regions in Oregon (Willamette, Rogue, and Umpqua valleys and eastern Oregon), the Rogue Valley was the warmest for average temperatures for the 2010 vintage, with the other locations ranging from -1.0 to -1.8°F below normal.

While the 20% lower than normal dormant period rainfall continued the generally dry conditions from earlier in 2009, the growing season (Apr-Oct) rainfall (9.38 inches) was nearly double the rainfall that occurred during the 2009 vintage and 51% above the 1971-2000 climate normals as measured at the Medford airport weather station (Figure 1). The bulk of the rainfall during the growing season came in

April and late October, but May and June were relatively wet as well. Nine individual rain events greater than 0.4" were recorded in Medford with the majority coming in April, May and June. However, the average bloom and véraison periods were largely free of rainfall (Figure 1). Two record rainfall events occurred during the 2010 growing season, the Medford airport station recorded a 0.78" rainfall on August 17th (doubling the previous record) that was accompanied by some minor to moderate hail in the valley. The other event essentially signaled the end of the season when 1.11" was recorded in Medford and was followed by a cool down to more normal temperatures (Figure 1).

From a degree-day standpoint the spring heat accumulation started off very slow and did not catch up to the 1928-2008 long term average until the third week of July (Figure 2). The remainder of the summer tracked the long term average until October when the warmer than average conditions increased the accumulation to a value above average, but still lower than the last ten years. Degree-day accumulation for 2010 ended up at 2946 for the Medford airport weather station (2432 at the Medford Agri-Met station in Jacksonville). The 2946 GDD is 13% less than 2009, but 6% more than the period of record average for Medford (Figure 2). Statewide Medford ended up with just slightly higher heat accumulation than Milton-Freewater (2898) and more than McMinnville (1853) and Roseburg (2580). However, these GDD values were 9 to 16% below the 2003-2010 averages at each location.

