PETITION TO ESTABLISH A NEW AMERICAN VITICULTURAL AREA TO BE NAMED PAULSELL VALLEY

The following petition serves as a formal request for the establishment and recognition of an American Viticultural Area to be named Paulsell Valley, located in eastern Stanislaus County, California. The proposed AVA covers approximately 34,155 acres and includes approximately 826 acres of planted and productive vines across three vineyards. In addition, a fourth vineyard of approximately 700 acres is planned for the area. This petition is being submitted by Patrick L. Shabram on behalf of Rock Ridge Ranch, representing growers in the area.

This petition contains all the information required to establish an AVA in accordance with Title 27 Code of Federal Regulations (CFR) part 9.3.

Table 1 - Distinguishing characteristics of Paulsell Valley relative to surrounding areas

	Paulsell Valley	**North**	**South**	**East**	**West**
Topography	Mound-intermound exceeding 80 foot relief	Fluvial Valley (Stanislaus River)	Mound-intermound (less than 80 foot relief) and Modesto Reservoir	Foothills to mountains	Transitioning to valley floor
Geology	Volcanic tuff and alluvial fan deposits	Alluvium of mixed sources	Volcanic tuff and granitic sediment	Volcanic, metamorphic and sedimentary rock	Volcanic tuff and alluvial fan, transitioning to deep alluvium
Elevation	145ft.-610ft. Mostly 180ft.-400ft.	Generally below 300ft.	Below 400ft.	Above 200ft. to several thousand feet	Generally below 280ft.
Mesoclimate	Greater than 4200 DD*, slightly wetter	Unreported	3900DD to 4450 DD, slightly drier	>4200 DD but cooling moving east, wetter	3800 DD to 4450 DD, drier
Soil	Pentz, Peters, and Keyes most common	Mixed alluvial soils	Whitney, Hopeton, or Hanford more common	Exchequer and Auburn and Amador soils	Peters, Pentz, and Keyes most common, transitioning to deep alluvium
Common varietals	Cabernet Sauvignon, Petite Sirah, Petit Verdot	Unknown or limited	Unknown or limited	Unknown or limited (Sierra Foothills most known for Zinfandel)	Cabernet Sauvignon most common
Existing AVAs	N/A	N/A	N/A	Sierra Foothills (non-adjacent)	N/A

*DD = degree days

Overview

The Paulsell Valley viticultural area is located in eastern Stanislaus County south of Knights Ferry and southeast of Oakdale. The name is taken from the Paulsell Valley, a valley carved by Dry Creek in and around the unincorporated community of Paulsell. Located above the valley floor of the San Joaquin Valley, the area is at the base of the foothills of the Sierra Nevada rising to the east. Growers have known that the area possesses soils unique from the deep alluvium of the San Joaquin Valley, but that the area is not yet in the foothill soils and climate common to the Sierra Foothills AVA.

The area is currently home to three vineyards totaling 864 acres of planted vines, with a fourth vineyard of approximately 700 acres currently planned. The proposed Paulsell Valley American Viticultural Area (AVA) occupies a total of 34,155 acres. The Paulsell Valley is not currently within or adjacent to any existing AVA. The closest existing AVA is the Sierra Foothills AVA located approximately one mile to the northeast at its closest location.

Name Evidence

Although not currently identified by the United States Geographic Survey (USGS) Board on Geographic Names or on USGS topographic maps, the name is nonetheless recognized regionally and by local growers and residents of the area. Usage of the name includes references from government sources. First, the name has been used extensively by the Oakdale Irrigation District. Frank Clark, a director with the Oakdale Irrigation District, used the name in a 2014 opinion editorial to *The Modesto Bee*, stating, "The canal currently serves only a tiny portion of that area, about 2,000 acres [of farming operations] known as the Paulsell Valley."[1] Second, the name also has been used by the United States Department of Agriculture Soil Conservation Service. In the 1957 Soil Survey of Eastern Stanislaus County, the survey describes Paulsell series soils as "along

[1] Clark, Frank, "Frank Clark: Oakdale Irrigation District doesn't mine groundwater," *The Modesto Bee*, November 16, 2014, accessed online at http://www.modbee.com/opinion/article4164277.html.

Dry Creek in the Paulsell Valley."[2] Further, a 1961 soil association map from the U.S. Department of Agriculture Soil Conservation Service, describes the Paulsell soil association as "Deep, clay soils on lacustrine deposits in Paulsell Valley."[3]

Additional articles in the *Modesto Bee* also reference Paulsell Valley. A May 2014 article on Oakdale Irrigation District expansion notes, "Additional farmers in the Paulsell Valley east of Modesto also are interested in tapping into OID's water supply... OID directors on Tuesday agreed to initiate a conceptual engineering plan and cost estimates for serving portions of the Paulsell Valley."[4] The headline of a September 2014 article notes "OID rejects request to help fund Paulsell Valley expansion study."[5] In another 2014 article, the newspaper notes "O'Laughlin said he previously looked into options for OID to deliver water to the Paulsell Valley in eastern Stanislaus..." also referring to another farmer as "Paulsell Valley almond grower Louis Brichetto."[6] An additional *Modest Bee* reference using the name Paulsell Valley includes a November 3, 2014 article, "Numerous Stanislaus County farmers – such as those in the Paulsell Valley southeast of Oakdale,"[7] The name also appears in *Eye on Modesto*, a local political blog, on November 26, 2012. The *Eye on Modesto* piece references *The Modesto Bee* and the Oakdale Irrigation District and the annexation of Paulsell Valley into the district.[8]

Finally, the name Paulsell Valley has been used by to describe the origin of wine. A wine from Rock Ridge Ranch on the wine list at Bello Luna Bistro in Merced, California,

