

# Vintage 2021

## North Willamette Valley

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### **Summary:**

Winter 2020-21 was mild and relatively dry and was followed by one of the driest growing seasons on record, continuing the ongoing drought concerns for Oregon and much of the western US. The spring was relatively cool with mild frosts in early April for some sites and a relatively cold period centered on May 20th with temperatures dipping into the mid to upper 30s which was followed by wide swings between early season heat then cool, wet conditions at the end flowering and start of fruit set. Heat stress came early in 2021, with late May and early June and late June, then another heat event in the second week of August. Over three days in late June all-time temperature records were broken across the region. Growing degree-day totals for 2021 at the reference vineyards (2503) was the highest over the last four vintages, while the McMinnville station saw its 3rd highest since 2000. Across sites and varieties in the region the phenological timing averaged April 14th for bud break, June 4th for bloom, August 10th for véraison, and September 14th for harvest. Growers reported that the combination of cold events in spring, rain during flowering and fruit set, heat events, and a very dry growing season lowered yields in 2021. Growers also reported generally low disease pressure, relatively low pest pressure, little to no bird pressure until later in the picking window, and a harvest that presented very good to exceptional fruit quality.

### **Background:**

This vintage summary is derived from weather stations located at ten locations across the north Willamette Valley. The locations include one in the Chehalem Mountains AVA, two in the Dundee Hills AVA, four in the Eola-Amity Hills AVA, one in the Yamhill-Carlton AVA, and two in the Willamette Valley AVA. The locations average 549 ft. in elevation, ranging from 205 ft. to 636 ft. Note that there are two fewer locations in 2021. Phenological observations come from the same ten locations plus five others in the North Willamette Valley. Additional comparisons are made with the long-term McMinnville weather station located at the McMinnville Municipal Airport (157 ft.), and other stations in other growing regions in Oregon.

### **Climate:**

#### ***Dormant Season***

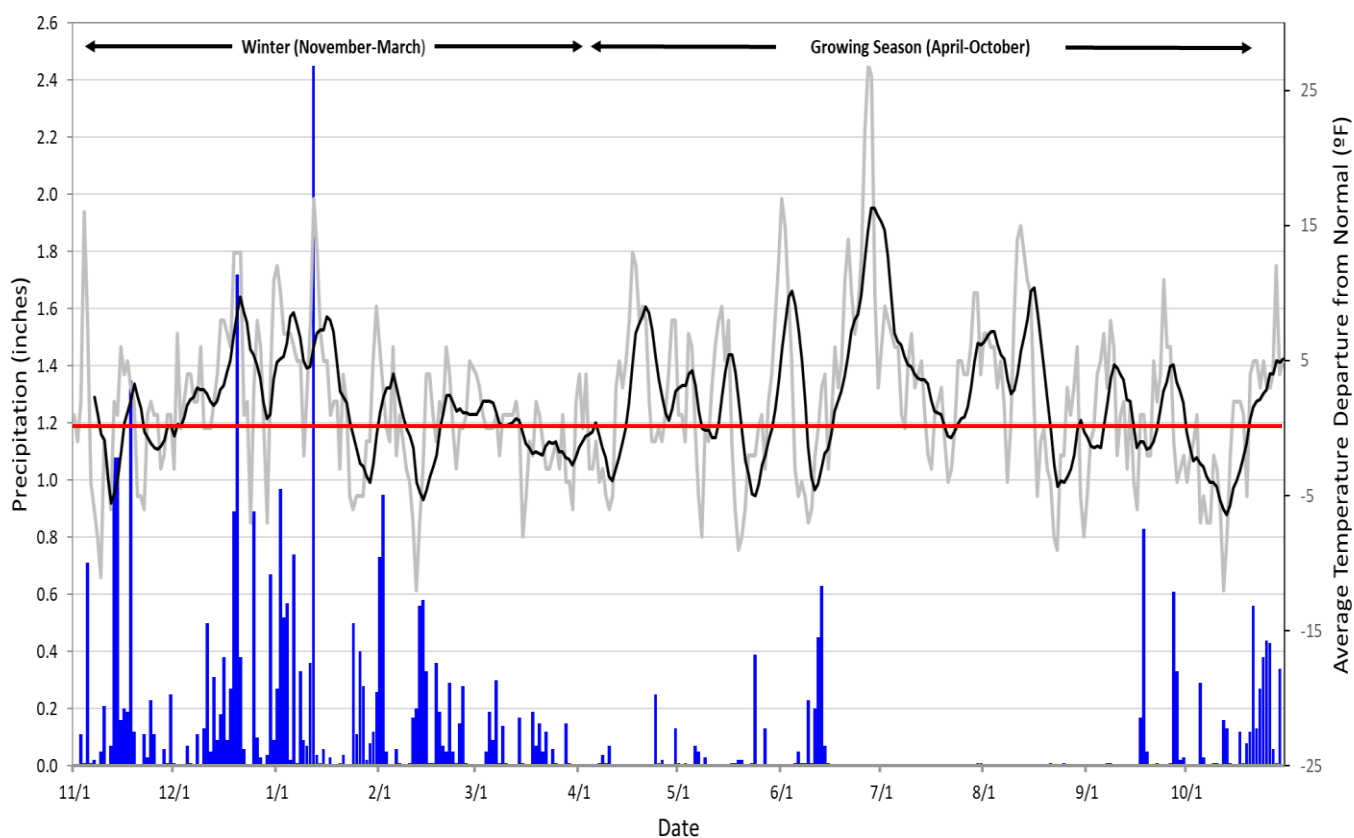
The PNW experienced a relatively warm winter during 2020-2021, with temperatures in the region 1.7°F above the 1901-2000 period<sup>1</sup>. In Oregon, the winter averaged 1.5°F warmer than normal, with minimum temperatures warmer than maximum temperatures compared to averages. Spatially the winter ranged from 0.7°F above along the coastal climate division and southwestern valleys to 2.4°F above in the north