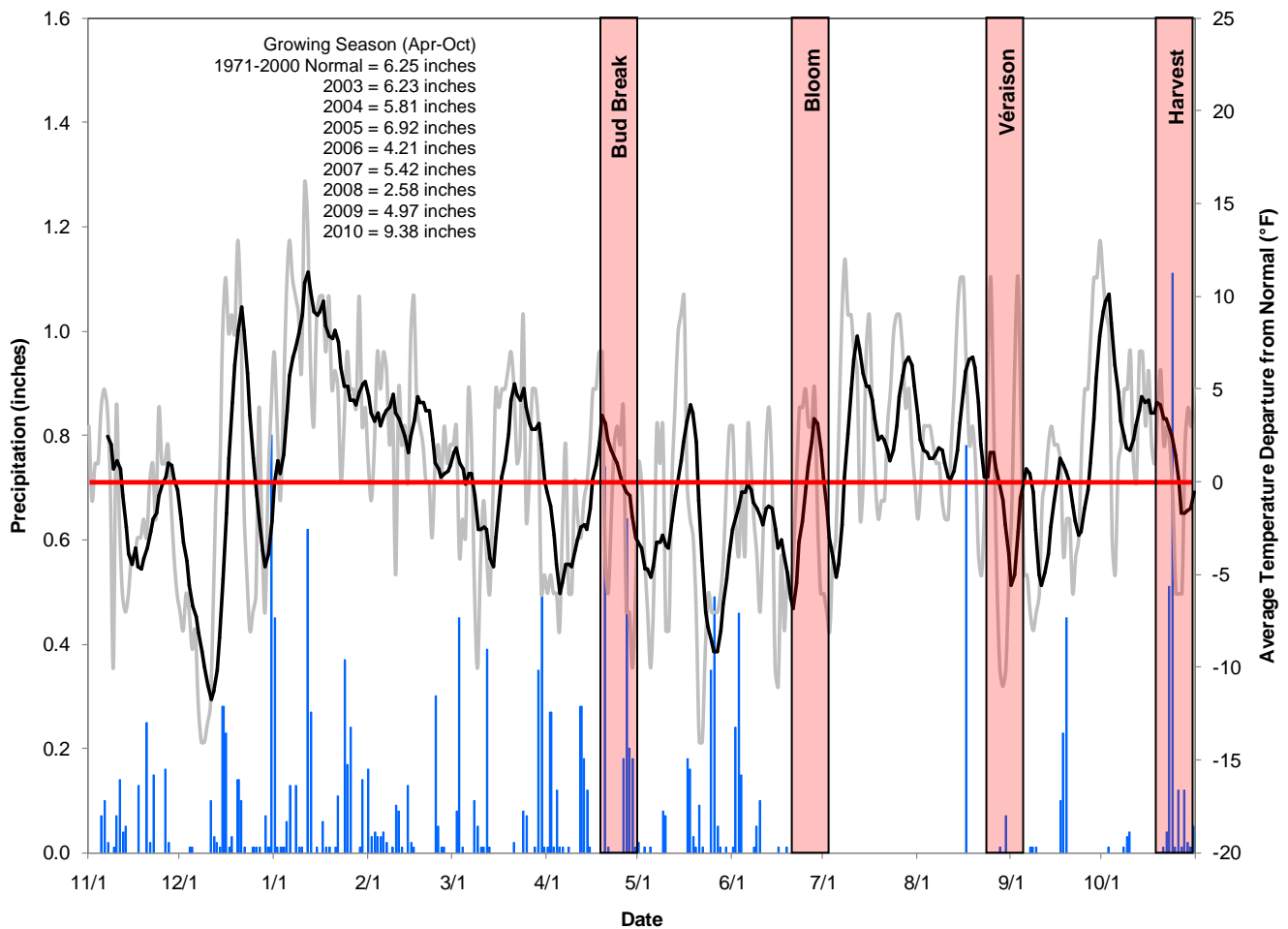


Figure 1 – Daily average temperature departures from normal and precipitation for November 1, 2009 to October 31, 2010 from the Medford Airport weather station. The gray line is the day to day temperature departures from normal, the black line is the weekly average departures, and the blue bars are daily precipitation. The long-term average is derived from the 1971-2000 climate normals. The vertical red bars represent the variation in region-wide average phenology (see text for more details).