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[2] United States Department of Agriculture Soil Conservation Service and California Agriculture Experiment Station, *Soil Survey: Eastern Stanislaus Area*, Series 1957, No 20, 1964, page 17. A second reference to Paulsell Valley is found on page 7 when describing the "Paulsell association" soils.
[3] United States Department of Agriculture Soil Conservation Service University of California Agriculture Experiment Station, *General Soil Map: Eastern Stanislaus County*, 1961.
[4] Sbranti, J.N., "Oakdale Irrigation District considers expanding water deliveries to farms and homes," *The Modesto Bee*, May 6, 2014. Accessed online at https://www.modbee.com/latest-news/article3164325.html.
[5] Sbranti, J.N., "OID rejects request to help fund Paulsell Valley expansion study," *The Modesto Bee*, September 16, 2014. Accessed online at https://www.modbee.com/news/local/article3172373.html.
[6] Sbranti, J.N., "OID water sales plan bashed by county advisory committee," *The Modesto Bee*, November 19, 2014. Accessed online at https://www.modbee.com/news/special-reports/groundwater-crisis/article4025625.html.
[7] Sbranti, J.N., "OID to discuss selling water to outside agencies during closed-door meeting," *The Modesto Bee*, November 4, 2014. Accessed online at https://www.modbee.com/news/local/oakdale/article3546951.html.
[8] Drake, Emerson, "Comparing Our Board to Theirs is an Insult Says OID Board Member," *Eye on Modesto,* November 26, 2012.

for example, is identified as Rock Ridge, Paulsell Valley Cabernet Sauvignon. Examples of name usage are provided as Exhibits G - M.

Historical Evidence

Viticulture within the proposed Paulsell Valley AVA may have existed as early as the late 19th Century. An 1888 directory of grape growers showed ten growers served by the Knights Ferry post office ("Knight's Ferry" in the directory).[9] Knights Ferry is an adjacent community to the north of the Paulsell Valley viticultural area. The location of at least two of those growers, Abraham Schell and H.R. Schell of Red Mountain Vineyard, was about one mile north of Knights Ferry, hence outside the Paulsell Valley viticultural area. The location of the other growers is not immediately clear, and it is possible that grapes were grown within the northern reaches of the proposed AVA. Additional census and references show viticulture acreage in the Knights Ferry area as early as 1870, as well as in 1891. While the Red Mountain Vineyard and its winery was known to have reestablished after Prohibition, eventually closing in 1943, the histories of other vineyards are not immediately known. The Annual Report of the Board of State Viticultural Commissioners in 1881 notes, "The grapes grown compare favorably with those in other localities, the largest vineyards being in and around Knight's Ferry. ...H.B. Peutland, of Knight's Ferry, report 25 to 30 acres in vines, and large quantities of suitable land in that vicinity."

The first modern vineyard was planted by Bill Jackson in the early 2000's. The Jackson vineyard was planted south of Dry Creek. Almost directly north of Dry Creek, Rock Ridge Ranch first planted vines in 2010, while Rock Creek Vineyards was planted in 2013. No wineries exist within the area, but French Bar wines was created with the 2015 vintage to produce wines specific to the region, sourcing fruit mostly from Rock Ridge Ranch.

[9] Peninou, Ernest P., A History of the San Joaquin Viticultural District, unpublished, 1965, 1995, 2000.

Geographic Evidence

The Paulsell Valley occupies some of the first rises out of the San Joaquin Valley floor, and, as such, is described as part of the foothills of the Sierra Nevada. Elevations are not as high as the Sierra Foothills AVA to the east, however. Further, soils found within the vicinity of the Sierra Foothills AVA to the east differ from soils found within the Paulsell Valley. Further, more detailed study of the area shows topographic and climatic differences that distinguish the Paulsell Valley area from the San Joaquin Valley floor farther to the west and the Sierra Foothills AVA farther to the east. The Paulsell Valley is warmer, but wetter than vicinities to the west, while drier than vicinities to the east. Further, topography distinguishes this viticultural area in every direction, while soils distinguish the region from areas to the north, east, south, and farther to the west.

Topographic and Geologic evidence – The Paulsell Valley landscape is dominated by rolling hills marked by cut arroyos, but also interspersed with steep isolated hills. The topography is referred to as mound-intermound topography or as "mound, intermound microrelief" by Natural Resource Conservation Service (NRCS) soil descriptions. Elevation ranges from approximately 140 feet to 612 feet above sea level, but the bulk of the proposed AVA is within the 180-foot to 400-foot range. The higher hills have elevations above 300 feet and local relief ranging from 80 feet to 180 feet. The Paulsell Valley is carved by Dry Creek, with some drainage towards Modesto Reservoir to the south and towards the Stanislaus River to the north. The hilly terrain pivots around a fluvial plain along Dry Creek, around the community of Paulsell in the western part of the viticultural area, and an area to the east around Warnerville. Because of the mound-intermound relief, the fluvial valley known as Paulsell Valley can be difficult to define in areas, as the isolated hills don't form the typical drainage divides common to many other fluvial valleys.

The role of geology is important to the characteristics of the area. The area was heavily deposited by ancient volcanic activity that was primarily pyroclastic in nature (i.e., lacking lava flow). Layers of volcanic tuff, rock created from the deposition of volcanic

ash, are the parent material for the most common soil types (Pentz and Peters, as noted later in this petition). Further, alluvial fans associated with volcanic activity are the source of Keyes series soils, the third most viticulturally significant soil in the area. While all the rock in the area lacks significant resistance to weathering, the layers that are more resistant protect less resistant layers below. Hence, where more resistant layers persist, hills are present. The higher hills have a greater number of resistant layers present.

Further, the layer of alluvial deposition that is the source of Keyes series soils suggests significant flooding events, possibly also associated with volcanic eruptions. The cobbly soils associated with this layer, observed with a number of larger stones that are less easily eroded, serve as a secondary resistant layer to soils developing underneath this layer. Hence, a number of cobbly soils are present, interspersed with soils formed from volcanic tuff.