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<sup>1</sup> Some comparisons are made with a 100-year average from 1901-2000 while others are made with climate normals, which are 30-year periods used by the global weather and climate services community for summarizing numerous weather variables. All references to 'normal' and 'average' for the Medford weather station in this report are with the 1981-2010 period, which will be replaced by the 1991-2020 period sometime during 2021.

central climate division. The McMinnville weather station had a November 2020 through March of 2021 that was 1.1°F above the 1991-2020 normals. The first three months of the winter were very mild with November slightly below average, but December-January 3.5°F above average. The remainder of the winter was cool with temperatures in February and March -0.2°F and -1.0°F below average, respectively. The second week of November, the last week of December, the third week of January, and mid-February saw the coldest temperatures of the winter with an absolute minimum of 24.0°F observed on November 9th at the McMinnville airport station. The dormant period saw three record temperature extremes with a warmest minimum temperature of 58°F on November 4th, a record cold minimum temperature of 24°F on November 9th, and a record maximum temperature on January 13th of 64°F.

The ten reference vineyards in the North Willamette Valley averaged 43.1°F during the winter of 2020-2021 (Table 1), which was the same as the previous winter (Table 2). Average minimum temperatures during the winter ranged from 36.4 to 37.5°F over the sites with an absolute minimum of 22.5°F observed on February 13th. On average, the sites observed a total of 24 days below freezing during the winter, which was similar to the previous winter.



**Figure 1** – Precipitation (blue bars) and temperature departure from normal for the McMinnville weather station from November 1, 2020 through October 31, 2021. The gray line represents the daily temperature departures from average, above and below the red line) and the black line represents the weekly moving average.

Precipitation during the winter of 2020-2021 was below normal over the majority of the PNW, with the driest areas being southern and eastern Oregon, eastern Washington, and southern Idaho (50-80% of normal). Only portions of western Washington and Oregon and the northern Cascades experienced normal winter precipitation (100-130% of normal). The McMinnville weather station experienced November through March precipitation of 25.23”, which was 2.22” below the 1981-2010 climate

normals (8% below) with December and January seeing slightly above normal precipitation (Figure 1). It should also be noted that this was substantially more (>9 inches) than what was observed the previous winter. The greatest one-day precipitation amount at the McMinnville weather station occurred on January 12th with 2.46". There were no precipitation records for the winter at the McMinnville weather station.

