

## 23. California

California is the largest producer of wine in the US. It makes 85 per cent of all US wine, which means that this state alone is still comfortably the world's fourth largest producer after Italy, France and Spain.<sup>1</sup> Vineyards specifically for wine production cover just under 250,000 ha and are located throughout the state: along the Pacific coastline, in the interior Central Valley, and up into the Sierra Nevada foothills.<sup>2</sup> The state's AVAs can be grouped into North Coast, Central Coast, inland valleys (including the Central Valley), Sierra Foothills and South Coast.

Grapes were initially introduced to California by Spanish missionaries, who planted grapes at the missions they established along the California coast as far north as Sonoma Valley. Most grapes were used to make altar wine and sweet fortified wine. Plantings increased during the 1849 Gold Rush and its concurrent population increase. By the late 19th century, many of the regions that are important for California wine today were producing wines, and a centre of wine research and education at the University of California (now based in Davis) had been established.

Production continued to grow to the extent that, in the 1890s, overplanting led to a significant drop in grape and wine prices, making it difficult for wine producers to survive. This was shortly followed by Prohibition, from 1920 to 1933, which stopped the manufacture, transportation, sale and possession of alcohol beverages and hence devastated the USA's winemaking industry.

From the 1930s to the 1960s, the California wine industry rebuilt itself. In the mid-20th century, consumer preferences were mainly for medium-sweet or sweet wines and many of the wines were named after famous European wine regions such as 'Chablis', 'Burgundy' or 'Rhine', although the style of these wines often bore no resemblance to the European wines they were named after. (Established brands are still able to use such names on their wines if sold in the domestic market, and this is seen on some inexpensive, high-volume brands.) As the US wine trade evolved, wines started to be labelled with descriptions such as 'red table wine' and then, promoted heavily by quality-focused vintner Robert Mondavi, with the name of a grape variety and a specific origin.

Within the mid to late 20th century, Chardonnay and Cabernet Sauvignon plantings grew rapidly, and they quickly became the two predominant grape varieties. During the same period, significant improvements were made in grape growing and winemaking; many of which were pioneered by leading winemaker and consultant André Tchelistcheff, such as temperature-controlled fermentation, better winery hygiene and techniques to prevent various diseases and frost damage.

In 1976 a France versus California blind tasting was held in Paris, at which two California wines received top scores (1973 Stag's Leap Wine Cellars Cabernet Sauvignon and 1973 Chateau Montelena Chardonnay), bringing new attention and growth to the California wine trade. More vineyards were planted, many using the new AXR1 rootstock, which could give vines with higher yields than the traditional rootstocks. However, AXR1, which had some *V. vinifera* ancestry in its DNA, quickly proved to be unsuitable when phylloxera started to attack California vineyards in the 1980s. Large-scale planting was required; however, from this

came the opportunity to re-evaluate site selection, choice of planting material and canopy management, in many areas with a focus on quality rather than quantity.

The 1990s saw the rise in deeply coloured, highly concentrated and high alcohol red wines in response to both consumer demand and critical acclaim. Whites similarly tended to be made in a very ripe style with high levels of new oak. This trend has now largely passed, and in recent years California's wine production has been more diverse and of higher quality than ever before. There is greater concentration on matching grape variety to the regional or site climate and soil, a higher number of professionally trained winemakers that have experience of winemaking elsewhere in the world, a highly-regarded local wine research



centre located in Davis and an ever-greater interest in experimenting with a wide range of grape varieties, winemaking techniques and wine styles.

## THE GROWING ENVIRONMENT AND GRAPE GROWING

### Climate

Two key influences on climate in California are the cold Pacific Ocean and the ranges of mountains that run along the length of the state. In the case of the ocean influence, a combination of the California current, bringing water from the north, and upwelling (the process whereby deep cold water rises to the surface) along the west coast of the USA means coastal waters are much colder here than those along the east coast. Vineyards without exposure to the ocean due to mountain protection are warm or even hot, whereas those with most exposure gain a significant cooling influence. The topography of the land is much more influential than the degrees latitude, with some of the coolest areas also being some of the most southerly.

In general, the Coast Ranges, that start in the far north of the state and run down to Santa Barbara County, provides some shelter from the ocean, however, gaps within these ranges, usually where river valleys break through, mean that ocean influence can reach further inland. As the land warms during the day, the air above it rises and pulls in cooler air from the coast during the afternoons and evenings, giving a high diurnal range. This air movement cools the vineyards, reduces risk of fungal diseases and frosts, and in some places can be strong enough to cause the vines' stomata to close and slow ripening in this way (as well as by lowering temperatures).

Fog can form in the afternoons and often can last into the morning, cooling but also reducing exposure to sunshine in those areas that are most affected. California's latitudes



Fog reduces sun exposure in Sonoma Coast



are relatively low for a wine region (approximately 32–42° N) meaning when the fog burns off, sunlight is intense.

Altitude can be a cooling influence in some areas. In the majority of cases, these vineyards are situated above the layer of fog, so although altitude may lead to lower temperatures, these areas do gain long hours of intense sunlight which can lead to greater levels of colour and tannins in black grapes.

Areas without the influence of the coast or altitude can be much warmer. The largest of these areas are in the Sacramento and San Joaquin Valleys, often termed the Central Valley, where much of the grapes destined for inexpensive, high-volume wines are grown.

The overall climate could be described as Mediterranean without the marked contrasts in seasonal temperatures of a continental climate. The growing season in most of the regions is relatively dry. Dry autumns can extend the viable growing season, helpful in the coolest regions.

### **Vineyard management**

The 1990s saw large-scale vineyard replanting, caused by the presence of phylloxera, Pierce's disease and increased understanding of vineyard management. Many vineyards changed from a relatively uniform way of planting and training – generally low-density, high-yielding vines pruned and trained either to replacement-cane or cordon – to be replanted with different densities, training and trellising techniques and a variety of planting materials. Greater attention was paid to matching rootstock to the growing environment and to grape growers' aims. Attention to the site and the vine has increased even further in the 21st century with increased focus on precision viticulture.

Traditionally, California has benefitted from plentiful, skilled Mexican labour. However, ongoing federal policies on illegal immigration and work permits have led to a reduction in this labour force over recent years. Although vineyards in certain areas, such as the Central Valley, have long been set up for mechanisation, an increasing number of vineyards throughout the state are now using machinery where topography allows.

Lack of rainfall during the growing season means that irrigation is installed in many vineyards. Drought has been a problem in recent years and has seen groundwater supplies dramatically decrease, leading to tensions between various agricultural businesses as well as residents in certain areas. Spurred by the drought, local water sustainability agencies have



**Variations on vine training in different sites in the Napa Valley**



been put in place to create and enforce water management schemes, leading to greater monitoring and regulation of water use.

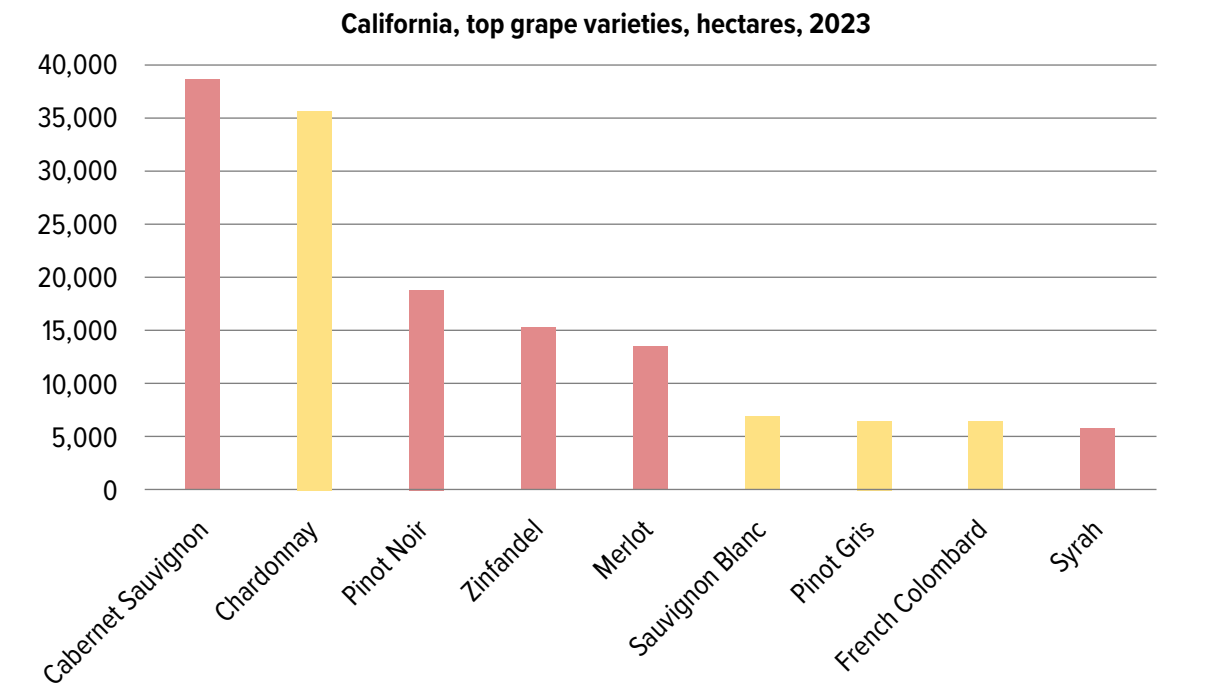
Low growing-season rainfall and breezes from the coast can reduce the risk of fungal diseases. However, bacterial Pierce’s disease, spread by leafhopper insects called sharpshooters, is a serious threat. Most associated with southern California and areas of the Central Valley, it has also affected more northerly areas, such as Sonoma and Napa in recent years.<sup>3</sup>

Various weather hazards can also be a challenge for grape growing. Spring frosts can be problematic, with sprinklers and wind machines being typical methods of combatting them. Warm, dry weather means wildfires are a serious threat, which may damage vines and winery buildings in their path, but also lead to risk of smoke taint in the grapes over a much broader area.