Mound-intermound relief is also identifiable outside the Paulsell Valley, but the relief becomes less pronounced. This relief is mostly found to the south, southwest, and southeast of the Paulsell Valley viticultural area, but the upper depositional layers have been weathered and eroded away. Within the Paulsell Valley, the most predominant layers of soil-forming material reside in the 300-foot to 500-foot elevation range. The relief of mounds north of Modesto Reservoir is commonly 80 to 180 feet, with maximum elevations typically above 300 feet and many with summits above 400 feet in elevation. South and east of Modesto Reservoir and west of Cashman Creek, mounds are typically below 300 feet in elevation with relief commonly below 80 feet and most mounds with relief lower than 70 feet. While the hills are lower outside Paulsell Valley, they generally occur in greater frequency. Hence, these areas lack the relatively more resistant rock layers found in the Paulsell Valley area.

Topography to the west, east, and north of the area contrasts with the mound-intermound topography and rolling hills found within the area. To the west is the San Joaquin Valley floor, offering significantly flatter terrain. Meanwhile, terrain to the east offers more

consistency in underlying bedrock rather than layers of depositional material, hence a more dendritic-like stream pattern and more consistency in slope. The underlying bedrock to the east is primarily volcanic and metamorphic rock created from past lava flows. The Paulsell Valley viticultural area is layered in pyroclastic material as a result of local volcanic activity, but the areas to the east, mostly at or east of Willms Road, were created through andesitic lava flow and metamorphic rock altered by the heat from these lava flows.

North of the Paulsell Valley area is the Stanislaus River floodplain. Here the Stanislaus River has carved through the layers found within the Paulsell Valley. This area is a more traditional valley carved by the Stanislaus River. Along the floodplain are alluvial terraces and alluvial fans that differ from the mound-intermound topography of the Paulsell Valley area.

Elevations within the Paulsell Valley also distinguish the area. To the west on the valley floor, elevations are typically below 300 feet, but more commonly below 200 feet. Elevations to the east are much higher, at 500 to 3500 feet. As noted earlier, elevations within the Paulsell Valley are typically between 180 feet and 400 feet, with some higher hills above 500 feet. As noted later in this petition, the subtly higher elevations of the Paulsell Valley may play a role in both temperatures and precipitation. The Keyes soils, cobbly loams identified later in this petition, mostly fall within this range. Hence, elevations below this level are missing this depositional layer. Within the Paulsell Valley, viticulture appears in the 180-foot to 400-foot range.

The underlying geology plays a significant role in soil development. Most of the higher mound summits, for practical reasons, are not currently under cultivation. Yet the mineral contributions of the higher mound layers, as higher layers erode onto surrounding terrain, contribute to the mineral construct of soil surrounding these higher mounds. Soils within the Paulsell Valley experience excellent drainage, reducing the potential for soil borne pathogens while placing enough stress of vines to instill more complex flavor in the grapes. While the soils are well-drained, the soils eroding off the higher slopes, combined

with a dry climate, can help assure soils are not leached of nutrients. Meanwhile, minerals present may impact microbial life. While the role of minerals on wine flavor are debated, more recent research suggest microbes may impacted regional flavors of wine.[10] Further, vines within the Paulsell Valley benefit from slope, which helps ensure good drainage and exposure, but the isolated nature of higher mounds decreases shadows, allowing most vineyards to receive long hours of solar radiation. While mound-intermound topography exists to the south, the mounds are lower reducing the mineral contributions of higher depositional layers that have already eroded from the area. Further, mounds are less frequent to the west reducing the mineral contributions to the soil composition. An absence of mound-intermound topography to the north and east means soils are not experiencing the same chemical composition and are more prone to fluvial valleys with east/west orientation, creating greater necessity to consider the effects of south facing versus north facing slope on vineyard development.

Climatic evidence – Temperatures found in the Paulsell Valley area are generally warmer than temperatures found on the San Joaquin Valley floor. A review of 2017-2012 growing degree days (GDD) from seven weather stations in and around the Paulsell Valley was conducted as part of a geographic study completed prior to this petition. Three of these stations were within the proposed Paulsell Valley AVA, while one is to the east in the Sierra Foothills AVA (Green Springs), one is to the west of the viticultural area (Oakdale), and two are to the southwest (Blue Oak Vineyards and Denair II). Data from these stations show that temperatures within the proposed AVA are generally warmer than on the San Joaquin Valley floor to the west (Tables 3 and 4). The warmest of the stations assessed as part of the climate analysis was Rock Ridge Ranch (RRR) located within the Paulsell Valley area, with GDD ranging from 4607°F to 5204°F. Weather stations on the San Joaquin valley floor at Blue Oak Vineyard (with GDD ranging from 4056°F to 4179°F), Denair II CIMIS 206 station (with GDD ranging from 3934°F to 4437°F), and CIMIS 194 at Oakdale to the west of the Paulsell Valley (with GDD ranging from 3780°F to 4308°F) were all lower than the three Paulsell Valley stations. The coolest of the three Paulsell Valley stations, Warnerville (with GDD ranging

[10] Gilbert, Jack A., van der Lelie, Daniel, and Zarraonaindia, "Microbials *terrior* for wine grapes, Proceeding of the National Academy of the Sciences, January 7, 2014.

from 4201°F to 4534°F) had an average 2017-2014 GDD of 4,320°F, compared to 4,299°F at Oakdale. Green Springs (GRN) within the Sierra Foothills AVA, demonstrates GDD more consistent with the Paulsell Valley stations, with a range of 4586°F to 4711°F[11], which falls between Rock Ridge Ranch and Rock Creek Vineyards (4455°F to 4922°F[12]).