Over the winter the ten reference vineyards averaged 24.94" of precipitation with the wettest period occurring during mid-December through mid-January, which is the same pattern as can be seen in Figure 1 for the McMinnville weather station. Precipitation amounts ranged from 11.16" to 34.44" (Table 1) and the highest daily total experienced was 2.37" on January 12th. The number of days experiencing light rainfall (<0.25") averaged 75 across the sites (50% of the days), while heavier rainfall days (>0.25") averaged 28 across the sites (19% of the days). Dry days during the 2020-2021 winter averaged 49 days or roughly 33% of the winter.

**Table 1** – Weather and climate characteristics from ten vineyard locations in North Willamette Valley for the dormant season (November 1, 2020-March 31, 2021) and growing season (April 1-October 31, 2021). Growing degree-days are calculated with a base of 50°F with no upper cut-off. Note that missing data during the dormant season from the stations was statistically replaced by data from the McMinnville station.

<b>Dormant Season (Nov 1 – Mar 31)</b>	<b>Average</b>	<b>Standard Deviation</b>	<b>Maximum</b>	<b>Minimum</b>	<b>Range</b>
Average Temperature (°F)	43.1	0.3	43.5	42.7	0.8
Average Maximum Temperature (°F)	49.7	0.5	50.4	48.9	1.5
Average Minimum Temperature (°F)	36.8	0.3	37.5	36.4	1.1
Absolute Minimum Temperature (°F)	23.8	0.5	24.0	22.5	1.5
# of Days < 32°F	24	4	29	18	11
Total Precipitation (inches)	24.94	7.13	34.44	11.16	23.28
Highest Daily Total (inches)	2.37	0.78	3.28	1.05	2.23
Number of Days Without Precipitation (days)	49	11	73	34	39
Number of Days with Precipitation < 0.25" (days)	75	15	97	51	46
Number of Days with Precipitation > 0.25" (days)	28	10	41	10	31
<b>Growing Season (Apr 1 – Oct 31)</b>	<b>Average-Median</b>	<b>Standard Deviation</b>	<b>Maximum</b>	<b>Minimum</b>	<b>Range</b>
Growing Degree-Days	2503	173	2713	2192	521
Growing Season Average Temperature (°F)	61.4	0.9	62.4	59.8	2.6
Average Maximum Temperature (°F)	73.5	0.6	74.2	72.6	1.6
Absolute Maximum Temperature (°F)	110.5	1.1	111.8	108.1	3.7
# of Days > 95°F	8	2	11	5	6
Average Minimum Temperature (°F)	50.8	1.7	52.7	47.4	5.3
Absolute Minimum Temperature (°F)	31.2	2.3	34.3	27.6	6.7
# of Days < 32°F	1	1.6	5	0	5
Median Last Spring Frost (date or days)	3/30	24 days	4/11	2/14	56 days
Median First Fall Frost (date or days)	11/21	11 days	11/21	10/27	25 days
Median Frost-Free Period (days)	224	28 days	280	211	69
Total Precipitation (inches)	10.08	3.32	18.44	6.75	11.69
Highest Daily Total (inches)	1.29	0.73	3.23	0.63	2.60
Number of Days Without Precipitation (days)	165	5	177	158	19
Number of Days with Precipitation < 0.25" (days)	35	6	44	25	19
Number of Days with Precipitation > 0.25" (days)	14	3	20	9	11