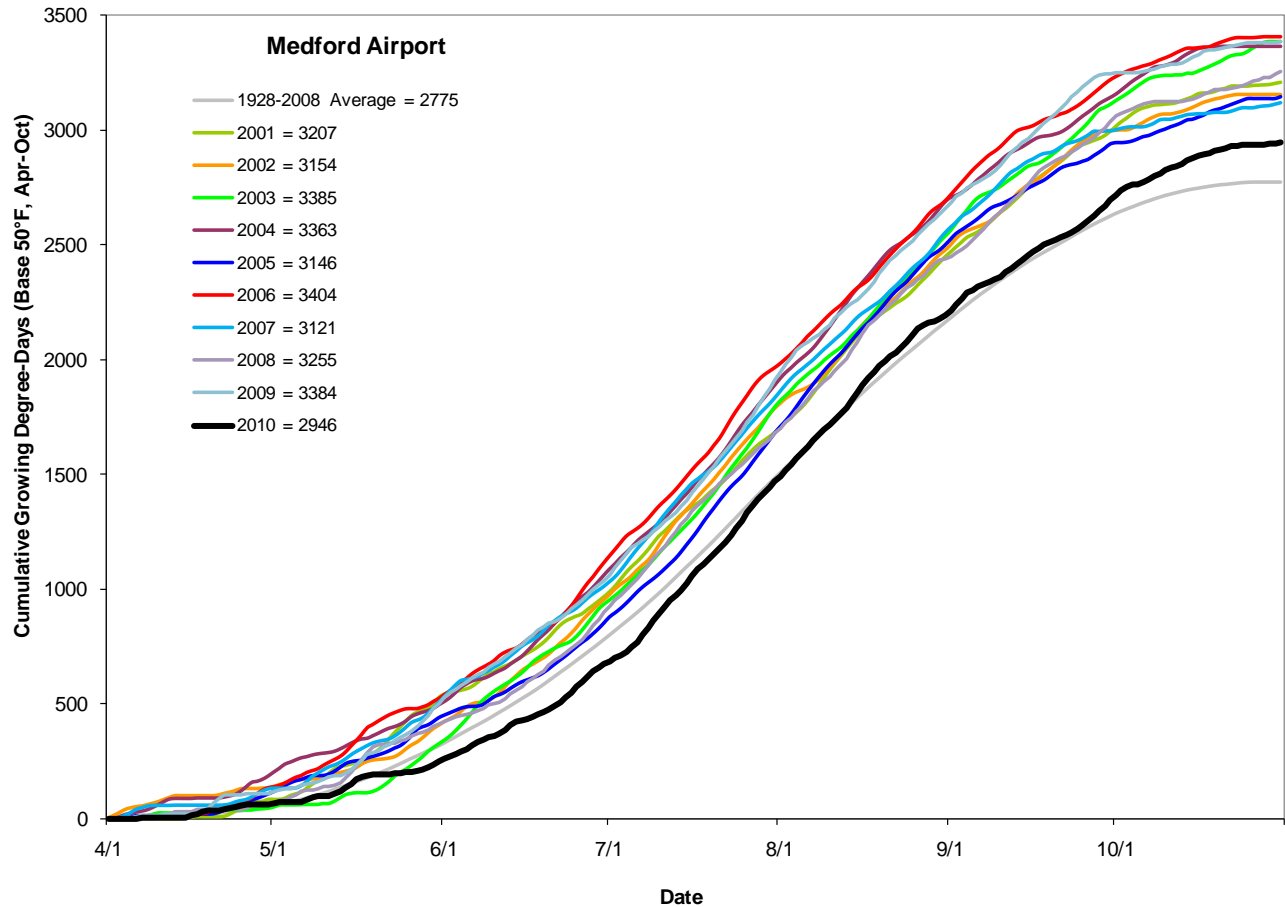


Figure 2 – Growing degree-day accumulation during April-October 2010 from the Medford Airport weather station (base 50°F). The long-term average is derived from the 1928-2008 period of record for the station.

Site temperature data from the 20 reference vineyards showed that the average degree-day accumulation for the 2010 vintage was 2300 with a standard deviation of 228 units (Table 2). Maximum accumulation was 2813 degree-days (Bear Creek Valley site) while the minimum was 1990 degree-days (Illinois Valley site). By sub-region, the Bear Creek Valley had the highest mean degree-days (2505) but the greatest standard deviation, which indicates the greater variation in site elevations. The Valley of the Rogue had 2361 degree-days on average with low variability across the four sites. The Applegate Valley had 2152 degree-days with relatively higher elevation-induced variation and the Illinois Valley had 2069 degree-days with low site variability.

Table 2 – Sub-region reference vineyard growing degree-days from April-October 2010 (base of 50°F with no upper cut-off).

| <i>Region</i> | <i>Mean</i> | <i>Standard Deviation</i> | <i>Maximum</i> | <i>Minimum</i> |
|---------------------|-------------|---------------------------|----------------|----------------|
| Average | 2300 | 228 | 2813 | 1990 |
| Applegate Valley | 2152 | 96 | 2277 | 2048 |
| Bear Creek Valley | 2505 | 222 | 2813 | 2291 |
| Illinois Valley | 2069 | 61 | 2138 | 1990 |
| Valley of the Rogue | 2361 | 77 | 2457 | 2272 |

Summarized across all reference vineyards, growing season temperature extremes indicate site differences in frost timing, frost occurrence, and extreme maximum temperatures (Table 3). The 2010

season saw maximum temperatures reach over 100°F during five main periods (two periods in mid-July, one in late-July, one in mid-August, and one in the third week in August) with the hottest day of the year on August 25th, when an overall maximum of 111.3°F was observed. In addition, there was 29 days on average with temperatures over 95°F across the region, with the Valley of the Rogue experiencing the most at 40 days and the Applegate Valley the least at 19 days.

Table 3 – Sub-region reference vineyard **average** temperature extremes during April-October, 2010.

| <i>Region</i> | <i>Maximum Temperature (°F)</i> | <i># of Days > 95°F</i> | <i>Minimum Temperature (°F)</i> | <i># of Days < 32°F</i> | <i>Last Spring Frost</i> | <i>First Fall Frost</i> |
|---------------------|---------------------------------|----------------------------|---------------------------------|----------------------------|--------------------------|-------------------------|
| Average | 108.1 | 29 | 23.1 | 13 | 5/9 | 10/18 |
| Applegate Valley | 105.9 | 19 | 21.5 | 14 | 5/12 | 10/18 |
| Bear Creek Valley | 111.1 | 30 | 23.3 | 8 | 5/6 | 10/27 |
| Illinois Valley | 105.1 | 29 | 22.1 | 17 | 5/14 | 10/15 |
| Valley of the Rogue | 110.2 | 40 | 21.6 | 15 | 5/6 | 10/12 |

Following the overall cool year characteristics, the absolute minimum temperatures during the growing season were moderately cool as well. The coldest night during the growing season occurred on April 9th with temperatures dipping into the low 20s throughout the region (Table 3). Averaged across the regions, the 2010 growing season experienced 13 nights at or below frost levels that varied from a low of 8 in the Bear Creek Valley to 17 in the Illinois Valley. However, the average last frost in the spring occurred May 9th across the region with frost conditions occurring as late as the third week in May at many sites (Table 4). The first fall frost occurred during the second to third weeks in October at many sites, with the Bear Creek Valley the latest on average (October 27th).