Table 2 - Weather Stations

Location	Station ID	Agency/Source	Lat.	Long.	Elev.
Rock Ridge Ranch (Paulsell Valley)	RRR	Rock Ridge Ranch	37.728	-120.664	313 ft.
Rock Creek Vineyard (Paulsell Valley)	RCV	Rock Ridge Ranch	37.728	-120.626	249 ft.
Warnerville (Paulsell Valley)	CWS	Stanislaus County (CDEC)	37.725	-120.601	226 ft.
Blue Oak Vineyard	BOV	Rock Ridge Ranch	37.651	-120.843	140 ft.
Oakdale	CIMIS194	California Irrigation Management Information System	37.727	-120.851	165 ft.
Denair (Denair II)	CIMIS206	California Irrigation Management Information System	37.546	-120.755	150 ft.
Green Springs	GRN	Cal Fire (CDEC)	37.833	-120.500	1020 ft.

Heat summations at Green Springs are consistent with temperatures found within the Paulsell Valley area, falling between Rock Ridge Ranch and Rock Creek Vineyard. Hence, like the Paulsell Valley, temperatures to the east of the Paulsell Valley study area are also warmer than the San Joaquin valley floor. Further analysis of daily temperatures suggests that the discrepancy between temperatures on the valley floor and Paulsell Valley and areas to the east are more a result of lower minimum temperatures on the valley floor rather than lower maximum temperatures, hence creating overall lower averages (Table 5).

Table 3 – 2017-2012 GDD for weather stations in and around the Paulsell Valley (°F)

Station	2017 GDD	2016 GDD	2015 GDD	2014 GDD	2013 GDD	2012 GDD
RRR	4952	4846	5015	5204	4758	4607
RCV	4455	4461	4756	4922	---	---
CWS	4330	4201	4389	4534	4268	---
BOV	4179	4056	---	---	---	---
C194	4308	4212	4165	4250	4035	3780
C206	4120	4142	4437	4338	4131	3934
GRN	4711	4601	4702	---	4586	4624

[11] Data are incomplete for 2014.
[12] Dara are incomplete for 2013 and 2012.

Table 4 – Average GDD for stations in and around the Paulsell Valley, based on most recent seasons (°F)

Station	2 YR Ave	3 YR Ave	4 YR Ave	5 YR Ave	6 YR Ave
RRR	4899	4938	5005	4955	4897
RCV	4458	4557	4649	---	---
CWS	4266	4307	4364	4344	---
BOV	4118	---	---	---	---
C194	4260	4228	4234	4194	4125
C206	4131	4233	4259	4234	4184
GRN	4656	4671	---	---	---

Table 5 – Average Growing Season Low Temperatures in the Paulsell Valley and on the San Joaquin Valley Floor

Station	Average Min Temp (°F)
RRR	57.9
RCV	55.4
CWS	54.8
BOV	52.4
C194	53.9

In terms of precipitation (Tables 6 and 7), a general pattern exists of precipitation increasing from west to east (Graph 1). The highest precipitation values are found at Green Springs in the Sierra Foothills AVA to the east of the proposed Paulsell Valley AVA, and the lowest totals are found at the CIMIS 206 station in Denair, southwest of the proposed AVA. Average precipitation data for CIMIS 194 at Oakdale are not shown in Graph 1 or Table 6, as 2016-2017 data are incomplete, but in other years the station is typically higher than Denair and Blue Oak Vineyard, but lower than Rock Ridge Ranch, Rock Creek Vineyards, and Warnerville. The one exception is 2014-2015, when Oakdale shows higher precipitation than any of the Paulsell Valley stations. The calculated five-year average for 2011-2016 shows 10.5 inches at Oakdale compared to 13.7 inches at Warnerville and 9.7 inches at Denair. Hence, on average, the Paulsell Valley receives less

precipitation than in the higher foothills to the east and more precipitation than on the valley floor to the west.

Graph 1 – Two-year average precipitation in inches at stations in and around study area, identified from west to east

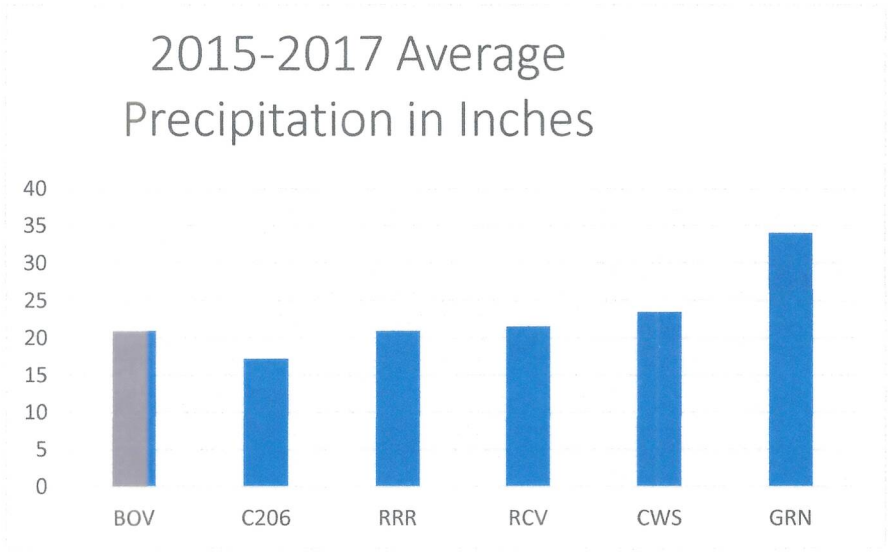

Table 6 – Annual Precipitation for weather stations in and around Paulsell Valley (inches)