Sustainable grape growing, winemaking and business practices are a key focus in the state, and several sustainability programmes have been established. The California Sustainable Winegrowing Alliance provides a number of resources to aid grape growers and wineries in incorporating sustainable methods, and runs a certification programme, ‘Certified Sustainable’. A number of other certification programmes have been founded within particular counties or AVAs, for example, Napa Green Winery, Sonoma County Winegrowers, and Lodi Rules. Approximately 85 per cent of California wine production comes from wineries that are certified by one of the sustainable certification programmes across the state.<sup>4</sup>

Organic certifications are less common but growing. In the USA, to be labelled as Organic Wine, there must have been no addition of SO<sub>2</sub> in the winemaking process. For this reason, a very small proportion of wines have this certification. By comparison, more wines are labelled with ‘certified organic grapes’, meaning that the grape growing process has been certified. (However, as in several other wine-producing countries, some grape growers farm organically but do not see the value in certification.) A smaller proportion of grape growers are certified biodynamic.

GRAPE VARIETIES, WINEMAKING AND WINE STYLES



Source: California Department of Food and Agriculture<sup>5</sup>

Nearly two-thirds of grapes grown in California are used for wine, one-third are used as table grapes and raisins. The majority of grapes used for wine are black (63 per cent).

Cabernet Sauvignon and Chardonnay are by far the most planted grape varieties, each at approximately 15 per cent of the state's wine grape plantings.<sup>6</sup> The vineyard area bearing grapes for Chardonnay is slightly higher than that for Cabernet Sauvignon, but greater plantings of Cabernet Sauvignon in the last few years means that this is likely to change in the next couple of years as these vines start to produce fruit suitable for wine production.

### **Cabernet Sauvignon**

Styles of Cabernet Sauvignon vary markedly. Site can be influential; vineyards with some moderating influence generally giving fresher black fruit and some herbal flavours, less body and lower alcohol. However, vineyard management and harvesting dates are also important, with green-harvesting and long 'hang times' (leaving the grapes on the vine well into ripeness and perhaps extra-ripeness) giving very concentrated, very ripe styles of wine, often with a full body and high alcohol.

All but perhaps some inexpensive wines will be matured in oak. High percentages of new French oak are common, but maturation times are often shorter than they once were, and generally the balance of fruit and oak is being better managed now than in previous decades. Cabernet Sauvignon, often blended with small proportions of other Bordeaux grapes, produces many of the most prestigious and expensive wines in California.



**New and older barrels in the Napa Valley**

### **Chardonnay**

California Chardonnay is made in a full spectrum of styles, depending on site climate, winemaking practices and price. The sites chosen for Chardonnay increasingly have been nearer the coast or with coastal influence, or at high altitudes.

A number of premium wines are made in a medium (+) to full-bodied styles, often with pronounced flavours of peach and pineapple and secondary flavours from malolactic conversion and new oak. More recently, some producers have been choosing to make fresher, leaner styles, often with less-ripe fruit characteristics (citrus fruits) and less overt new oak. Sometimes lees contact will be managed to give struck match aromas from volatile sulfur compounds.

Inexpensive Chardonnays are generally made in a soft, easy-drinking style with medium acidity, sometimes slight residual sugar and are often unoaked or made with oak alternatives.

### **Pinot Noir**

Pinot Noir plantings have grown rapidly in the last 20–30 years. Like Chardonnay, premium and super-premium wines tend to come from relatively cool sites, whether that be due to coastal influence or altitude. Styles range from those with medium (+) acidity, medium body

and alcohol and fresh flavours of red cherry and raspberry, to those with greater body and alcohol, medium to medium (+) acidity and riper flavours, either black fruits or slightly jammy. In general, there is a trend for earlier picking than in the past, and a proportion of whole bunch fermentation or stem inclusion to enhance aroma complexity and give greater tannic structure. Maturation in some new oak, generally French, is common.

### **Zinfandel**

Zinfandel is often deemed as a signature variety of California, not widely grown elsewhere in the world (except in Puglia). California also has considerable plantings of old-vine Zinfandel, including some plants that are over 100 years old. Zinfandel is prone to uneven ripening which can lead to the combination of medium (+) acidity and some fresh flavours, alongside jammy characters.

Premium Californian Zinfandel often has medium (+) acidity, medium to full body, ripe medium (+) tannins and flavours that range from raspberry to blueberry and blackberry. American oak is often used for maturation, the overt vanilla flavours pairing well with Zinfandel's juicy fruit profile. Inexpensive Zinfandel is usually made in a soft, ripe, often jammy style, possibly with oak alternatives to give some flavours of spice.

Zinfandel, usually from the Central Valley, is also commonly made into rosé wine, termed White Zinfandel. These wines are often made with a short maceration on the skins, leading to a medium pink colour, before fermentation in stainless steel at cool temperatures. The fermentation is often stopped early to produce a medium-dry wine, often with low alcohol (around 10.5–11% abv). They tend to have medium acidity and body and flavours of strawberry and fruit candy. These wines, usually sold under some of the highest-volume brand names, are often inexpensive to mid-priced and generally of acceptable to good quality.

### **Merlot**

Merlot was very popular in the 1990s and early 2000s, but as consumer trends changed, since that time, plantings have declined. Much Merlot is made into inexpensive and mid-priced wines with medium acidity and tannins and fruity plummy character. However, a number of producers make premium wines from the grape, often in areas with a more moderate rather than hot climate, such as Stag's Leap District and Oak Knoll District in the Napa Valley. Such wines may have higher acidity and tannins, and a greater freshness and complexity of flavours. In these wines Merlot may sometimes be blended with other Bordeaux varieties.

### **Colombard**

Colombard, called French Colombard in California, is a neutral white grape, also commonly used for IGP wines in South West France. In California, it is generally grown in the Central Valley and used in inexpensive wines. Its name is rarely seen on wine labels, and instead, wines produced from it, generally in a blend with other varieties, are labelled with a description such as 'fruity white' or 'dry white'.

### **Syrah**

Syrah has risen in popularity over recent years. It often does best in areas with some cooling influence, in which cases it can produce wines with medium to medium (+) body, medium (+) acidity and tannins and fresh plum, blackberry and spice flavours. A small number of



producers specialise in Rhône varieties and also produce wines from varieties such as Grenache and Cinsaut, and whites such as Viognier, Marsanne and Roussanne.

**Pinot Gris** plantings have increased in the last couple of decades. Wines tend to be made in a dry but fruity style, with peach, pear and melon flavours. **Sauvignon Blanc** is generally also made in a fruity style, typically fermented in stainless steel and released early from the winery. Some producers choose to ferment and mature Sauvignon Blanc in oak, giving greater body and texture, with toasty flavours. Sauvignon Blanc is occasionally labelled Fumé Blanc, but this name does not necessarily mean the wine has been fermented or matured in oak.

A large number of other grape varieties are grown in various parts of the state including those native to Italy, Germany, Spain and Portugal, as well as further French grape varieties.

**Petite Sirah** is particularly noteworthy. This grape variety originated from France, under the name Durif, but there is now far more planted in California (and the USA in general) than anywhere else in the world. As a late ripening variety, Petite Sirah does best in the warm areas of the state, where it produces deeply coloured, full-bodied wines with medium (+) to high levels of tannins and acidity and black fruit and spice flavours. It is also used as blending ingredient to add colour, body, tannins and acidity to other red wines.

### WINE LAW, REGULATIONS AND WINE BUSINESS

California has 147 AVAs. As noted previously, these vary from very large areas, such as Central Coast which extends down the coast for around 450 kilometres (280 miles), to small areas, such as Cole Ranch in Mendocino which totals just a couple of hundred hectares.

Where a single grape variety is mentioned, at least 75 per cent of the wine must be from that named variety. A wine labelled with 'California' must be made entirely from grapes grown in the state. At least 75 per cent of the grapes must come from any named county, for example, Sonoma County. If an AVA is mentioned, at least 85 per cent of the grapes must come from that AVA. Vineyard names may appear on the label if at least 95 per cent of the grapes are from that vineyard.

Rules for labelling wine with a vintage differ according to the geographical indication. At least 95 per cent of the grapes must come from any stated vintage if the wine is labelled with an AVA; this reduces to at least 85 per cent if purely a county or the state is mentioned.

Wineries can only use the term 'estate bottled' if the wine has been made and bottled at the producer's winery, and from grapes from vineyards owned or controlled by the producer that are within the same AVA. This has led to the creation and approval of a number of very large AVAs permitting some of the state's largest producers that may have vineyards and wineries far apart to legitimately label some of their premium wines as 'estate bottled'.

California is the largest wine-producing state in the USA. Total volume sales (both domestic and export) in 2021 were 24 million hL, of which 21 million hL were sold in the US.<sup>7</sup>

California wine production is in the hands of 5,900 grape growers and over 4,800 bonded wineries.<sup>8</sup> Although many wine-producing companies own vineyards, buying in fruit to supplement their own grapes is common (they may also sell some of the fruit from their own vineyards to other wineries). The bought-in grapes may come from a different AVA or even a different county, and can either be blended with other fruit (and labelled with a large AVA such as Central Coast, or simply 'California') or be kept separate to make its own wine (for example, a producer based in Rutherford may produce a Chardonnay entirely from Carneros fruit). Estate wineries do exist but tend to be small.

This model where many wine producers are acting as either merchants or grower-merchants, means that producers can make a wide variety of wines, often beneficial in attracting consumers to taste and buy at the cellar door or join the winery's wine club.

Independent professional grape growers that farm thousands of hectares are a key part of the structure of the business. Grape prices can vary according to supply and demand, and this has often led to the head-grafting of vineyards to keep up with the latest consumer demands. Grapes from vineyards under the management of certain well-known, quality-conscious grape growers are usually in high demand, especially from prestigious vineyards, and sell for a considerable premium. Similarly, grape prices vary dramatically according to region and grape variety, and it is one factor influencing the price of wines. Cabernet Sauvignon can usually command a premium compared to other grape varieties. Napa Valley fruit can be around ten times the price of fruit from Lodi.

Wine producers range in size from those producing a few hundred cases to some of the largest wine companies in the world. E & J Gallo was founded in Modesto, California in 1933 and is now the largest wine company in the world, selling around 100 million cases throughout the world in 2021.<sup>9</sup> It also owns the world's largest selling brand, Barefoot Cellars. In contrast, there are also a number of wineries producing very small volumes of outstanding quality wines (often termed 'cult' wines) which are in incredibly high demand among collectors and some investors, and are among the most expensive and hard-to-obtain wines in the world. Examples include the wines from Screaming Eagle Winery and Harlan Estate.

The [Wine Institute of California](#) represents the California wine industry and has about one-fourth of the producers as members. Many counties and AVAs also have their own trade associations.