Comparisons with Previous Years

Compared to the past six dormant periods, this past winter was 1.2°F warmer on average than the 2009 winter and slightly warmer than the long term average (Table 4). This past winter had a significantly lower than normal number of days below 32°F, but experienced the lowest average absolute minimum temperature during the 2003-2010 time frame. In terms of heat accumulation, the 2010 growing season was significantly cooler than any vintage since 2003, approximately 12% lower than average (Table 4).

Table 4 – Reference vineyard climate comparisons across the dormant (November 1 – March 31, 2009-10) and growing seasons (April 1 – October 31, 2010) for each year of the project.

| <i>Season/Variable</i> | <i>Year</i> | | | | | | | | <i>Average</i> |
|--------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Dormant Season | 2002-03 | 2003-04 | 2004-05 | 2005-06 | 2006-07 | 2007-08 | 2008-09 | 2009-10 | |
| Average Temperature (°F) | NA | 42.8 | 41.1 | 40.3 | 40.8 | 39.2 | 39.9 | 41.1 | 40.7 |
| Minimum Temperature (°F) | NA | 18.4 | 18.1 | 16.0 | 9.8 | 15.0 | 12.4 | 8.4 | 14.0 |
| # of Days < 32°F | NA | 51 | 84 | 77 | 77 | 96 | 85 | 65 | 76 |
| Growing Season | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | <i>Average</i> |
| Growing Degree-Days | 2903 | 2737 | 2463 | 2699 | 2510 | 2535 | 2680 | 2300 | 2603 |
| Maximum Temperature (°F) | 113.1 | 111.9 | 108.9 | 114.6 | 110.2 | 111.5 | 115.6 | 111.3 | 112.1 |
| # of Days > 95°F | 47 | 42 | 37 | 40 | 25 | 36 | 36 | 29 | 37 |
| Minimum Temperature (°F) | 20.9 | 30.1 | 26.4 | 23.3 | 21.6 | 19.7 | 21.6 | 21.5 | 23.1 |
| # of Days < 32°F | 10 | 5 | 10 | 17 | 10 | 22 | 16 | 13 | 13 |
| Last Spring Frost | 5/19 | 4/2 | 4/20 | 5/13 | 5/28 | 5/12 | 5/13 | 5/22 | 5/8 |
| First Fall Frost | 9/17 | 9/21 | 9/24 | 9/22 | 9/24 | 9/23 | 9/7 | 10/5 | 9/21 |

The maximum and minimum temperatures are the absolute values recorded for the entire region for that year. Frost dates are the absolute latest and earliest observed over the entire region for that year.

Absolute maximum temperatures and the number of days over 95°F during 2010 were also lower than average. The absolute minimum temperatures observed during the growing season were slightly lower than the period average, while the number of days lower than 32°F was average. The absolute latest last spring frost date was two weeks later than normal, while the absolute first fall frost date was the latest during the last eight vintages (Table 4).

Phenology

As mentioned previously, with the 2010 vintage the phenology observations come from six sites and seven varieties (not all varieties observed at all sites) for a total of 22 observations. This is roughly ¼ of the number of phenology observations from the full project during the 2003 to the 2009 vintages. While this will create differences in the overall statistics, a test of these six sites versus the entire 20 sites during previous years finds no significant difference in the phenology means, indicating that these six sites generally represent the larger suite of sites.

Summarizing the phenological observations for the entire region and across all varieties shows an average bud break of April 20th with a 9-day standard deviation (Table 5). Bud break was observed as early as April 6th and as late as May 4th. Flowering occurred on June 27th on average with nearly 30 days between the earliest and latest sites across the region and over all varieties. *Véraison* and the start of the ripening phase occurred, on average, over a 14-day period during the last week of August and first week of September (averaging August 31st). The earliest *véraison* was observed on August 20th while the latest was observed on September 10th. Harvest dates ranged over 50 days across varieties and sites with an average date of October 26th and the majority of sites bringing fruit in from mid-October to mid-November (Table 5).