Station	2016-2017	2016-2015	2014-2015	2013-2014	2012-2013	2011-2012
RRR	24.0	17.9	9.6	---	8.3	---
RCV	25.4	17.8	9.2	7.6	---	---
CWS	26.4	20.5	10.6	8.8	10.6	18.2
BOV	23.2	18.8	---	---	---	---
C194	---	15.9	11.4	6.6	9.7	8.6
C206	19.6	14.7	8.9	6.6	6.8	7.7
GRN	37.6	30.5	---	---	---	---

Table 7 – Annual Precipitation Averages based on most recent years (inches)

Station	2 YR Ave	3 YR Ave	4 YR Ave	6 YR Ave
RRR	21.0	17.2	---	---
RCV	21.6	17.5	15.0	---
CWS	23.5	19.2	16.6	15.9
BOV	21.0	---	---	---
C194	---	---	---	---
C206	17.2	14.4	12.5	10.7
GRN	34.1	---	---	---

Although most of the precipitation falls outside the growing season, precipitation was assessed primarily because it is a defining characteristic presented in the Treasury Decision establishing the Sierra Foothills AVA (T.D. ATF-261) to the east. Specifically, the Treasury Decision notes lower precipitation in the Sierra Foothills AVA than in the higher elevations of the Sierra Nevada. With orographic lifting, precipitation values would be expected to be greater in the higher elevations of the Sierra Nevada than in the Sierra Foothills AVA and higher in the Sierra Foothills AVA than in the Paulsell Valley. Further, the Paulsell Valley would be expected to have higher precipitation totals than the San Joaquin valley floor. Data support the expectation of higher precipitation totals moving from the San Joaquin valley floor towards higher elevations in the Sierra Nevada (Graph 1), a result of orographic lifting and a dominant westerly flow. The valley floor station with the most complete data set (Denair II – CIMIS 206) and the station with the most complete totals within the Paulsell Valley area (Warnerville – CWS) shows a six-year average of 15.9 inches at Warnerville, compared to only 10.7 inches at Denair (Table 6). Unfortunately, only two years of reliable data were available at Green Springs, within the Sierra Foothills AVA. The distinction between Green Springs and the Paulsell Valley stations, however, is even greater than the distinction between the Paulsell Valley and the valley floor (two-year average of 34.1 inches at Green Springs compared to a range of 21.0 inches to 23.5 inches at the Paulsell Valley area weather stations and 17.2 inches at Denair). Hence, precipitation totals help distinguish the Paulsell Valley area both from the valley floor and from the Sierra Foothills to the east.

A wetter climate to the east of the Paulsell Valley may also be visible in an increase in biomass moving into the higher elevations. While grasses dominate the Paulsell Valley area, the edges of oak woodland are located to the east of the area. Trees typically require greater availability of moisture. As temperatures, and hence potential evapotranspiration rates, are relatively consistent, the increase in available moisture is explained either through higher soil field capacity or greater precipitation.

Hence, the Paulsell Valley is both warmer and slightly wetter than the San Joaquin valley floor. Further, the Paulsell Valley receives less precipitation than the Sierra Foothills

AVA to the east. Data were not assessed along the Stanislaus River to the immediate north or to the immediate south.

Temperature indices like GDD have long been used to establish viticultural regions.[13,14] Long traditions in grape growing regions has shown that climate plays a significant role in wine grape development.[15] Temperatures impact the timing of bud break, grape development and sugar accumulations, and subsequent harvest dates as well as the appropriate varietal for a given region. Warmer temperatures often translate into earlier bud break, grape maturity and harvest dates. Hence, grapes grown within the Paulsell Valley experience different bud break, blossom, flowering, veraison, and harvest dates than areas to the west and south. Meanwhile, higher low nocturnal temperatures allow for more grape development at low temperatures, which may impact character in the wine made from these grapes. Further, when combined with soil field capacity, precipitation may also impact the prevalence of certain diseases, the need for irrigation, the accumulation of excess juice in the grape diluting flavor, and the types of stressed placed on grapes, which impacts the overall characteristics of the grapes and character in the wine produced from these grapes. Given the timing of rainfall, the slightly wetter conditions of the Paulsell Valley compared to the west likely has little negative impact on grape conditions, but may offer more soil moisture, reducing the need for irrigation, than what otherwise may be needed. Yet by being west of the wetter conditions caused by orographic lifting in the Sierra Foothills, Paulsell Valley viticulture avoids some of the concerns of harvest time rainfall that could impact viticulture further to the east.

Soil evidence – The most common soils in the study area are Pentz series soils, ranging from Pentz cobbly loam to Pentz sandy loam. Not including Peter-Pentz complex soils, these soils account for 23% of the defined viticultural area. The official soil descriptions (OSD) from the NRCS describe these soils as "shallow, well drained soils that formed in material weathered from weakly consolidated basic andesitic tuffaceous sediments."

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[13] Jones, Gregory V. et al, "Spatial Analysis of Climate in Winegrape Growing Regions in the Western Unites," American Journal of Enology and Viticulture, September 2010, 313-326.
[14] Swinchatt, Jonathan and Howell, David G., *The Winemaker's Dance: Exploring Terrior in the Napa Valley*, University of California Press, 2004.
[15] Winkler, A.J. et al, *General Viticulture*, University of California Press, 1974.

Pentz soils are commonly found on hilly terrain with localized mound-intermound topography.

Associated with the Pentz series soils and common to the area are Peters series soils. Peters series soils account for 11% of the total area. These soils range from cobbly clay to clay. A basic description of Peters series soils is almost identical to Pentz series soils: shallow, "well drained soils that formed in material weathered from weakly to moderately consolidated basic andesitic tuffaceous sediments." Peters series soils occur on nearly level to steep terrain.