### 23.1. North Coast – Mendocino and Lake Counties

The **North Coast AVA** is a large AVA in California, running about 160 kilometres (100 miles) down the Pacific Ocean coastline and reaching 80 kilometres (50 miles) inland. It encompasses substantial proportions of Napa County, Sonoma County, Mendocino County and Lake County. The Mayacamas Mountains run through the North Coast AVA, dividing Mendocino and Lake County, and extending south for over 80 kilometres (50 miles) into Napa and Sonoma, down to San Pablo Bay.

#### MENDOCINO COUNTY

Mendocino County runs along the Pacific Ocean to the west, with Lake County to its east, and Sonoma County to its south. Of around one million ha, 7,000 ha are under vine.<sup>10</sup> Vineyards are grouped either in the cooler AVAs closer to the Pacific Ocean or further inland in warmer areas, some of which are planted at altitude. The more coastal AVAs (such as Anderson Valley) tend to specialise in Pinot Noir, Chardonnay and aromatic white varieties. Inland AVAs (such as Redwood Valley) are able to ripen Zinfandel, Syrah, Petite Sirah and Cabernet Sauvignon, though those with vineyards at particularly high altitudes (such as Potter Valley) can produce aromatic whites such as Sauvignon Blanc and Riesling. Mendocino grapes are generally priced lower than those grown in Napa and Sonoma and are often used for multi-regional blends.

The county encompasses 12 AVAs.<sup>11</sup> The **Mendocino AVA** which starts at the Russian River headwaters, covers six of the county's AVAs (Anderson Valley, Yorkville Highlands, McDowell

Valley, Potter Valley, Redwood Valley and Cole Ranch), and can be used for multi-regional blends between these AVAs.

### **Anderson Valley AVA**

Anderson Valley is the most well-known of Mendocino's AVAs. The valley runs from north-west, only a few kilometres/miles from the Pacific, to south-east, which is further inland. Day-time temperatures can be warm but cold air and fog are funnelled inland along the Navarro River, giving cold evenings and mornings. Further inland, the valley becomes narrower and reduces the flow of ocean breezes and fog and conditions are warmer.

The valley receives plentiful precipitation ranging from 900–2,000 mm per annum, mostly falling in the winter and spring, with the north-western side of the valley being the wettest. The vast majority of the vineyards are planted on the sloped sides of the valley. Cold nights mean frost can be an issue in the spring particularly in low-lying areas.

Just under 1,000 ha are planted.<sup>12</sup> Early-ripening Pinot Noir and Chardonnay are the two most planted varieties, and are used in both sparkling and still wines. In terms of still wines, Pinot Noir has become particularly reputed. Style varies depending on site climate, clones used and harvesting times, but the wines generally have fresh raspberry, cherry and plum fruit, medium body and medium (+) acidity. They are generally good to outstanding, and premium priced, with some super-premium examples. Significant producers include Littorai and Williams Selyem. Aromatic Alsace-style white wines from Gewurztraminer, Riesling, Pinot Gris and Pinot Blanc are also successfully produced.

There are 30 wineries in the AVA, many of which have cellar doors to take advantage of the tourist trade around the Mendocino coast. The reputation of the AVA for Pinot Noir means a number of wineries from other areas of the state buy Anderson Valley fruit to make appellation-specific (or even vineyard-specific) wines.

### **LAKE COUNTY**

Lake County is in the rain shadow of the Mayacamas Mountains to the west and the Vaca Range to the east, giving a warm climate. Most of the vineyards are in the southern part of the county around Clear Lake, the state's largest natural lake.

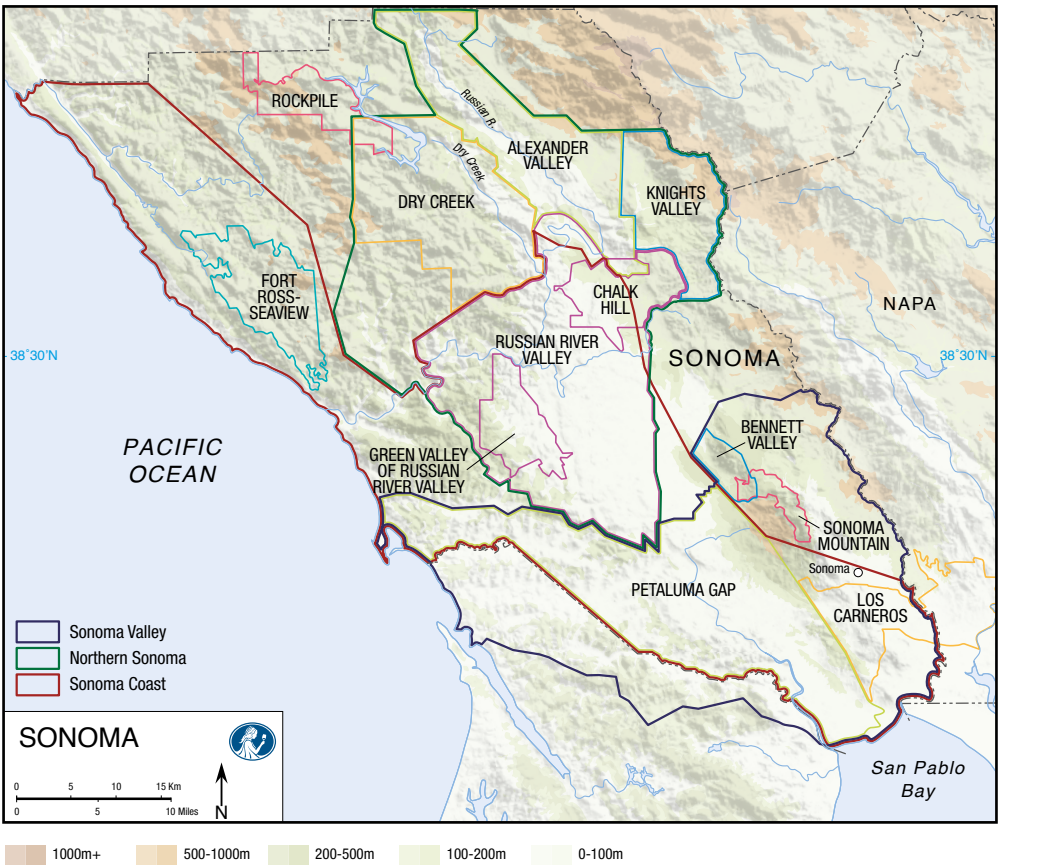
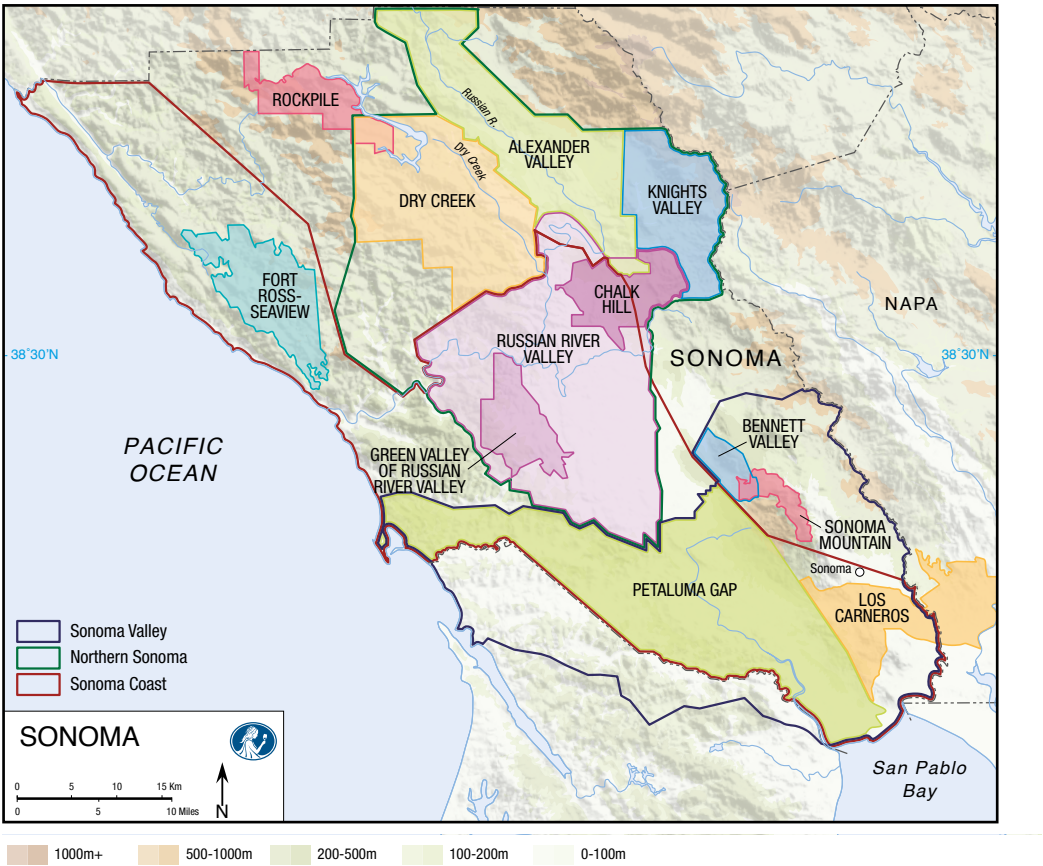
Lake County has 7 AVAs.<sup>13</sup> **Clear Lake AVA** is the largest and has four sub-AVAs. The lake, which takes up around half of the area of the AVA, provides afternoon breezes. Furthermore, many of the vineyards are planted on the slopes and ridges around the lake and, at 400–450 m, benefit from the cooling effects of altitude. Black grape varieties make up the majority of plantings and Cabernet Sauvignon and Sauvignon Blanc are the two most planted grape varieties. Just over 200 ha are planted.

There are a small number of prestigious vineyard sites and wineries in the county. However, much of the inexpensive Lake County grapes are used for multi-regional blends.

## **23.2. North Coast – Sonoma County**

Sonoma County borders the Pacific Ocean and Mendocino, Lake, Napa, and Marin counties, and encompasses 19 AVAs.<sup>14</sup> There are three overarching AVAs – Northern Sonoma AVA, Sonoma Coast AVA, and Sonoma Valley AVA – so large that they overlap with each other and encompass various smaller AVAs with specific climates and geographical features. As mentioned in Wine Laws and Wine Business, these overarching AVAs allow producers to





Second map to show topography within the regions.

use the term 'estate bottled' when their vineyards and winery are spread far apart, while still permitting the word 'Sonoma' to appear on the label (rather than North Coast).

If a wine comes from an AVA that sits entirely within Sonoma County, the words 'Sonoma County' must appear on the wine label (along with the name of the AVA).