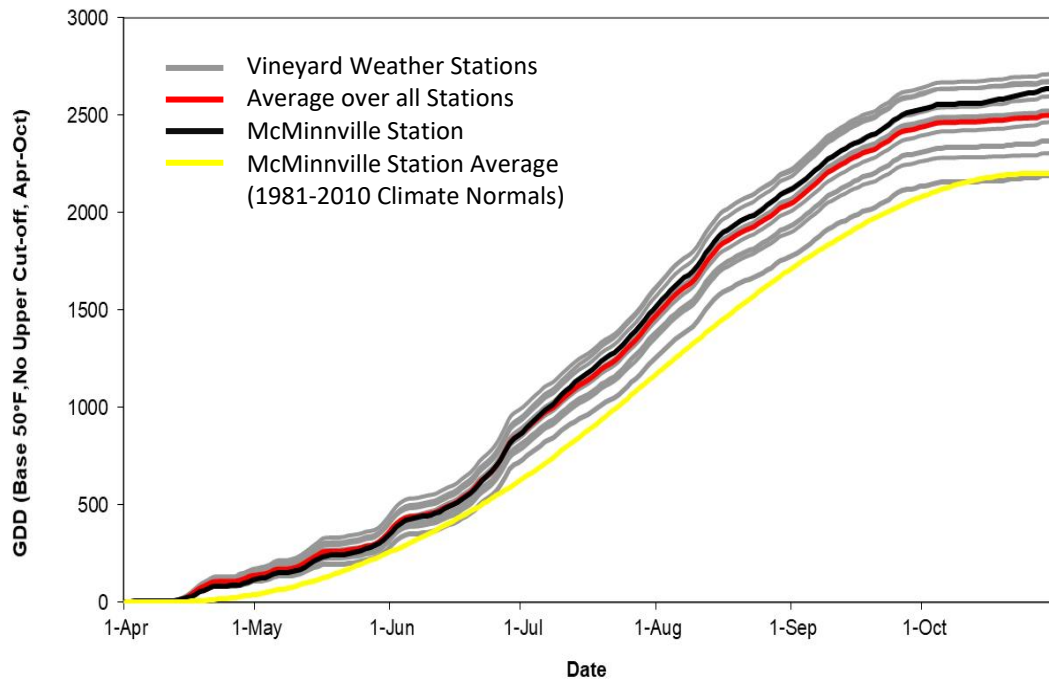
## ***Growing Season***

The 2021 growing season from April through October across the PNW was very warm, ending up 3.0°F above the long-term average from 1901-2000 and the 2nd warmest on record. Oregon was slightly higher than the PNW average at 3.3°F above average with the regions ranging from the Willamette Valley +2.7°F, the Columbia Gorge and Columbia Valley +3.3°F, and Southern Oregon +3.4°F. For Oregon as a whole, maximum temperatures were the warmest on record (3.9°F above average) while minimum temperatures were the 3rd warmest on record (2.6°F above average). The McMinnville weather station had a growing season that was 2.1°F above average with every month except October experiencing warmer than average departures (Figure 1). The growing season was extremely warm during June, July, and August but gave way to a slightly warmer than average September (+1.0°F) then a relatively cool October (-0.5°F). The warmest days at the McMinnville station during the growing season occurred during the extreme heat wave of June 26-28 where records were set over three days of 104°F, 111°F, and 114°F. In addition, temperatures reached 102°F and 103°F on August 11th and 12th, respectively. The station experienced 35 days above 90°F and 13 days above 95°F, both significantly higher numbers compared to the last five years.