In addition to the Pentz series soils and the Peters series soils is the Peters-Pentz complex. A complex is found in areas with similar soil types that are mixed at such a scale that they are not defined as one or the other. This complex represents slightly less than the total Pentz series area, at a little more than 22%. Collectively, Pentz, Peters, and Peters-Pentz complex represent 57% of the defined viticultural area.

Another soil type found within the study area and common to local viticulture is Keyes series soils (10% of total area). These soils are highly-gravely to cobbly loams described as having "formed on material weathered from basic andesitic sediment." These soils are found on alluvial fans or terraces or in mound-intermound relief.

The Pentz and Peters soils are tied closely to the geologic and topographic distinction of the Paulsell Valley viticultural area. The soils are indicative of deposition created through volcanic activity. They also are associated with mound-intermound topography. Pentz soils are more typically at the summit of the larger mounds, while a combination of Peters, Pentz, or Peters-Pentz complex surrounds them. Despite extreme textural differences, Keyes soils are also a result of similar volcanic deposition, but in this case associated with fluvial processes. Where the Keyes parent layer has been exposed, rockier Keyes soils replace loam.

Also of consideration is the Raynor series clay to clay loam (8% of total area). A limited amount of Raynor clay is currently home to viticulture in the area. Raynor clay is formed from andesitic mudstone.[16]

Another soil common to the area is the Paulsell clay, an alluvial soil with grassland vegetation (7% of total area). This soil series is common to the lower-lying areas of the Paulsell Valley, outside the Dry Creek arroyos. Currently no viticulture is found within the Paulsell series soil type. Paulsell series soils formed from former lake sediment[17]. In other words, past poor drainage allowed finer materials to wash down into these lower-lying areas, which explains both why terrain is so flat in these areas and why they are higher in clay content. Today, these soils are well-drained by Dry Creek, which has created a deep incision through these sediments.

The three most important soils to viticulture, Peters, Pentz, and Keyes soils, are found outside the defined viticultural area, as the tuffaceous and fluvial deposits are not limited to the Paulsell Valley. Pentz, Peters, and Keyes series soils extend to the west and southeast of the Paulsell Valley. So too are the Raynor series soils and Paulsell soils found outside the Paulsell Valley viticultural area.

Sharp contrasts in soils exist, however, to the northeast and south of the viticultural area. To the northeast, mostly east of Willms Road, Amador and Auburn series soils are more common. Amador soils are similar to Peters and Pentz soils in that they are formed from consolidated tuffaceous sediments and are common to mound-intermound relief. Auburn series soils, however, have metamorphic parent material, specifically amphibolite schist. Other soils, such as Exchequer soils, are derived from metamorphosed igneous rock. Further, a number of lava flows are evident in the area, pointing to a greater geologic influence from andesitic igneous rock. Also found are schist outcrops (metamorphic rock) and Hornitos soils, which are derived from sedimentary rock inconsistent with Peters/Pentz parent material.

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[16] A description of Raynor series soils is not available through the OSD website. This description is taken from the 1965 soil survey.

[17] United States Department of Agriculture Soil Conservation Service and California Agriculture Experiment Station, *Soil Survey: Eastern Stanislaus Area,* 1964.

To the south, Hopeton clays, Montpellier coarse sandy loam, and Whitney sandy loams become more common. These soils are formed from deposited sediments usually of granitic origin or weakly consolidated sandstone of weathered igneous materials. Hence, these soils are unlike Peters, Pentz, and Keyes soils in the lack of volcanic tuff material. To the north, alluvial sandy soils are found in alluvial deposits along the Stanislaus River floodplain. These soils include Honcut, Hanford, and Columbia series soils. Tailings and dredge from former mining operations are also abundant along the river floodplain. Further to the west, soils become deeper and are more likely alluvial deposits of soils washed down from the Sierra foothills.

Table 7 – Soils in the Paulsell Valley Viticultural Area

Series	*Acreage*	*Percent Total Area*
Pentz and Peters (including complex)	19,398	56.79
Pentz	*7981*	*23.37*
Peters-Pentz Complex	*7640*	*22.37*
Peters	*3777*	*11.06*
Keyes	3267	9.57
Raynor	2579	7.55
Paulsell	2561	7.50
Ryer	984	2.88
Bear Creek	798	2.34
Montpellier	591	1.73
Redding	479	1.40
Snelling	397	1.16
(terrace escarpments)	361	1.06
Zaca	348	1.02
Amador	340	1.00
All others (all below 1%)	2052	6.00
TOTAL	**34,155**	**100.00**

Hence, a common theme among the soils of the Paulsell Valley area is soils of parent material derived from volcanic eruptions, but not from direct lava flow. Soils to the east have more influence from volcanic rock. Soils to the south, on the other hand, have greater influence from intrusive igneous rock (i.e., granite parent material). Soils to the north are associated with deposition from the Stanislaus River and mining activities.

As noted above, soils may hold subtle distinctions that impact overall grape characteristics. Holding capacities impact how much moisture can be utilized by the vine from rainfall, while good drainage helps prevent soil-borne pathogens. Further, the moisture, or lack thereof, impacts stresses placed on the vine which impacts overall character in the wine. Further, different soil holding capacities and drainage encourage different plant growth, which leads to different organic nutrients present in the soil. This distinction is especially true to the east where more oak trees occupy the landscape. Less obvious, but long found valuable by growers is the mineral content of soil, which is often credited with creating subtle distinction in flavor. More recent research suggests the microorganisms, impacted both by climate and soil, may be responsible for these subtle shifts in flavor. Hence, soils of the Paulsell Valley, derived of ash and fluvial fans mixed with ash, create soils that differ in mineral content and holding capacity from soils found to the east, north, south, and further to the west. As a result, wines produced of Paulsell Valley have the potential for subtle flavor characteristics attributable to these soil characteristics even if the other distinguishing attributes of the area were not present.