### **Northern Sonoma AVA**

The Northern Sonoma AVA covers a large area, from the Mendocino border to the north, the Mayacamas Mountains to the east, down to Santa Rosa, situated in the middle of Sonoma County. Its vineyards are separated from the Pacific Ocean by the Sonoma Coast AVA. It is further defined by the Russian River, which starts north in Mendocino County and flows through the Northern Sonoma AVA where it fills underground aquifers and provides water for vineyards, before flowing into the Pacific Ocean. It incorporates several smaller AVAs including Alexander Valley, Knights Valley, Rockpile, Chalk Hill, Russian River Valley (plus Green Valley of Russian River Valley) and Dry Creek Valley.

### **Alexander Valley AVA**

The Alexander Valley AVA is in the northeast corner of Sonoma County. It has a warm climate, which is cooled in the evenings by Pacific air funnelled in from the Petaluma Gap and Russian River Valley to the south. Vineyards are planted both on the valley floor and on west / southwest facing slopes and benchlands of the Mayacamas Mountains, at elevations of 100 to 750 m. The aspect and altitude of these vineyards give long hours of bright sunshine, leading to grapes that are high in colour and tannins. The influence of altitude also helps to retain acidity in the grapes. There is a mixture of soils with greater fertility on the valley floor and more low-nutrient, free-draining sand and gravel at higher altitudes, generally leading to less vigour and lower yields. Average rainfall is just over 800 mm per year, but mainly falls in the winter.

Cabernet Sauvignon is the most planted variety and produces full-bodied wines with ripe flavours of blackberry, blackcurrant, dried herbs and chocolate. Those from plantings on the valley floor tend to have less tannin, whereas those from grapes on the slopes and benchlands tend to be more structured and concentrated. Alexander Valley Cabernet Sauvignons are typically good to outstanding in quality and mid-priced to premium in price, with some super-premium examples. There are also notable plantings of Chardonnay, Merlot, Zinfandel, Petit Verdot and Malbec. Significant producers, among many, include Kendall-Jackson (including the Stonestreet Estate) and Seghesio.

### **Knights Valley AVA**

The furthest-inland AVA, and separated from the northern end of Napa County by the Mayacamas Mountains, the Knights Valley AVA is one of the warmest areas of Sonoma County. It is surrounded by hills and sheltered from any cooling influence of the Pacific Ocean.

However, cooler sites can be found by planting at higher altitudes (around 450 m) in the foothills of the Mayacamas. The warm temperatures and warm, free-draining volcanic soils help to produce ripe, full-bodied Cabernet Sauvignon, the most planted grape variety in the AVA. Merlot, Syrah, Zinfandel and some Chardonnay and Sauvignon Blanc are also grown.



**Dry Creek Valley AVA**

Best known for Zinfandel and Sauvignon Blanc, the Dry Creek Valley AVA is a narrow valley 3 km by 26 km (2 by 16 miles) with vineyards planted on both the valley floor and on slopes and benchlands either side of the Dry Creek river, a tributary of the Russian River. Sheltered by coastal mountains to the west, Dry Creek Valley has warm days. However, mountains on either side of the valley funnel cool ocean air and fogs from San Pablo Bay (a tidal estuary, the northern extension of San Francisco Bay). This occurs during the afternoon and evenings, giving much cooler nights and helping to retain acidity in the grapes. There are slight differences in climate throughout the valley. The coastal influence means the south of the valley is generally cooler. West-facing vineyards on the east of the river which are exposed to the warm afternoon sun tend to be warmer than those on the western slopes.

Soils are mixed but tend to be gravel sandy loam on the valley floor and gravel red clay loam on the slopes and benches. These gravelly free-draining soils help to reduce vigour and yields.

The AVA is particularly known for its Zinfandel and is home to some old vines of over 100 years old. The wines tend to be medium (+) to full-bodied, with medium (+) acidity and ripe flavours of blackberry, black plum and cherry. Those from the west-facing sites and vineyards in the north of the appellation are often riper, with more jammy and dried fruit flavours than the fresher styles from the east-facing vineyards and those within the south of the appellation. Maturation in oak is typical, usually with a proportion of new oak to lend notes of spice; American oak is common. The wines range from good to outstanding and mid-priced to



**Old vines in Dry Creek Valley**



premium. Cabernet Sauvignon, Merlot, Cabernet Franc, Petit Verdot and Rhône varieties (Syrah, Grenache, Mourvèdre, Cinsault, Carignan) are also produced. The key white variety is Sauvignon Blanc. Significant producers include Kinsella Estates and Ridge.

### **Rockpile AVA**

The Rockpile AVA is located in the northern part of Sonoma County, overlapping with the Dry Creek AVA and extending up to Mendocino County. The vineyards are planted on steep rocky slopes and must be above 800 ft (approximately 244 m) to be within the AVA. A variety of aspects and altitudes (up to around 650 m) leads to a diverse range of growing conditions.

The vineyards are heavily influenced by the snake-like Lake Sonoma which surrounds the bottom of the AVA on three sides. The lake helps to create an inversion layer, which keeps the vineyards relatively warm at night (by comparison, Dry Creek Valley has warmer days and cooler nights). The vineyards sit above the fog layer, which stays close to the lake, meaning that they are exposed to long hours of sunshine.

The shallow hillside soils hold little water, while windy conditions lead to high evapotranspiration rates. This results in low yields and concentrated, ripe fruit.

Grape varieties include Zinfandel, Petite Sirah, Syrah, Cabernet Sauvignon, Cabernet Franc, Malbec, Petit Verdot, and even Douro varieties. Significant producers include Seghesio Family and Devil Proof.

### **Russian River Valley AVA**

The Russian River AVA is located in the middle of Sonoma County. It is included in the Northern Sonoma AVA and part of it is in Sonoma Coast AVA. Russian River Valley AVA covers a range of both flat and hilly topography which influences the climate, which generally ranges from moderate to warm.

The south and western parts of the AVA are coolest as they receive fog and wind through the Petaluma Gap, a break in the Northern Coast Range. Fog usually arrives in the evening and retreats to the ocean the following morning. During this period it reduces temperatures significantly which leads to a slower accumulation of sugar and greater retention of acidity as aroma and flavour compounds ripen.

The most planted grape varieties in this part of the AVA are early-ripening Pinot Noir and Chardonnay. Soils vary, ranging from yellow sandstone to rocky sandy clay loam, but are generally free-draining and low in nutrients, controlling vigour and yield.

The quality of the fruit (and rising popularity of Pinot Noir) has meant that the boundaries of the AVA have been extended twice (to include further neighbouring areas that are affected by the fog) and plantings have increased from 1,600 ha in the late 1990s to over 7,200 ha in 2013.<sup>14</sup> Pinot Noirs tend to be medium to medium (+) bodied, with medium tannin and medium (+) acidity, with ripe strawberry and red cherry flavours with vanilla spice from oak maturation. Chardonnays often have medium to medium (+) body and medium (+) acidity with ripe peach and pineapple flavours and often creamy and spicy flavours from malolactic conversion and oak maturation. For both grapes, wines range from good to outstanding in quality and from mid-priced to super-premium. Significant producers include Rochioli and La Crema.

Inland and up to the northeast corner of the AVA, vineyards are sheltered by hills from the fog and breezes, giving warmer conditions, which are best for Cabernet Sauvignon, Merlot, Zinfandel and riper styles of Chardonnay and Pinot Noir.

Russian River Valley contains two sub-AVAs: Green Valley of Russian River Valley AVA and Chalk Hill AVA. **Green Valley of Russian River Valley AVA** is located next to the Petaluma Gap where it gains the first fogs in the afternoon and is the last area to have the fog burn off in the mornings. This leads to some of the coolest conditions in northern California. The majority of vineyards are on free-draining, low-nutrient sandstone soils, limiting vigour and creating small concentrated grapes. Pinot Noir and Chardonnay are the most planted grapes and are used for both still and sparkling wines. Styles of wines are similar to those of the wider Russian River Valley but can have higher acidity and fresher fruit flavours.

The **Chalk Hill AVA** is located in the northeast corner of the Russian River Valley AVA and just south of Alexander Valley. It is a hilly area, which blocks some of the Pacific breezes, and relatively far inland, creating a warmer climate than found in the surrounding areas. The soil is white volcanic ash (rather than the chalk suggested in its name) and vineyards are planted from the valley floor up to 500 m. Chardonnay, Cabernet Sauvignon and Sauvignon Blanc are the most notable varieties planted.

### **Sonoma Coast AVA**

The Sonoma Coast AVA runs from Mendocino in the north, along the Pacific Ocean, down to Marin County and San Pablo Bay to the south. It includes the Sonoma side of Carneros, part of Sonoma Valley, the western part of Chalk Hill, and most of the Russian River Valley AVA; and hence includes a wide variety of climates growing a range of grape varieties. The AVA also includes the Petaluma Gap AVA and Fort Ross Seaview AVA.

Vineyards in the west of the AVA can be within a few kilometres/miles of the coast and are extremely exposed to cold ocean winds and fog. Cool, windy conditions in spring mean fruit set is often disrupted and yields are low. Growing conditions are also cool, with limited sunshine hours due to the fog. This means that early-ripening Pinot Noir and Chardonnay dominate, producing relatively light-bodied, high acid styles of wine with medium alcohol. Significant producers include Aubert and Occidental.



**Vineyards in Fort Ross Seaview are located above the fogline and gain long sunshine hours.**

The **Fort Ross Seaview AVA** is located in the northwest of the Sonoma Coast AVA. To be labelled as Fort Ross Seaview AVA wines must be made from vineyards within the AVA boundaries that are over 280 m above sea level. This altitude means the vineyards sit above the fog layer and so gain longer hours of sunshine and warmth compared to the surrounding Sonoma Coast. Coastal winds still provide a moderating influence on temperature. The wines can have riper fruit than those made from grapes below the fog line, but still have fresh, high acidity. Chardonnay, Pinot Noir and Syrah are the most planted grapes.

Defined by its wind conditions, and one of the newest AVAs, the **Petaluma Gap AVA** is located in southern Sonoma County and northern Marin County. It extends from the eponymous gap in the Northern Coast Range to San Pablo Bay. Open to the coast at both ends, high-speed coastal winds flow throughout the AVA. The AVA boundaries were defined according to an area that maintains a persistent wind of at least 12 kilometres (8 miles) per hour through the growing season. The winds lower temperatures but also are strong enough to cause leaf stomata to close, slowing respiration and photosynthesis. Pinot Noir comprises 75 per cent of all plantings followed by Chardonnay and Syrah.<sup>15</sup> The wines tend to have high acidities, fresh fruit flavours and often lower alcohol compared to more sheltered, inland appellations.