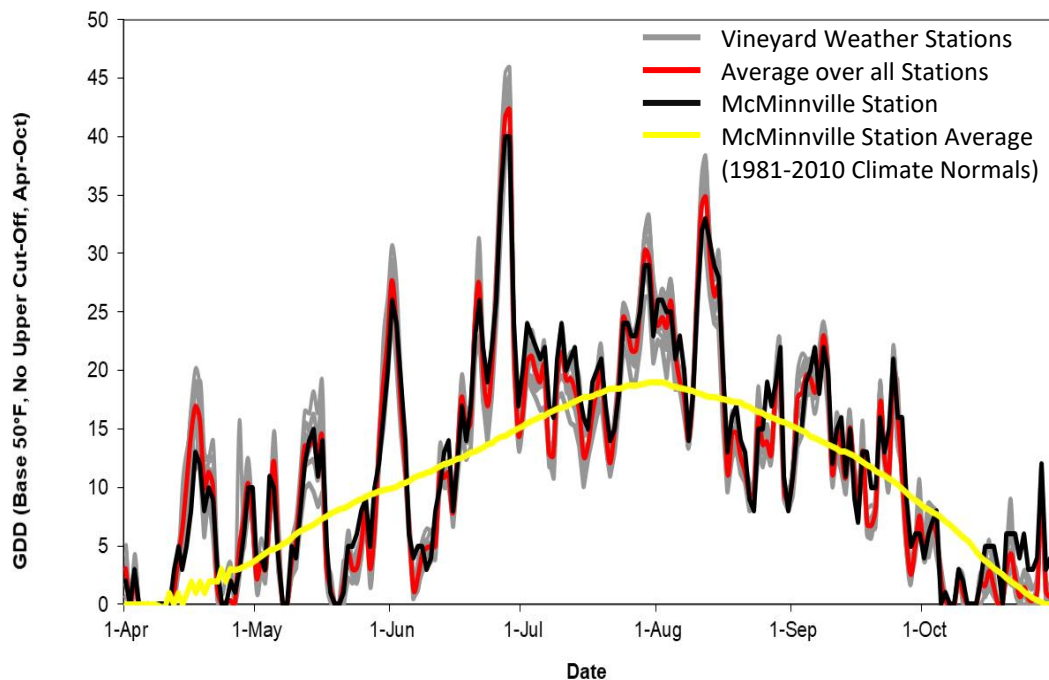
Heat accumulation in the PNW started off near average to slightly above average in eastern and northern Oregon and eastern Washington, while moderately above average for southern Oregon. For most of the vintage, growing degree-days (GDD) tracked close to 2015, one of the warmest vintages to date, until falling off in mid-September through the end of October. In the end, the 2021 vintage GDD amounts over most of California, Oregon, and Washington ended up 17-28% above the 1981-2010 normals, 7-12% above the last fifteen vintages, and up to 10% greater than the 2020 vintage. Isolated areas in eastern Washington, eastern Oregon, and Idaho were closer to normal. For the McMinnville weather station 2021 GDD ended up at 2642, which was 9% above 2020 and 20% up from the 1981-2010 climate normal period. The vintage had similar GDD to that seen in the 2003, 2016, and 2017 vintages (+/- 3%) but below the 2014 and 2015 vintages, the warmest to date for McMinnville.

The ten reference vineyards averaged 2503 GDD during the 2021 growing season (Table 1), up 204 GDD from 2020 and the highest over the last four vintages (Table 2). The sites ranged from a low of 2192 GDD to a high of 2713 GDD for the vintage. Figure 2 shows that the average GDD accumulation at the ten sites (red line) was 139 GDD lower than the McMinnville airport location (black line), which is similar to the differences seen the previous three vintages. Each of the site curves show the three main heat events, in late May and early June, late June, and early August, then essentially little to no further accumulation after October 1st (Figure 2). Figure 3 shows the same degree-day data but, instead of cumulative as in Figure 2, it gives the daily accumulation values. Evident in the figure are the wide swings in heat accumulation during May through June, with a heat event in late May and early June followed by a cool period and low GDD amounts then the extreme heat event in late June followed by average accumulations through early August (Figure 3). After the early August heat event, accumulation stayed near average until late September through mid-October when accumulation dropped off significantly.

For the reference vineyards during 2021, the growing season average temperature was 61.4°F during 2021 (Table 1), which was warmer the last few vintages (Table 2). The warmer season came largely from maximum temperatures which were 1.2°F higher than the last few years, while minimum temperatures were only 0.4°F higher. Similar to the McMinnville station, the warmest periods during the growing season occurred in late May and early June, late June, and the second week of August (Figure 1) with an average absolute maximum site temperature of 111.8°F observed on June 28th. During the vintage, the reference vineyards experienced 8 days over 95°F on average (Table 1), more than the last few vintages



**Figure 2** – Growing degree-day accumulation during April-October 2021 from each of the vineyard weather stations (grey lines), the average over all vineyard weather stations (red line), and the McMinnville Airport weather station (black line). The long-term average (yellow line) is from the 1981-2010 climate normals for the McMinnville weather station. Calculated from daily Tmax and Tmin observations for April 1<sup>st</sup> through October 31<sup>st</sup> using a base of 50°F with no upper cut-off.



**Figure 3** – Same data as in Figure 2 but shown as daily growing degree-day values during April-October 2021 from each of the vineyard weather stations (grey lines), the average over all vineyard weather stations (red line), and the McMinnville Airport weather station (black line). The long-term average (yellow line) is from the 1981-2010 climate normals for the McMinnville weather station. Calculated from daily Tmax and Tmin observations for April 1<sup>st</sup> through October 31<sup>st</sup> using a base of 50°F with no upper cut-off.