Average intervals between phenological events (an important measure of vine and berry development timing) shows that bud break to flowering was 66 days on average; that flowering to *véraison* was 66 days on average; and that *véraison* to harvest was 57 days on average (Table 6). These intervals had a 9 to 14 day standard deviation across sites and varieties, but a very wide range between the shortest and longest intervals due to the cool season. For 2010, the length of the bud break to harvest period averaged 188 days with wide range of days between the earliest and latest.

Table 5 –Phenological date and interval characteristics for the 2010 vintage averaged over sites and varieties.

| <i>Event/Interval</i> | <i>Median</i> | <i>Standard Deviation</i> | <i>Latest or Longest</i> | <i>Earliest or Shortest</i> |
|------------------------------|---------------|---------------------------|--------------------------|-----------------------------|
| Bud Break | April 20 | 9 days | May 4 | April 6 |
| Flowering | June 27 | 8 days | July 6 | June 10 |
| <i>Véraison</i> | August 31 | 7 days | September 10 | August 20 |
| Harvest | October 26 | 12 days | November 30 | October 9 |
| Bud Break to Flowering | 66 days | 9 days | 85 days | 51 days |
| Flowering to <i>Véraison</i> | 66 days | 10 days | 83 days | 45 days |
| <i>Véraison</i> to Harvest | 57 days | 14 days | 102 days | 39 days |
| Bud Break to Harvest | 188 days | 15 days | 236 days | 172 days |

Comparisons with Previous Years

For the 2010 vintage the main phenological events (six sites only) were near normal to significantly delayed when compared to the previous seven vintages (Table 6). Average bud break was near the

period average but showed a greater variation across sites than in previous years. Bloom was 12 days later than average, but with similar site and variety variation (8 days). Average véraison dates during 2010 were 11 days later than average, varying by +/- 7 days over sites and varieties. The 2010 median harvest date was 15 days later than average, with similar site and variety variation (+/- 12 days) but significant differences in the earliest and latest harvest dates.

The average time between bud break and bloom was 10 days longer in 2010 than the period average, reflecting the cool spring conditions (Table 6). Even with a later than average bloom, the bloom to véraison period averaged 66 days in 2010, showing overall consistency in average lengths and site/variety differences. The average length of time between véraison and harvest was 57 days in 2010, 10 days longer than the 2009 vintage and five days longer than average, but with slightly higher variability than past vintages. The average bud break to harvest interval of 188 days in 2010 was longer than average and comparable to that experienced in 2005. However, the vintage experienced the widest range of bud break to harvest intervals than any other year since 2003.

Table 6 – Reference vineyard average phenology comparisons for the 2003 to 2010 vintages. *Note that the 2010 vintage numbers come from fewer sites and varieties than the previous years.