### **Sonoma Valley AVA**

The Sonoma Valley AVA is located in the south-eastern part of Sonoma County, bordered on the east by the Mayacamas mountain range and on the west by the Sonoma mountain range, which shelter it from cool Pacific breezes. The southern part of the AVA is the coolest, as it opens straight on to San Pablo Bay. Cold winds flowing northwards from the San Pablo Bay moderate temperatures and lead to slower ripening in the southern part of the valley. Sonoma Valley's smaller sub-appellations include Sonoma Mountain AVA and Bennett Valley AVA towards the north of the valley, and Carneros AVA towards the south.

### **Sonoma Mountain AVA**

The Sonoma Mountain AVA is on the western side of Sonoma Valley. Most vineyards are on east-facing, steep slopes within the Sonoma mountain range. Vineyards are planted up to 730 m, above the fog line, exposing the grapes to intense sun and warm day-time temperatures, giving ripe flavours and tannins and deep colour. However, cold air coming down from the mountains can give cool nights, helping to retain acidity. Soils are volcanic in origin and free-draining and low in nutrients, controlling vigour and yields. These features help create concentrated, ripe Cabernet Sauvignon, the most planted variety, Merlot, Zinfandel and Syrah. Chardonnay, Sauvignon Blanc, and Semillon are generally planted on the cooler sites, generally on the west side of the AVA which still has some influence from the coast.

### **Bennett Valley AVA**

The sub-AVA of Bennett Valley is one of the smallest in Sonoma County. The area is surrounded by hills giving warm sheltered conditions in the day, but cool air and fog flows into the valley through a break in the hills at night. Syrah, Merlot, Sauvignon Blanc and Chardonnay are the key varieties. Other Rhône varieties such as Grenache and Viognier are also planted.

### **Carneros AVA**

The Carneros AVA is located between San Pablo Bay to the south and the Sonoma and Napa counties to the north. Proximity to the San Pablo Bay means the AVA is affected by fog and

cold winds in the morning and evening, though day-times are usually warm and sunny. It is a relatively low elevation appellation, rising from sea level to inland hills up to around 200 m.

Carneros is best known for Pinot Noir and Chardonnay, with a portion used for sparkling wine. Wine styles from both grapes can range from medium-bodied, medium alcohol, medium (+) acid and fresher fruit, to fuller-bodied, riper, higher-alcohol styles. They tend to be good to outstanding in quality and mid-priced to super-premium. Carneros also produces Merlot, Syrah and Cabernet Sauvignon. Significant producers include Kistler and Tor.

Wines from this AVA can either be labelled as 'Los Carneros' or 'Carneros'. The AVA overlaps the border between two counties; Sonoma and Napa. Grapes and wine from the Sonoma side of the AVA may use 'Sonoma County' on the label. Similarly, if the grapes and wine come from the Napa Valley side of the AVA, those wines may be labelled as 'Napa Valley'. If grapes and wine come from both counties, it can only be called 'Carneros'.

Carneros was recognised for its cool to moderate climate back in the 1980s (before many other areas with similar or cooler climates were recognised). Many large companies based elsewhere in Sonoma and Napa own vineyards in the area (and have done so for many decades) or buy in fruit either to bottle as 'Carneros' or to provide a higher acid, fresh fruit component in a blend with fruit grown in warmer conditions. There are also wineries based in Carneros and that specialise in the wines from the AVA. Significant producers include Kistler Vineyards and Ramey.

### 23.3. North Coast – Napa County

The Napa Valley in Napa County is globally known for high quality wines, particularly from Cabernet Sauvignon. It represents 4 per cent of California's production, but 27 per cent of the retail value of all California wine sold.<sup>16</sup> **Napa Valley AVA** encompasses the whole valley, but the area also has 16 smaller AVAs within it. Conjunctive labelling laws mean that wines that qualify to be labelled with a single specific AVA (e.g. 'Rutherford') must also include the words 'Napa Valley' on the label.

#### THE GROWING ENVIRONMENT AND GRAPE GROWING

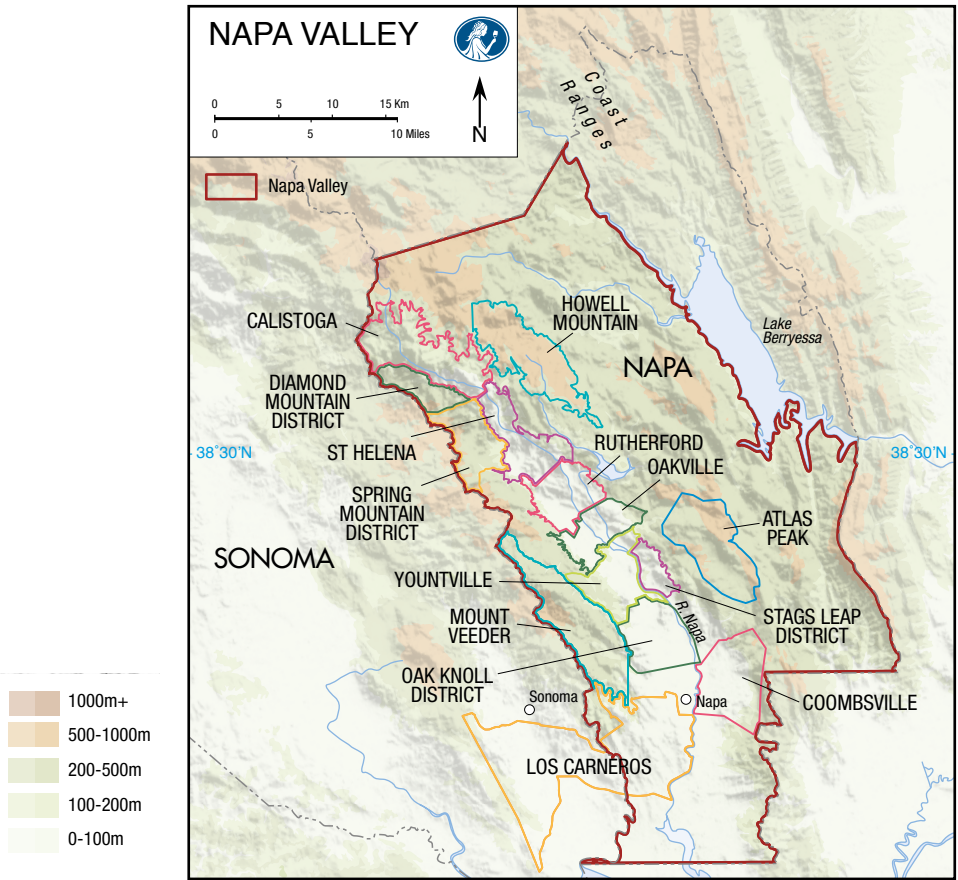
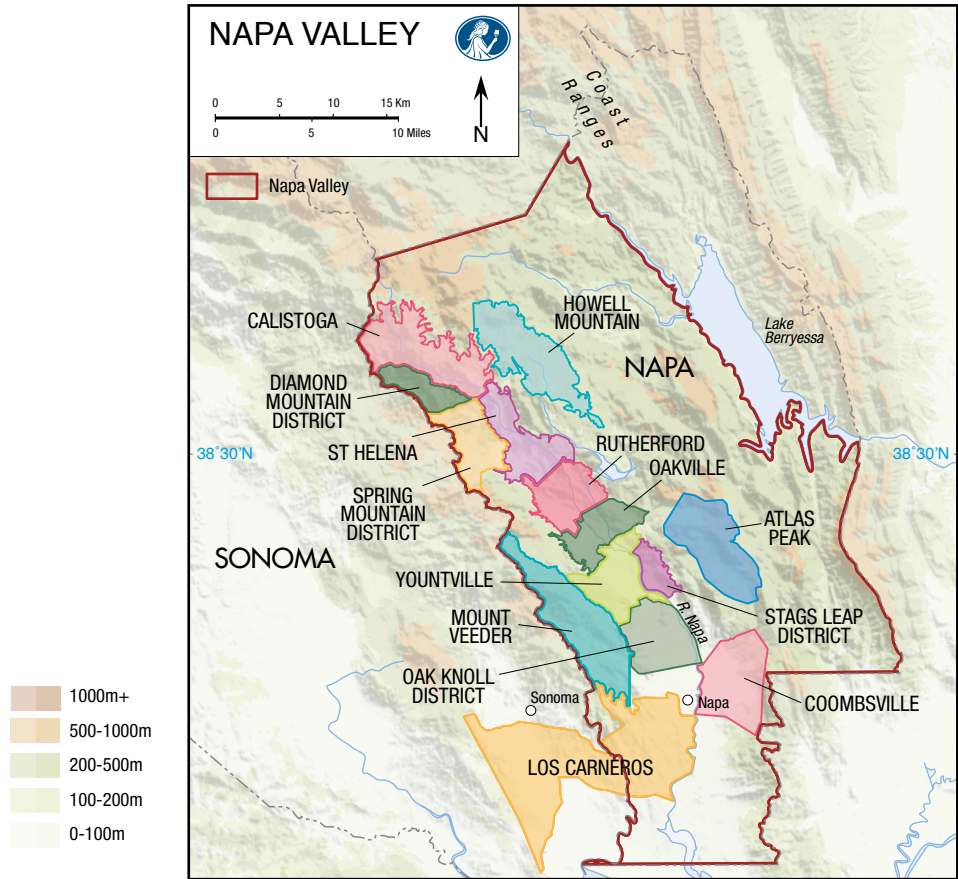
The valley is 50 km long by 8 km wide (30 miles by 5 miles) with 18,200 ha under vine,<sup>17</sup> and it is formed by the Napa River, the Mayacamas Mountains to the west and north and the Vaca Mountains to the east. Vineyards are found both on the valley floor and on the mountain slopes either side.

The Mayacamas Mountains shelter the valley from the cold Pacific Ocean while the Vaca Mountains protect the area from the hot Central Valley. However, the valley is open to the San Pablo Bay in the south. As the vineyards heat up during the day, air rises and pulls cool air and fog from the bay up the valley in the afternoon.