(Table 2). The coldest periods during the growing season came during early April with site temperatures dropping to 31-36°F, a cool period down to the mid to upper 30s around May20th, and late October when the absolute minimum of 27.6°F was observed on the 26th. The number of days below 32°F during the growing season ranged from none to five across the sites, which was similar to the last few vintages. The median last spring frost date across the sites in 2021 was March 30th, although there was a wide range of 56 days between the earliest and latest spring frost at the sites. The median first fall frost date across the sites occurred on November 21st (Table 1), over fifteen days later than the last few vintages. The overall frost-free period in 2021 averaged 224 days across the sites which was slightly shorter than the average over the last four vintages (Table 2).

Growing season precipitation was near average to significantly below average over most of the western US in 2021, with drought conditions widespread and increasing over the year. The PNW ended the season down by approximately 25-50% for the April through October months, with only isolated areas in western Washington, the northern Cascades, and Bitterroot Range in northern Idaho experiencing higher-than-average amounts. Statewide Oregon saw between 15-90% of the average growing season precipitation, with eastern and southern areas of the state experiencing the greatest deficits. The McMinnville station ended the growing season 2.95” below average with the wettest periods coming during the second week in June and the third and fourth weeks of September (Figure 1). The highest single day event for the McMinnville station during the growing season was 0.83” on September 18th, the same day as the first significant rain event of the 2020 vintage.

**Table 2** – Same weather station information as in Table 1, except for each year since 2018. \*Note that the winter of 2017-2018 data was not processed for these sites.

<b>Dormant Season (Nov 1 – Mar 31)</b>	<b>2017-18*</b>	<b>2018-19</b>	<b>2019-20</b>	<b>2020-21</b>	<b>Average</b>
Average Temperature (°F)		42.0	43.1	43.1	42.7
Average Maximum Temperature (°F)		48.4	49.6	49.7	49.2
Average Minimum Temperature (°F)		36.8	37.7	36.8	37.1
Absolute Minimum Temperature (°F)		23.4	25.9	23.8	24.4
# of Days < 32°F		32	23	24	26
Total Precipitation (inches)		19.03	18.60	24.94	20.86
Highest Daily Total (inches)		1.48	1.35	2.37	1.73
Number of Days Without Precipitation (days)		58	62	49	56
Number of Days with Precipitation < 0.25” (days)		67	66	75	69
Number of Days with Precipitation > 0.25” (days)		25	25	28	26
<b>Growing Season (Apr 1 – Oct 31)</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>Average</b>
Growing Degree-Days	2372	2101	2299	2503	2319
Growing Season Average Temperature (°F)	60.7	59.3	60.3	61.4	60.4
Average Maximum Temperature (°F)	73.1	70.3	71.9	73.5	72.2
Absolute Maximum Temperature (°F)	97.8	96.8	99.3	110.5	101.1
# of Days > 95°F	6	2	4	8	5
Average Minimum Temperature (°F)	50.2	50.2	50.4	50.8	50.4
Absolute Minimum Temperature (°F)	32.5	30.0	30.3	31.2	31.0
# of Days < 32°F	0	1	2	1	1
Median Last Spring Frost (date or days)	3/23	3/11	3/26	3/30	3/22
Median First Fall Frost (date or days)	11/9	10/29	10/26	11/21	11/5
Median Frost-Free Period (days)	231	232	223	224	228
Total Precipitation (inches)	9.09	12.23	9.53	10.08	10.23
Highest Daily Total (inches)	1.17	0.96	0.92	1.29	1.09
Number of Days Without Precipitation (days)	167	150	154	165	159
Number of Days with Precipitation < 0.25” (days)	35	46	47	35	41
Number of Days with Precipitation > 0.25” (days)	12	18	13	14	14

For the 10 reference vineyards, precipitation during April through October averaged 10.08”, ranging from a low of 6.75” to a high of 18.44” (Table 1) with the highest amounts coming from the more elevated sites. The 2021 vintage experienced near average rainfall amounts as observed over the last four years (Table 2). The highest single amount received at any one site was 1.29”, which occurred on September 18th. The total number of days without precipitation during the growing season added up to 165 during 2021, 11 days more than experienced in 2020. The number of days with precipitation amounts less than 0.25” was 35, fewer than the last couple of years, while the number of days with greater than 0.25” was 14 (Table 1), right at the average of the last four years (Table 2).