| <i>Stage or Interval</i> | <i>2003</i> | <i>2004</i> | <i>2005</i> | <i>2006</i> | <i>2007</i> | <i>2008</i> | <i>2009</i> | <i>2010*</i> | <i>Average</i> |
|-------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|----------------|
| Bud Break | | | | | | | | | |
| Median | 4/18 | 4/2 | 4/15 | 4/25 | 4/19 | 4/30 | 4/23 | 4/20 | 4/19 |
| Standard Deviation | 10 days | 8 days | 10 days | 9 days | 10 days | 9 days | 10 days | 9 days | 9 days |
| Flowering | | | | | | | | | |
| Median | 6/11 | 6/4 | 6/19 | 6/12 | 6/10 | 6/22 | 6/15 | 6/27 | 6/15 |
| Standard Deviation | 10 days | 6 days | 7 days | 6 days | 7 days | 8 days | 8 days | 8 days | 8 days |
| Véraison | | | | | | | | | |
| Median | 8/20 | 8/11 | 8/22 | 8/16 | 8/16 | 8/24 | 8/20 | 8/31 | 8/20 |
| Standard Deviation | 7 days | 6 days | 9 days | 6 days | 6 days | 7 days | 8 days | 7 days | 7 days |
| Harvest | | | | | | | | | |
| Median | 10/7 | 10/1 | 10/19 | 10/9 | 10/9 | 10/14 | 10/7 | 10/26 | 10/11 |
| Standard Deviation | 12 days | 10 days | 10 days | 12 days | 12 days | 9 days | 13 days | 12 days | 11 days |
| Bud Break to Flowering | | | | | | | | | |
| Median | 52 days | 64 days | 65 days | 48 days | 52 days | 51 days | 52 days | 66 days | 56 days |
| Standard Deviation | 10 days | 7 days | 10 days | 9 days | 10 days | 7 days | 8 days | 9 days | 9 days |
| Flowering to Véraison | | | | | | | | | |
| Median | 69 days | 68 days | 64 days | 67 days | 68 days | 65 days | 64 days | 66 days | 66 days |
| Standard Deviation | 9 days | 9 days | 9 days | 6 days | 8 days | 9 days | 8 days | 10 days | 9 days |
| Véraison to Harvest | | | | | | | | | |
| Median | 48 days | 50 days | 59 days | 52 days | 54 days | 52 days | 47 days | 57 days | 52 days |
| Standard Deviation | 8 days | 10 days | 11 days | 11 days | 11 days | 9 days | 12 days | 14 days | 11 days |
| Bud Break to Harvest | | | | | | | | | |
| Median | 172 days | 186 days | 189 days | 168 days | 174 days | 166 days | 163 days | 188 days | 176 days |
| Standard Deviation | 15 days | 12 days | 14 days | 14 days | 14 days | 11 days | 16 days | 15 days | 14 days |

Composition

As mentioned previously, with the 2010 vintage there were no fruit samples taken during mid-September and the harvest data come from six sites and seven varieties (not all varieties observed at all sites) for a total of 22 observations. This is roughly ¼ of the number of harvest composition and yield observations from the full project during the 2003 to the 2009 vintages. While this will create differences in the overall statistics, a test of these six sites versus the entire 20 sites during previous

years finds no significant difference in the harvest composition and yield means, indicating that these six sites generally represent the larger suite of sites.

Grower-submitted harvest composition values for the 2010 vintage showed an average 23.2 °Brix with a range from 20.1 to 25.5 °Brix across sites and varieties (Table 7). Titratable acidity averaged 7.1 g/L with a minimum of 4.2 g/L a maximum of 9.5 g/L. Harvest pH numbers averaged 3.47 with range from 3.20 to 3.88. Harvest yields averaged 2.2 tons/acre across the sites and varieties, but ranged from a low just below 1.0 ton/acre to 5.5 tons/acre (Table 7).

Table 7 –Harvest composition characteristics for the 2010 vintage averaged over sites and varieties.

| <i>Region</i> | °Brix | TA (g/L) | pH | Yield (T/acre) |
|--------------------|-------|----------|------|----------------|
| Median | 23.2 | 7.1 | 3.47 | 2.2 |
| Standard Deviation | 1.4 | 1.2 | 0.22 | 1.3 |
| Maximum | 25.5 | 9.5 | 3.88 | 5.5 |
| Minimum | 20.1 | 4.2 | 3.20 | 0.8 |

Comparisons with Previous Vintages

The 2010 vintage harvest composition values from the six sites give a general comparison with the 2003 through 2009 vintages (Table 8). Average °Brix values of 23.2 were the lowest observed during this period. A reflection of the lower °Brix and cool season, average titratable acidity was the highest observed over the last eight years (7.1 g/L) while site and variety variation was high. In terms of pH, the 2010 vintage was slightly higher than average with higher than normal site and variety variation. Overall the reported yields during 2010 were 22% lower than the eight year average (Table 8) and showed significant variety and site variation (Table 7).

Table 8 – Reference vineyard average harvest composition comparisons for the 2003 to 2010 vintages. *Note that the 2010 vintage numbers come from fewer sites and varieties than the previous years.

| <i>Parameter</i> | <i>Harvest Numbers</i> | | | | | | | | |
|--------------------|------------------------|------|------|------|------|------|------|-------|---------|
| | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010* | Average |
| °Brix | 24.4 | 24.5 | 23.4 | 24.1 | 23.6 | 23.9 | 23.5 | 23.2 | 23.8 |
| TA (g/L) | 6.1 | 5.8 | 6.3 | 5.9 | 6.3 | 6.2 | 5.9 | 7.1 | 6.2 |
| pH | 3.42 | 3.49 | 3.39 | 3.50 | 3.37 | 3.43 | 3.55 | 3.47 | 3.45 |
| Yield ¹ | 2.9 | 2.6 | 2.8 | 3.1 | 3.2 | 3.0 | 2.9 | 2.2 | 2.8 |