#### AVAs on the valley floor

The cold air and fog is particularly felt by the valley floor vineyards, which sit under the fog layer giving a high diurnal range. The most affected vineyards are those on the southerly parts of the valley floor. In AVAs such as **Carneros AVA** and **Coombsville AVA**, but also **Oak Knoll AVA** situated just to the north of the city of Napa, the fog does not burn off until well into the morning, limiting the hours of warmth and sunlight. The furthest south, Carneros is best known for early-ripening Chardonnay and Pinot Noir. Cabernet Sauvignon is the main grape in Coombsville and Oak Knoll, but Merlot and Chardonnay are also widely grown.





Second map to show topography within the regions.



**The valley floor in Napa with San Pablo Bay in the distance**

Due to relatively cool conditions, Cabernet Sauvignon and Merlot tend to be lighter-bodied, with fresher fruit than the warmer AVAs.

**Yountville AVA**, **Stags Leap District AVA**, **Oakville AVA** and **Rutherford AVA** are located further north on the valley floor. They have warm climates but nights are still cooled somewhat by the winds and fog from the bay (most in Yountville, the most southerly, less in Rutherford, the most northerly). Cabernet Sauvignon is the predominant grape, with smaller plantings of varieties such as Merlot, Cabernet Franc and some Zinfandel in Rutherford. Cabernet Sauvignon wines tend to show concentrated ripe fruit, medium (+) to full body and high ripe tannins. They tend to be rounder and more fruity in youth than the more structured wines from the mountains, with juicy blackcurrant, blackberry and plum fruit and often notes of spice (liquorice, cloves) or herbs. Sauvignon Blanc is the main white grape variety, producing ripe, juicy wines with peach and tropical flavours and medium (+) acidity.

The most famous vineyard area in Oakville and Rutherford is The Rutherford Bench. This narrow (5 km/3 mile) stretch of vineyards is located on a gently sloping alluvial fan at the bottom of the Mayacamas range. See more on 'bench' soils below.

**St Helena AVA** and **Calistoga AVA** are located still further north and barely receive any cooling influence from the San Pablo Bay. The conditions are warm to hot. Calistoga gains some cooling influence during the afternoon and night from Pacific breezes that come through the Chalk Hill gap (a break in the Mayacamas). Cabernet Sauvignon is still widely planted, along with Merlot, but there are also plantings of Syrah, Petite Sirah and Zinfandel.



### AVAs on the mountain sides

The vineyards in the mountains either side of the valley floor are generally above the fog layer and hence can receive longer hours of sunlight than many of those on the valley floor. The cooling influence for these 'mountain AVAs' is altitude (sites up to 800 m). Overall, this means that mountain vineyards have fewer temperature extremes and hence a lower diurnal range. In general, the combination of climate and soils means that wines from the mountain AVAs often have higher levels of tannins and acidity than those from the valley floor.

West-facing vineyards (generally those on the east side of the valley) are exposed to the intense afternoon sun, and so tend to be warmer than those that face east, giving higher alcohols and riper fruit. Temperatures also differ north to south, as the most southerly mountain AVAs gain some cooling coastal influence. This means that **Mount Veeder AVA** on the south west of the valley is the coolest mountain AVA with Cabernet Sauvignon struggling to ripen in some years. **Atlas Peak AVA** to the south-east of the valley is also relatively cool but does gain the afternoon sun. By comparison, **Howell Mountain AVA** in the north-east of the valley is one of the warmest Napa AVAs, producing intensely concentrated, ripe Cabernet Sauvignon with high, firm tannins. **Spring Mountain District AVA** and **Diamond Mountain District AVA** on the north-west side tend to be slightly cooler.



Looking down to the valley floor from Spring Mountain District

### Soils

Napa Valley has a wide variety of soil types due to tectonic plate and volcanic activity from over 150 million years ago. Soils change over small areas and it is possible to find multiple soil types in a single vineyard. Broadly speaking, soils on the mountains tend to be thin and poor in nutrients, restricting vigour and leading to reduced yields of small, concentrated grapes.

Soils in the middle and east of the valley floor, typically made from silt and clay, were formed by the Napa River as it has flooded and shrunk over time. These soils have the

highest fertility and water-retaining capacity, and the wines that they produce tend to be less structured than those from the mountains or alluvial fans.

Alluvial fans have been created at the bottom of the mountains, generally on the west side of the valley, caused by the deposition of sediments by mountain streams as they reach the flat valley floor. These alluvial fans are often called 'benches' and are deep, rocky and have moderate fertility. The grapes and resulting style of wine is considered to be between that of the mountains and mid-valley floor. Many of the valley floor AVAs have both alluvial fans and fluvial soils in their boundaries.

### **Vineyard management**

The Napa Valley Agricultural Preserve, established 1968, awarded tax benefits for people who kept vineyard land rather than building upon it. Today, nearly 90 per cent of Napa County is under high levels of protection from development, meaning that, despite its desirable location not far from the San Francisco Bay area, it is not under threat from housing and business construction.

However, almost all viable and permitted vineyard land within the Napa Valley has been planted. Legislation prevents land with more than a 30 per cent slope from being converted to vineyard. Instead, these areas are generally forested, which helps to reduce erosion. The popularity and prestige of Napa Valley wine, along with an inability to expand production, leads to incredibly high grape and land prices.

Vines are typically pruned and trained to cordon or replacement spur, with VSP trellising. Mechanisation can be used on valley floor vineyards, whereas tending the vineyard by hand can be the only option on a number of mountain side vineyards. With a dry growing season, drip irrigation is widely installed.

Cool night temperatures mean that frost can be problematic in valley floor vineyards, whereas air movement and warmer nights in the mountain AVAs reduce the risk.

Napa County has its own sustainability certification programme called Napa Green. Certification is available for both the vineyard and the winery. Currently 40 per cent of California's certified sustainable wineries are in Napa Valley.<sup>18</sup>

### **WINEMAKING AND WINE STYLES**

Cabernet Sauvignon accounts for 40 per cent of total production and 55 per cent of crop value, with smaller plantings of Merlot, Pinot Noir, Zinfandel, Petit Verdot, Malbec, Cabernet Franc, Syrah and Petite Sirah. Chardonnay is the most planted white grape, followed by Sauvignon Blanc and Pinot Gris.<sup>19</sup>

Styles of wines from Napa have evolved over the last few decades. In the 1980s and 1990s, the preferences of the consumer and critics were for full-bodied, intense wines. Grapes were often harvested relatively late (given a 'long hang time') giving extra-ripe flavours, high alcohols and lower acidities. Both red and white wines were matured in a high proportion of new oak, giving overt vanilla, coconut and toasty characters.

Today, wine styles are far more divergent. The general trend is to pick earlier than in the past, and extra-ripe styles of wine are rarely seen. High proportions of new oak are still common for red wines, although the time spent in oak is often shorter than it once was. Napa wineries are generally well-resourced, and equipment may range from optical sorters for selecting the healthiest fruit to concrete eggs that are being trialled or used to provide a different blending component.

Even if red wines fulfil the requirements for single varietal labelling, they are likely to have a small proportion of other varieties in the blend; typically, a high proportion of Cabernet Sauvignon with small percentages of Merlot, Cabernet Franc and/or Petite Sirah.

Blending across different vineyards is also common, which may be within or across different AVAs. This may include vineyards on different soil types, for example those on the alluvial fans with those on more fertile fluvial soils, or the blending of fruit from cooler southerly AVAs such as Carneros or Coombsville with riper fruit from the more northerly AVAs. However, single-vineyard wines can also be found, particularly if the grapes are sourced from a well-known vineyard, such as To Kalon (in the Rutherford Bench area) or Martha's Vineyard.

Styles of Cabernet Sauvignon wines vary up and down the valley, depending on both the site (as explained above) and the choices made in grape growing and winemaking, but they tend to range from good to outstanding in quality and are usually premium or super-premium in price. Significant producers, among many, include Screaming Eagle, Harlan Estate and Stag's Leap Wine Cellars.

Chardonnay and Sauvignon Blanc are the two key white varieties in the Napa Valley. As with the red wines of Napa, the profiles of these white wines are influenced by the site. Cooler valley floor AVAs give higher acidities, warmer valley floor AVAs give riper fruit characteristics (more stone fruit and tropical rather than citrus) and mountain AVAs typically produce wines with less pronounced fruit. Chardonnay is often fermented and matured in oak, but usually less new oak than in the past. Sauvignon Blanc is usually made in an unoaked style (stainless steel fermentation, early release), but some producers make an oaked style.

## 23.4. Central Coast

The **Central Coast AVA** parallels the Pacific Ocean coastline and runs for 450 kilometres (280 miles) from San Francisco to Santa Barbara. It extends about 95 kilometres (60 miles) inland from the coast and is cooled by marine air funnelling through gaps in the coastal hills. It includes multiple counties, each of which have their own smaller AVAs, many of which are detailed below.