The McMinnville weather station experienced six record weather events during the 2021 growing season. This is fewer than what has been experienced over the past five years at the site. These included two record warmest minimum temperatures on June 26th (65°F) and August 6th (62°F); the three record maximum temperatures during the extreme heat event during June 26-28; and one record minimum temperature on October 12th of 30°F. There were no record precipitation events during this period at the McMinnville weather station.

**Phenology:**

Plant growth timing was observed at fifteen locations with bud break, bloom, and véraison recorded at 25-50% occurrence, and harvest as the date that picking started for each location. Summarizing the phenological observations for the locations and averaged across all varieties for 2021 shows an average bud break of April 14th (Table 3), which is the same as the average for the past four vintages but four days later than the longer-term average (Table 4). The sites also showed a shorter range with four-days across sites, reported as early as April 12th and as late as April 16th. The average date of flowering was June 4th which was the earliest over the last four vintages. The range across sites in flowering during 2021 saw the earliest occurring on June 1st and the latest on June 9th. Véraison and the start of the ripening phase during 2021 occurred over a 11-day period across mid-August, averaging August 10th across the sites, which was the earliest over the last four vintages (Table 4). The earliest véraison in 2021 was observed on August 7th while the latest was observed on August 18th. In 2021, harvest at these sites occurred over a 18-day period from September 5th to September 23rd with an average date of September 14th (Table 3). Across these sites and varieties, harvest dates were the earliest across the four vintages.

**Table 3** – Phenological date (25-50% occurrence) and interval characteristics for the 2021 vintage averaged over all sites and varieties.

<i>Event/Interval</i>	<i>Average</i>	<i>Standard Deviation</i>	<i>Latest or Longest</i>	<i>Earliest or Shortest</i>
Bud Break	April 14	2 days	April 16	April 12
Flowering	June 4	3 days	June 9	June 1
Véraison	August 10	2 days	August 18	August 7
Harvest	September 14	5 days	September 23	September 5
Bud Break to Flowering	51 days	3 days	58 days	46 days
Flowering to Véraison	67 days	4 days	77 days	61 days
Véraison to Harvest	35 days	5 days	48 days	25 days
Flowering to Harvest	102 days	6 days	112 days	90 days
Bud Break to Harvest	153 days	5 days	162 days	144 days

Intervals between phenological events show that bud break to flowering during 2021 had an average interval across these sites of 51 days; that flowering to véraison was 67 days on average; and that véraison to harvest was 35 days on average (Table 3). These intervals had 3 to 6-day standard deviations across sites, but a wide range between the shortest and longest intervals due to site elevation/temperature differences. For 2021, the length of flowering to harvest averaged 102 days while the length of the bud break to harvest period averaged 153 days with 18 days between vineyard sites with the shortest and longest intervals. For the 2018-2021 vintages the intervals have fluctuated a few days each year with 2021 seeing a slightly shorter bud break to flowering period, average flowering to véraison, shorter véraison to harvest and flowering to harvest periods, and an eleven-day shorter bud break to harvest period.

**Table 4** – Same phenological information as in Table 1, except for each year since 2018. § The earlier vintage average comes from Results Partners and a summary of North Willamette Valley sites for a 17-year average prior to 2018. The average\* comes from the 2018-2021 vintage data.

<i>Event/Interval</i>	<i>Earlier Vintages §</i>	<i>2018</i>	<i>2019</i>	<i>2020</i>	<i>2021</i>	<i>Average*</i>
Bud Break	April 10	April 17	April 16	April 11	April 14	April 14
Flowering	June 15	June 12	June 8	June 11	June 4	June 8
Véraison	August 20	August 15	August 14	August 17	August 10	August 14
Harvest	NA	Sept. 29	Sept. 27	Sept. 27	Sept. 14	Sept. 24
Bud Break to Flowering	65 days	56 days	53 days	61 days	51 days	55 days
Flowering to Véraison	66 days	65 days	67 days	68 days	67 days	67 days
Véraison to Harvest	NA	45 days	45 days	41 days	35 days	42 days
Flowering to Harvest	NA	110 days	111 days	108 days	102 days	108 days
Bud Break to Harvest	NA	167 days	164 days	170 days	153 days	164 days