Table 8 – Brief summary of soils characteristics of most common soils series in and around the Paulsell Valley viticulture area.[18]

Series	*Topography*	*Drainage*	*Parent*	*Depth*	*Vegetation*
Pentz (Paulsell Valley)	On hills with mound-intermound microrelief	Well drained	Andesitic tuff	Shallow	Annual grasses and forbs
Peters (Paulsell Valley)	Nearly level to steep hills	Well drained	Andesitic tuff	Shallow	Annual grasses and forbs
Keyes (Paulsell Valley)	Fans, terraces and hills	Well to moderately well drained	Andesitic sediments	Shallow	Annual grasses
Montpellier (South)	Level to hilly dissected terraces	Well to moderately well drained	Alluvium from granitic rock	Deep to very deep	Annual grasses and forbs with scattered oak
Whitney (South)	Undulating hills	Well drained	Granitic sediment	Variable	Annual grasses-herbs
Amador (East)	On hills with mound-intermound relief	Well drained	Rhyolitic tuff	Shallow	Annual grasses and forbs
Auburn (East)	Foothills	Well drained	Amphibolite schist	Shallow to moderately deep	Annual grasses and forbs
Exchequer (East)	Undulating steep uplands	Excessively drained	Breccia and metamorphic rock	Shallow	Annual grasses and other herbaceous plants, blue oak, shrubs
Hornitos (East)	Gently rolling to steep hills	Excessively to well drained	Sandstone	Shallow	Annual grasses and forbs, blue oak
Columbia (North)	Floodplains	Moderately well drained	Alluvium from mixed sources	Very deep	Riparian trees and shrubs
Honcut (North)	Floodplains and alluvial fans	Well drained	Alluvium from igneous and granitic rocks	Very deep	Annual grasses, herbs and scattered oak
Hanford (North)	Floodplains and alluvial fans	Well drained	Alluvium from granitic sources	Very deep	Annual grasses and herbaceous plants

Conclusion

The viticulture area recognized geographically as the Paulsell Valley is distinguished from locations immediately surrounding the area. The Paulsell Valley is distinguished from areas to the north by elevation, topography, and soils. The Paulsell Valley is further

[18] Based on USDA National Resource Conservation Service official soil series descriptions.

distinguished from the east by climate, specifically precipitation, elevation, topography and soils. To the south, outside the obvious delineator of the Modesto Reservior, the viticultural area is distinguished by soil, topography, and elevation. Finally, to the west, the Paulsell Valley is distinguished by elevation, topography, climate, and, further to the west, soils. The overall characteristics that define the Paulsell Valley viticultural area are soils dominated by Peters and Petz soils with significant pockets of Keyes soils as well as Raynor and Paulsell series soils. The area is home to mound-intermound topography ranging from 180 feet to over 600 feet in elevation with local relief of mound commonly greater than 80 feet. Finally, the area is warmer than the San Joaquin Valley floor to the west and southwest, with precipitation transitioning from the drier areas to the west and the wetter locations within the Sierra Foothills AVA.

These differences impact viticulture practice by impacting the timing of bud break to harvest dates, the potential for and nature of disease, and types of stress placed on vine. Further, drainage, exposure, and subtle soil distinctions, even when compared to areas where Peters and Pentz soils exist outside the proposed AVA, present subtle distinctions in growing circumstances that likely lead to distinctions in wine characteristics. Research at the University of California, Davis, for example, has shown differences in microbial terrior tied to differences in environmental conditions,[19] which may help explain different sensory components of wine attributed to different geographic regions. With the differences in climate, soil and topography found within the Paulsell Valley, the region is viticulturally distinguishable from surrounding areas.

Boundary Description

The following boundary descriptions approximate the unique geography and reputation of the Paulsell Valley wine growing region. As a general rule, the AVA follows the Pentz, Peters, and Keyes soil types staying within the mound-intermound topography with more resistant and less resistant parent material, topography greater than 80 foot

[19] University of California, Davis, "Sequencing study lifts veil on wine's microbial terrior," *UC Davis News and Information*, November 26, 2013.

relief, and elevations ranging from 160 to 600 feet. Some mound terrain meeting these criteria exists outside the proposed AVA boundaries, but frequency of the higher mounds is less common or the overall characteristics are not contiguous.

This boundary follows points found on the following quadrangles of USGS 7.5' Series (1:24,000) topographic maps:

Knights Ferry Quadrangle, California (2015)

Keystone Quadrangle, California (2015)

Cooperstown Quadrangle, California (2015)

Paulsell Quadrangle, California (2015)

From the starting point at the intersection of Willms Road, Kennedy Road/Sonora Road, and Highway 108/Highway 120 southeast of UTM (10S) 706000m E 4188000m N on the Knights Ferry map,

(1) Proceed in a southeasterly direction along Willms Road 7.2 miles onto the Keystone, then Cooperstown maps to its intersection with Warnerville Road, northwest of 0712000m E 4179000m N; then

(2) Proceed west, then south along Warnerville Road 0.5 miles to Crabtree Road, southwest of 712000m E 4179000m N; then

(3) Proceed in a southerly direction along Crabtree Road 4.8 miles to its intersection with 4171000m N; then

(4) Procced west along 4171000m N 2.0 miles onto the Paulsell map to Modesto Reservoir; then

(5) Proceed along the north shore of Modesto Reservoir in a general westerly direction 6.6 miles to the dam east of 705000m E and north of 4174000m N; then

(6) Follow the dam, then Reservoir Road south-southwest 2.2 miles to the 200 foot elevation line just north of 4171000m N; then

(7) Proceed northwest in a straight line 1.2 miles to the intersection of Hazeldean Road and Tim Bell Road, southwest of 703000m E 4172000m N; then