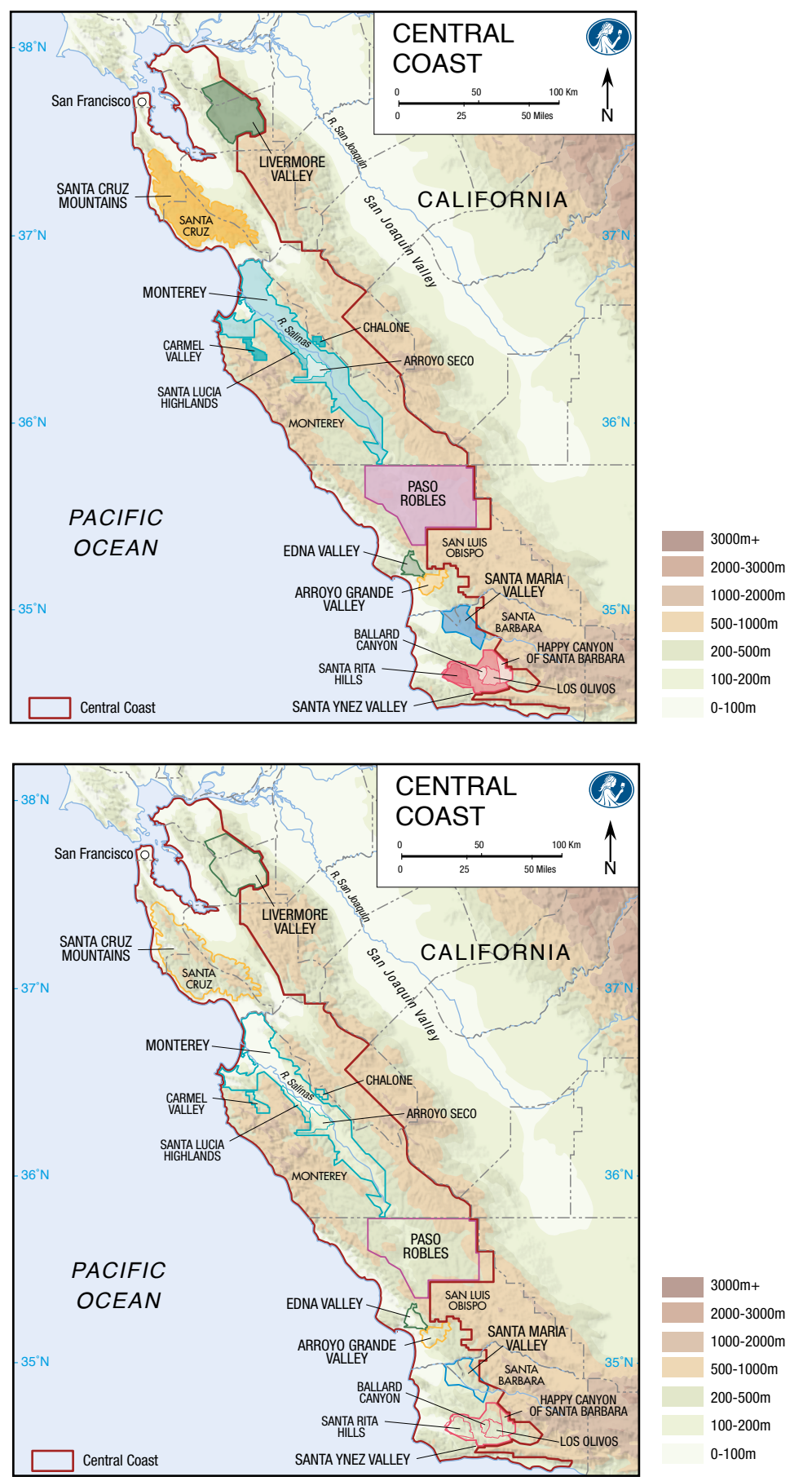
The Southern Coast Ranges (i.e. mountains), including the Santa Cruz, Gabilan and Santa Lucia ranges, run north to south, sheltering vineyards to the east from the cool wet fog rolling off the Pacific Ocean. At certain points, and especially in Santa Barbara County's Transverse Range, the orientation shifts to an east-west direction, funnelling in the cool marine air and cooling down the growing areas.

### Livermore Valley AVA

The Livermore Valley AVA is on the east side of San Francisco Bay in Alameda County. It is subjected to afternoon winds as hot air rises from the inland Central Valley to its east, sucking in cool air from San Francisco Bay. Stony soils are free-draining and help keep vigour low. A variety of grapes are grown including Chardonnay, Cabernet Sauvignon, Sauvignon Blanc and Zinfandel. Wines tend to have concentrated, ripe flavours and tannins, but with fresh acidity.

This AVA is one of California's oldest wine regions, with initial plantings in the 1760s by Spanish missionaries. In the 1880s, Wente Vineyards was established using Chardonnay cuttings from Meursault, and Concannon Vineyards was founded using Cabernet Sauvignon vines from Margaux. These are some of the oldest, continuously running wineries in the United States, operating even during Prohibition by producing sacramental wine. Today, about





80 per cent of California Cabernet Sauvignon (Clones 7, 8 and 11) and Chardonnay (Wente clone) are genetically related back to these original cuttings.

### **Santa Cruz Mountains AVA**

The Santa Cruz Mountains are part of the Coast Range that runs down the northern and central California coast. It includes three counties; Santa Clara, Santa Cruz and San Mateo. Many of the vineyards are planted at high altitudes (up to almost 800 m) along a ridgeline, providing a moderating influence on day-time temperatures. At night, cool air slips down the slopes, forcing warm air upward. Nights therefore remain relatively warm and frosts are generally avoided.

Cabernet Sauvignon, Chardonnay, and Pinot Noir are the most planted varieties. The AVA's eastern side, which borders Silicon Valley, is warmer and better suited to Zinfandel, Cabernet Sauvignon, and Merlot. Overall, the wines tend to be good to outstanding, and mid-priced to super-premium. Significant producers include Ridge Vineyards and Mount Eden Vineyards.

## **MONTEREY COUNTY**

The vineyard areas of Monterey County are based within the large Salinas Valley that runs from Monterey Bay in the north-west of the county to the border with San Luis Obispo County in the south, or in the mountain ranges either side of the valley.

### **Monterey AVA**

Stretching 130 kilometres (80 miles), the Monterey AVA is the largest in Monterey County. The majority of the AVA follows Salinas River Valley, which is moderated by cool marine air funnelled from Monterey Bay. The Salinas Valley opens directly onto Monterey Bay in the north. Due to a deep canyon in Monterey Bay, the water is particularly cold, and that means afternoons and evenings in the Salinas Valley can be particularly cool and windy. The coolest areas, those towards the north of the valley, are planted with Pinot Noir and Riesling; warmer sites further inland are able to ripen Cabernet Sauvignon, Merlot, Syrah and Zinfandel. Chardonnay is grown in both cooler and warmer sites and is the main grape variety with over 50 per cent of plantings.<sup>20</sup>

Soils are sandy loam and gravel and hence are free-draining. Low growing-season rainfall means that irrigation is essential, the water being sourced from the Salinas River. Availability of irrigation water and ease of mechanisation on the large flat valley floor means many of the grapes go into inexpensive and mid-priced high-volume wines, either exclusively from Monterey or into cross-regional blends.

### **Santa Lucia Highlands AVA**

The Santa Lucia Highlands AVA is a 30-kilometre (18-mile) long area of south-east facing alluvial terraces overlooking the Salinas Valley. Vineyards are planted up to around 350 m. Located relatively near to Monterey Bay, the vineyards are exposed to winds and fogs. Elevated locations take full advantage of the morning sunshine before afternoon maritime breezes cool the vineyards. It can sometimes be so windy that the vines' stomata close, slowing ripening. The key grape varieties are Chardonnay, Pinot Noir, with Syrah in more sheltered sites, all producing wines with fresh flavours and high acidities.

**Arroyo Seco AVA**

Named after the 'dry creek' upon which it sits, the Arroyo Seco AVA is located to the south and east of the Santa Lucia Mountains. It starts in the Arroyo Seco Canyon, a narrow gorge at the foot of the Santa Lucia Mountains, and then opens out onto the Salinas Valley floor. The vineyards within the canyon are more sheltered from coastal influences and are therefore warmer, growing Cabernet Sauvignon, Syrah and Zinfandel. Those on the valley floor are exposed to afternoon breezes and are better suited to Chardonnay and Riesling.

**Chalone AVA**

The Chalone AVA is in the eastern part of Monterey in the Gabilan Mountain Range. Vineyards are planted at around 550 m, and so sit above the fog line. Days are warm, with long hours of sunshine, but nights are much cooler, helping to retain acidity. The soils are made up of granite and limestone, and are free-draining helping to produce low yields of concentrated grapes. The AVA is best known for Chardonnay and Pinot Noir but grows a range of varieties including Chenin Blanc, Pinot Blanc and Syrah.

**Carmel Valley AVA**

Vineyards within the Carmel Valley AVA are predominantly located within Carmel Valley (a small valley parallel to the wider Salinas Valley) and the Cachagua Valley, which is further inland. Vineyard sites within the Cachagua Valley can be up to 670 m and sit above the fog line. Depending on aspect, these vineyards can be sheltered from coastal influences and hence can be some of the warmest in Monterey. However, altitude and being surrounded by mountains means that night time temperatures are still cool. In this area of the AVA, the most planted grape varieties are Cabernet Sauvignon and Merlot. Nearer the coast, in the cooler sites of Carmel Valley, plantings tend to be Pinot Noir and Chardonnay.

**SAN LUIS OBISPO COUNTY**

San Luis Obispo County is between Monterey County and Santa Barbara County on the Pacific coast. The main AVAs are Paso Robles, Edna Valley and Arroyo Grande.

**Paso Robles AVA**

Until 2014, Paso Robles was the largest undivided AVA in California at almost 250,000 ha (around three times the size as the whole of Napa Valley).<sup>21</sup> The area now has 11 sub-AVAs, which reflect distinct features in the growing environment and are less based on political boundaries than many other California AVAs. To date, Adelaida District AVA, located in the Santa Lucia Mountains in the north-west of the wider AVA is probably the best known. These wines may be labelled with the sub-appellation name but must also state 'Paso Robles' on the label.

The large AVA ranges from valley floors, to rolling hills to mountains with altitudes up to 670 m that can also have a cooling influence. The eastern parts of Paso Robles tend to have a warmer climate that produces full-bodied wines with concentrated, ripe fruit flavours, whereas western areas, nearer the Pacific Ocean, are generally cooler and can produce wines with higher acidity and fresher flavours. The Templeton Gap, on the west side of Paso Robles, is a low point in the Coastal Range that allows the Pacific Ocean's air to reach further inland, providing a moderating influence on temperatures of the westerly sub-AVAs.



**Rhône varieties and undulating terrain in Paso Robles**

Calcareous soils, which are not widely found in California, are a feature throughout much of the AVA, and in areas where the soil texture is clay (good at retaining water) and annual rainfall is moderate, producers can dry farm.

Black grape varieties make up the vast majority of plantings. The most planted grape variety is Cabernet Sauvignon, making up 39 per cent of plantings.<sup>22</sup> Merlot, Syrah, Zinfandel are also common, and the area has become known for a wide range of black and white Rhône varieties as well. Much of the region makes inexpensive to mid-priced wines of good quality, but there are a number of producers making very good to outstanding wines at mid- to premium prices. Significant producers include Saxum Vineyards and Tablas Creek.

### **Edna Valley AVA**

The Edna Valley AVA is known as being one of the coolest AVAs in California. About eight kilometres (five miles) from the Pacific Ocean, the valley lies northwest-southeast and receives cool fog and wind from Morro Bay to the north. Although most known for high quality Chardonnay and Pinot Noir (made into still and sparkling wines), a range of other varieties are planted, such as Syrah, Sauvignon Blanc, Albariño and Viognier.

### **Arroyo Grande Valley AVA**

Located south of Edna Valley, the Arroyo Grande Valley AVA is also considered one of the cooler areas in the state. The days are warm and sunny. However, the valley lies northeast-southwest which funnels in cool Pacific fog and wind up into the valley from the southwest, and cools temperatures at night, resulting in ripe grapes with high acidity. Pinot Noir and

Chardonnay dominate (again, for both still and sparkling wines), with some Zinfandel and Syrah planted in warmer areas, typically those further inland.