NA = Not Available

### **Impacts and Influences:**

Weather-related impacts (from above) combined with grower comments provide a general summary for the 2021 vintage include: 1) minor spring frosts in April but no reported damage, 2) late May cool period dropped nighttime temperatures in most locations into the upper 30s and low 40s for five nights, with some damage reported; 3) leading up to flowering there were major swings between abnormally high and low temperatures, followed by a bloom to fruit set period that was very warm to start and then ended with a wet period. These conditions likely played a role in fruit set being moderately down for some sites, resulting in lower yields; 4) the extreme heat of late June, while damaging to many crops and native plants, was reported to not have caused much damage to vines or developing fruit; 5) rain events in third week in September came after harvest had commenced or was over for many, with no reported impacts; 6) fruit quality was reported as very good with balanced sugar, acid, and pH; 7) disease pressure was average to significantly down across the region; 8) pest pressures were mentioned as moderate to high from mites and low from leafhoppers; and 8) average to lower than average bird pressure due to harvest timing, with later varieties and sites experiencing slightly higher bird pressure.

### **Current Conditions:**

While the drought of the last couple of years is still with us, precipitation amounts have risen since October across the PNW, albeit too much, too soon for some areas of western Washington and British Columbia. As of early January, over 95% of the western US remains in some level of drought with even



the most extreme drought conditions (extreme and exceptional) continuing to hover near 35%. Drought zones also extend into the Rockies, much of the Plains, most of Texas, and the western Great Lakes, with even portions of US east of the Mississippi River showing some short-term drought. Short- and long-term drought indicators from seasonal outlooks point to the PNW across to portions of the northern Rockies seeing continued improvement through the first half of the winter. However, the outlook continues to show the long-term drought in California, into the southwest, across eastern Oregon and Idaho, and across into the Rockies, while also indicating the likelihood of drought developing further in Texas and the southern Plains.

While there are numerous factors that drive our regional weather and climate, the two broader influences that are very prominent are Tropical Pacific and North Pacific sea surface temperatures.

Very much like last winter, the Tropical Pacific has moved into La Niña conditions. The Climate Prediction Center (CPC) has reported that SSTs in the east-central Pacific are approximately 1.5-3.0°F below average, with patterns in all key atmospheric variables consistent with La Niña conditions. Most model forecasts point to the Tropics exceeding the threshold of La Niña SST conditions then returning to ENSO-neutral levels during late spring to early summer. The official CPC/IRI outlook and other agency outlooks are consistent with these model forecasts, calling for a 95% chance of La Niña lasting through the winter. Therefore, a La Niña advisory is in effect. Now with meteorological winter in place and La Niña conditions, the forecast leads me to believe that we will likely see a pattern that is consistent with historical analogs where the PNW has a greater chance of being wetter than average (roughly 70%), while California and the southwest have a greater chance to remain dry. The seasonal forecast is so far holding true with a cold and wet December and early January and what appears to be a more favorable winter precipitation regime. Even California and the Rockies has received more than anticipated.

For the North Pacific, a large area in the Gulf of Alaska continues cooler than average with circulation over the region helping to mix cooler waters to the surface. Warm SSTs still exist over a large area in the central North Pacific, and cooler SSTs are occurring southwest from California and across the ENSO zone in the tropics showing a classic La Niña pattern in tropical SSTs. These conditions have the Pacific Decadal Oscillation currently in one of its strongest negative or cool phases on record. This type of pattern in cooler North Pacific SSTs supports the seasonal forecast showing the tendency for a cooler/wetter PNW, transitioning to cool and near average precipitation in northern California and to slightly cool and near average to dry overall during the winter in most of California.

Further updates will be provided in monthly Weather and Climate Summary and Forecasts on my webpages ([www.abacela.com/reports](http://www.abacela.com/reports) and [www.climateofwine.com](http://www.climateofwine.com)) and regional presentations over the coming months.

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