¹ Tons per acre

Conclusions

The 2010 vintage will be remembered as one of the coolest vintages in recent memory. The year started off with the warmest January and February on record in Medford and over much the western US, and was followed by a cool and wet spring, average summer, and warm October. The 2946 GDD as measured at the Medford airport station is most comparable to the 1991, 1993, 1995, and 1999 growing seasons. However, from 1928 to 1990 only nine years were as warm as the 2010 vintage with the mean GDD near 2700 and six years even below 2400 GDD. The low GGD during 2010 vintage largely came from little heat accumulation during the spring. During 1928-2010 only five springs (April-May-June) had lower GDD than 2010 and only one occurred since 1990 (1933, 1953, 1964, 1971, and 1991). Furthermore, much of the success of the 2010 vintage hinged on a warm end of September and ‘Indian’ summer in October, which ended up the as the second warmest October since 1928 (only 1987 had higher GDD for the month of October).

The temperature observations from the 20 reference vineyards also reflect these general conditions. The dormant period experienced the lowest absolute temperatures recorded since the project began in 2003 with values dropping below 10°F at all sites during December 6-11. However, overall the winter was warmer than average over all sites. The spring was cool across the sites with frost pressure into May at many locations. Growing degree-day accumulation averaged 2300 over the 20 sites, which was the lowest observed during the 2003-2010 observation period. Heat extremes were also low during 2010 with fewer heat spikes than normally observed. Phenological observations from the six sites showed generally delayed growth, longer than average bud break to bloom and véraison to harvest periods, and a very late overall harvest compared to average. Basic composition values reflect the cooler vintage with lower than average °Brix and higher acid levels. Yields were also down roughly 20% from prior years.

The influences of this year and overall cool vintage can be seen in how the regional climate variability mechanisms behaved. All signs in January and February pointed to sustained El Niño conditions, which would have likely continued the relatively dry conditions in the region and result in a warmer than normal spring. However, a dramatic shift in ocean temperatures in late February and early March caused the atmosphere's circulation to whiplash from unseasonably warm to unseasonably cool, producing a cool air trough over the western US much longer into the summer than anyone anticipated. This happened because of the 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 and the developing La Niña in the tropical Pacific. First, the cool waters off the west coast moderate temperatures along the western US (making it cooler overall). Second, the warmer than normal water further out in the Pacific brings higher moisture levels over the cooler waters producing a more prolonged marine layer and higher humidity along the coast and inland. Third, the warmer than normal water further out in the Pacific induces a stronger than normal trough over the western US (during the spring/fall) or a weaker high pressure ridge during the summer.

What does the winter of 2010-11 and the spring of 2011 hold for our region? The current scenario has us in a moderate La Niña through the rest of the winter, which tends to produce wetter and colder winters from extreme Northern California up into Canada and Alaska. For central to southern California the situation is such that we would expect a slightly cooler and drier winter, but the precipitation signal in California is not as strong as it is in the PNW. For next spring it will be important how long the current La Niña lasts, how strong it is, and the timing of a possible transition to neutral or El Niño conditions. At this point all of the current conditions and projection point to a greater chance of a cool, wet spring with similar frost pressure as 2010. However, more confidence in the long range projections will come as we head into January and updates will be provided then.

Future Work

- The observation network will continue with the reduce number of sites (six) and focus on site temperatures, phenology, and harvest composition and yields for the foreseeable future.
- An overview presentation will be given at the annual meeting of the Rogue Valley Winegrowers Association in January 2011 (see monthly newsletter and web site announcements for further details).
- The results will also be used to provide a Southern Oregon component to the Oregon Wine Industry Symposium's "Vintage Overview" and "Southern Oregon Research" session during February 21-23, 2011 in Eugene.

- A synthesis report with further in-depth analyses of the eight years of the study will be compiled and made available as soon as possible.

Acknowledgements

This research was made possible by funding from the Rogue Valley Winegrowers Association. In addition, acknowledgement goes to all of the participating vineyards, whose collaborative support provides the framework for the research.

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