### **SANTA BARBARA COUNTY**

Santa Barbara County is the most southern part of the Central Coast AVA. Its six AVAs include Santa Maria Valley and Santa Ynez Valley, which includes four sub-AVAs: Sta. Rita Hills, Ballard Canyon, Los Olivos District and Happy Canyon of Santa Barbara.

The AVAs are located in the Transverse Ranges – an east-west orientation of the Southern Coast Ranges formed by plate tectonic shifts. Here, the western side of the valleys face the Pacific Ocean and funnel in the cooling breezes and fog eastward into the vineyards, lowering temperatures significantly. The western sides of the AVAs are usually cooler and windier than the eastern sides. Air circulation helps reduce risk of frost and fungal diseases, meaning the grapes can be kept on the vine into the autumn months, which can be needed in the coolest sites.

Chardonnay and Pinot Noir are the most common grapes in cooler areas. Pinot Noirs often show medium (+) to high acidity, medium to medium (+) body, medium tannins and flavours of red cherry and plum. Alcohol levels can be high. Chardonnays similarly have medium (+) to high acidity, medium to medium (+) body and lemon, grapefruit and peach flavours. Syrah is often grown in warmer sites and produces wines that are medium or medium (+) bodied, with medium (+) tannins and acidity and fresh flavours of blackberry and plum. A range of other grapes are grown, including Sauvignon Blanc, Cabernet Sauvignon and Rhône varieties, particularly Grenache and Viognier. Overall, the wines tend to be good to outstanding, and mid-priced to super-premium. Significant producers include Mail Road Wines and Sine Qua Non.

Legislation in Santa Barbara County prevents wineries from setting up cellar doors on the site of their winery. Any cellar door or tasting room must be in a town or city.

### **Santa Maria Valley AVA**

The Santa Maria Valley AVA is in the northern portion of the county. The valley runs west to east, consistently funnelling cool Pacific Ocean air east to the vineyards, keeping temperatures cool. Vineyards are planted between around 100–250 m on hillside slopes on sandy clay shale loam. Pinot Noir and Chardonnay are the most planted grape varieties, followed by Syrah and Viognier.

### **Santa Ynez Valley AVA**

Santa Ynez Valley AVA is a large AVA with both cool coastal and warm inland temperatures. It contains four sub-AVAs: Sta. Rita Hills, Ballard Canyon, Los Olivos District and Happy Canyon of Santa Barbara.

The **Sta. Rita Hills AVA** is distinguished by its cool temperatures and calcium-rich soils. Its east-west orientation is framed by the Purisima Hills to the north and the Santa Rosa Hills to the south. It is located at the western edge of the Santa Ynez AVA, closest to the Pacific Ocean, and is the first area to receive the cool Pacific fog and breezes that funnel inland through the Transverse Ranges. The hilly terrain with a diverse mix of soils leads to a variety of different site conditions. Pinot Noir, Chardonnay, Sauvignon Blanc, Viognier and Syrah are all grown.





**Vineyards in Sta. Rita Hills**

Out of all the AVAs in Santa Barbara County, Sta. Rita Hills is particularly known for its Pinot Noir. These wines often show black cherry, black plum, tea leaf and savoury notes combined with medium (+) to high acidity and medium (+) tannins. They command premium and super-premium prices given small supply and strong demand.

**Ballard Canyon AVA** is located further inland. Plantings are relatively small. The canyon runs north to south, sheltering the vineyards from much of the cool breezes from the west. However, the AVA does experience overnight fog giving cooler nights. The warmer growing conditions mean that rather than Chardonnay and Pinot Noir, later-ripening Syrah and Grenache are the two most planted grape varieties.

**Los Olivos AVA** sits on alluvial terraces above the Santa Ynez River, and between the AVAs of Ballard Canyon and Happy Canyon of Santa Barbara. It has warm, sunny days, but without altitude or much fog influence has a relatively low diurnal range. A mix of Bordeaux, Rhône and Italian varieties are grown.

The **Happy Canyon of Santa Barbara AVA** is a small and newly formed appellation. It is located in the eastern-most end of the Santa Ynez AVA, furthest from the Pacific Ocean. It is also where the east-west valley shifts orientation to north-south, and blocks the Pacific coastal breezes, giving warm temperatures. Cooling influences come from high altitude sites and exposure to afternoon winds, both of which can give a high diurnal range. Cabernet Sauvignon and Sauvignon Blanc are the most planted, along with other Bordeaux varieties, Syrah and Grenache.



Clear skies at sunset in Los Olivos

### 23.5. Central Valley

The Central Valley is entirely inland and covers a large area. It consists of two valleys – the Sacramento Valley makes up the northern half with 6,700 ha under vine,<sup>23</sup> while the San Joaquin Valley covers the southern half with around 61,000 ha under vine.<sup>24</sup> High yielding vineyards are on flat fertile areas, with day-time temperatures regularly around 35–40°C (95–104°F) resulting in very ripe grapes. Common varieties include French Colombard, Chardonnay, Muscat, Zinfandel and Merlot. The area is historically known for large-scale production, with E & J Gallo Winery and Bronco Wine Company as the area's largest producers. The majority of wines labelled with the 'California' appellation come from the San Joaquin Valley (none of San Joaquin, Sacramento Valley and Central Valley are AVAs).

#### Lodi AVA

The Lodi AVA sits at the northern end of the Central Valley area and 160 kilometres (100 miles) inland from the San Francisco Bay. It is a large area at almost 45,000 ha (around twice the size of the entire Sonoma County). Lodi has a hot Mediterranean climate, which is moderated by cooling afternoon winds both from the San Francisco Bay and the Sacramento-San Joaquin Delta. Flat land in the area with breaks between the North and South Coast Ranges means that breezes off the bay can travel far inland. Vineyards are on flatlands of free-draining sandy and clay loam soils. Low rainfall means that irrigation is widely used (sourced from the Mokelumne River that flows through the AVA). The windy conditions reduce the risk of fungal diseases and frosts. Vines are usually cordon-trained and VSP trellised as replacement-cane systems would require more labour. However, the oldest vineyards are planted to bush vines.





**High-volume production in the Central Valley**

The conditions mean that a wealth of varieties can ripen well yet maintain a degree of freshness, including those from the Rhône and South of France (Syrah, Grenache, Cinsault, Mourvèdre, Viognier, Picpoul), Bordeaux (Cabernet Sauvignon, Merlot, Sauvignon Blanc), Spain (Tempranillo, Graciano, Albariño), Portugal (Touriga Nacional, Tinta Cão), Germany (Riesling, Gewurztraminer) and Italy (Barbera, Aglianico). Lodi is particularly well-known for Zinfandel, with some vines over 100 years old (sandy soils mean that phylloxera has not been a problem in some areas of the AVA). Styles range from medium to full-bodied, with medium to medium (+) acidity, ripe tannins and flavours of cherry, blueberry and blackberry.

Grapes from Lodi may either be part of an inexpensive California blend made by one of California's large producers, due to the low price of its fruit, or be used in wines made from grapes entirely from the AVA. Wines range from good to very good with some outstanding examples, and prices from inexpensive to premium. The most expensive wines are often from single vineyards of old, dry-farmed bush vines. Significant producers include Michael David and Ravenswood.

In 2006, the Lodi AVA was divided into seven sub-AVAs. The **Mokelumne River AVA** contains the majority of Lodi's wineries as well as old Zinfandel vines. Wines from these seven sub-AVAs must state 'Lodi' on the label as well as the name of the sub-AVA.

Lodi Rules, the first sustainability programme in California, was founded in the area. Over 1,000 wineries are currently certified both in California and elsewhere in the world. Around one fifth of Lodi's vineyards are currently certified sustainable.



Old bush vines in Lodi

### Clarksburg AVA

The Clarksburg AVA is southwest of Sacramento, and given its proximity to the Sacramento-San Joaquin Delta, shares a similar climate to that of Lodi with hot days moderated by afternoon breezes. It is most known for Chenin Blanc and Petite Sirah, as well as large plantings of Chardonnay, Pinot Grigio, Sauvignon Blanc and Viognier. Relatively few wines are labelled with the Clarksburg AVA and the majority of its grapes find their way into California blends.

## 23.6. Sierra Foothills

Sierra Foothills is a region and AVA located 160 kilometres (100 miles) east of San Francisco, in the western foothills of the Sierra Nevada mountain range. Vineyards were originally established in the mid- to late 1800s during the California Gold Rush, with vine cuttings from European immigrants-turned gold prospectors. Although many vineyards were abandoned during Prohibition, wine production grew again from the 1960s.

The **Sierra Foothills AVA** is vast, covering just over 1 million ha and encompassing multiple counties as well as a few smaller AVAs. The majority of the plantings are in Amador County's California Shenandoah Valley AVA and Fiddletown AVA, and in the El Dorado AVA in El Dorado County.

Day-time temperatures are hot, up to 35–40°C (95–104°F), but cool air descends from the mountains at night giving a high diurnal range. Planting at altitude also helps to manage sugar levels; up to around 600 m in Amador County and over 1,000 m in El Dorado AVA. The predominant soil type is a sandy clay loam from decomposed granite that retains sufficient water to allow for dry farming.

Sierra Foothills is most known for its old-vine Zinfandel, with some vines considerably over 100 years old. In addition to Zinfandel, a range of Rhône (Viognier, Roussanne, Marsanne, Grenache, Mourvèdre, Syrah), Italian (Barbera, Sangiovese, Pinot Grigio, Aglianico) and Spanish (Tempranillo) varieties are also planted.

### **23.7. South Coast**

The **South Coast AVA** extends from south of Los Angeles to the border with Mexico. It includes a number of sub-AVAs. Many of the vineyards are planted in areas exposed to breezes from the Pacific, though some instead rely on altitude for temperature relief, as the low latitude of the area means that some cooling influence is necessary for quality wine grape production.

Grapes were originally planted by Franciscan monks in the 1760s and commercial vineyards were planted in the 1830s. After Prohibition, vineyard land was overtaken by food crops, housing and urban sprawl in general. Pierce's disease spread through the area in the 1990s. However, this has allowed producers to reconsider their choice of varieties, rootstocks and clones when replanting, with quality rather than quantity as the focus. Chardonnay, Cabernet Sauvignon, Zinfandel and Chenin Blanc are some of the most common varieties found here.



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