(8) Proceed in a northerly direction along Tim Bell Road 3.1 miles to its intersection with Claribel Road, northeast of 703000n E 4176000m N; then

(9) Proceed west along Claribel Road 2.4 miles to its intersection the 260 foot elevation line, northwest of 700000m E 4176000m N; then

(10) Proceed in a straight line north 2.0 miles to the intersection of Warnerville Road and the 300 foot elevation line east of Cashman Creek, northwest of 700000m E 4179000m N; then

(11) Proceed in a straight line northeast 1.1 miles onto the Knights Ferry map to the intersection of a railroad track and 4181000m N at its intersection with Fogarty Road; then

(12) Proceed east along 4181000m N 0.9 mile to its intersection with Paulsell Lateral, west of 702000m E; then

(13) Proceed in a northerly direction along Paulsell Lateral 2.4 miles to Cashman Creek at the Cashman Dam (identified on previous USGS maps), northwest of 702000m E 4183000m N; then

(14) Proceed in a straight line northwest 1.3 miles to Highway 108/Highway 120 at the 700000m E line south of 4185000m N;

(15) Proceed in a straight line northeast 2.4 miles to the eastern intersection of the 300 foot elevation line and Highway 108/Highway 120 at 4187000m N just east of 703000m E; then

(16) Proceed southeast along Highway 108/Highway 120 1.0 mile to its intersection with the 260 foot elevation line southwest of 4187000m N 705000m E; then

(17) Proceed in a northeasterly direct along the 260 foot elevation line 1.4 miles to its intersection with Sonora Road, southwest of 4188000m N 706000m E; then

(18) Proceed southeast along Sonora Road 0.1 mile to its intersection with Kennedy Road southwest of 4188000m N 706000m E; then

(19) Proceed northeast, then east, then south along Kennedy Road/Sonora Road 0.4 mile to the starting point.

Supporting Evidence

This petition is in response to a geographic study conducted by Patrick L. Shabram, the author of this petition. The geographic study was conducted per interest by local growers in recognizing the Paulsell Valley viticultural area as a unique wine grape growing region. Patrick L. Shabram was retained to conduct an objective third party assessment of the characteristics that distinguish the Paulsell Valley and to determine whether establishment of a unique viticultural area was justified. The study also identified appropriate boundaries for any subsequent petition (modified only slightly in this petition). Patrick Shabram is a geographer and faculty member at Front Range Community College. He specializes in viticulture analysis, especially relating to viticultural areas. Some of the text of this petition has been taken from a report prepared

by Shabram addressing these topics. The report also includes photographs taken in the area as well as additional graphs. Based on the findings of this report, Patrick Shabram was asked and agreed to prepare this petition. A complete copy of this report is included as Exhibit B.

As part of the Shabram analysis, Mike Bobbitt & Associates was hired to create several maps, including a boundary map, an aerial view, and a soils map. Mike Bobbitt & Associates is a Sonoma, California-based geographic information systems (GIS) company specializing in the wine industry. For this study, Shabram utilized Mike Bobbitt & Associates' Atascadero, California field office. Maps created by Mike Bobbitt & Associates are included as Exhibits C, D, E, and F.

Also, for the Shabram report, Don Jarvis of Rock Ridge Ranch was interviewed and consulted. Mr. Jarvis is a long-time viticulturalist in Stanislaus County. Mr. Jarvis provided insight into the current and planned vineyards in the Paulsell Valley area.

Included are examples of published usage of the name Paulsell Valley. These sources include an article written by Frank Clark of the Oakdale Irrigation District, a page from the 1957 Eastern Stanislaus County Soil Survey from the United States Department of Agriculture, a map from the U.S. Department of Agriculture Soil Conservation Service, and several articles from *The Modesto Bee*. These materials are provided as Exhibits G through M.

Exhibits

Following is a list of exhibits supporting this petition:

Exhibit A – USGS maps outlining the proposed Paulsell Valley AVA boundary.

Exhibit B – Shabram, Patrick L., "Geographic Characteristics of the Paulsell Valley," 2018.

Exhibit C – Mike Bobbitt & Associates, "Paulsell Valley AVA: Proposed Boundary USGS Quads Map," map, 2018.

Exhibit D – Mike Bobbitt & Associates, "Paulsell Valley AVA: Proposed Boundary Aerial Map," map, 2018.

Exhibit E – Mike Bobbitt & Associates, "Paulsell Valley AVA: Proposed Boundary NRCS Soils," map, 2018.

Exhibit F – Mike Bobbitt & Associates, "Paulsell Valley AVA: Proposed Boundary Topo Map," map (with boundary descriptions), 2018.

Exhibit G – United States Department of Agriculture Soil Conservation Service, *Soil Survey Eastern Stanislaus Area*, Series 1957, No. 20, 1964, cover page and page 17. Usage of "Paulsell Valley" is under "Paulsell Series."

Exhibit H – Clark, Frank, "Frank Clark: Oakdale Irrigation District doesn't mine groundwater," *The Modesto Bee*, November 26, 2014. Usage of the name "Paulsell Valley" occurs on page 3 of the article.

Exhibit I – United States Department of Agriculture Soil Conservation Service University of California Agriculture Experiment State, *General Sol Map: Eastern Stanislaus County*, 1961.

Exhibit J – Shranti, J.N., "Oakdale Irrigation District considers expanding water deliveries to farms and home," *The Modesto Bee*, May 6, 2014.

Exhibit K – Shranti, J.N., "OID rejects request to help fund Paulsell Valley expansion study, *The Modesto Bee*, September 16, 2014.

Exhibit L – Shranti, J.N., "OID water sales plan bashed by county advisory committee," *The Modesto Bee*, November 19, 2014.

Exhibit M – Shranti, J.N., "OID to discuss selling water to outside agencies during closed door meeting," *The Modesto Bee*, November 3, 2014.