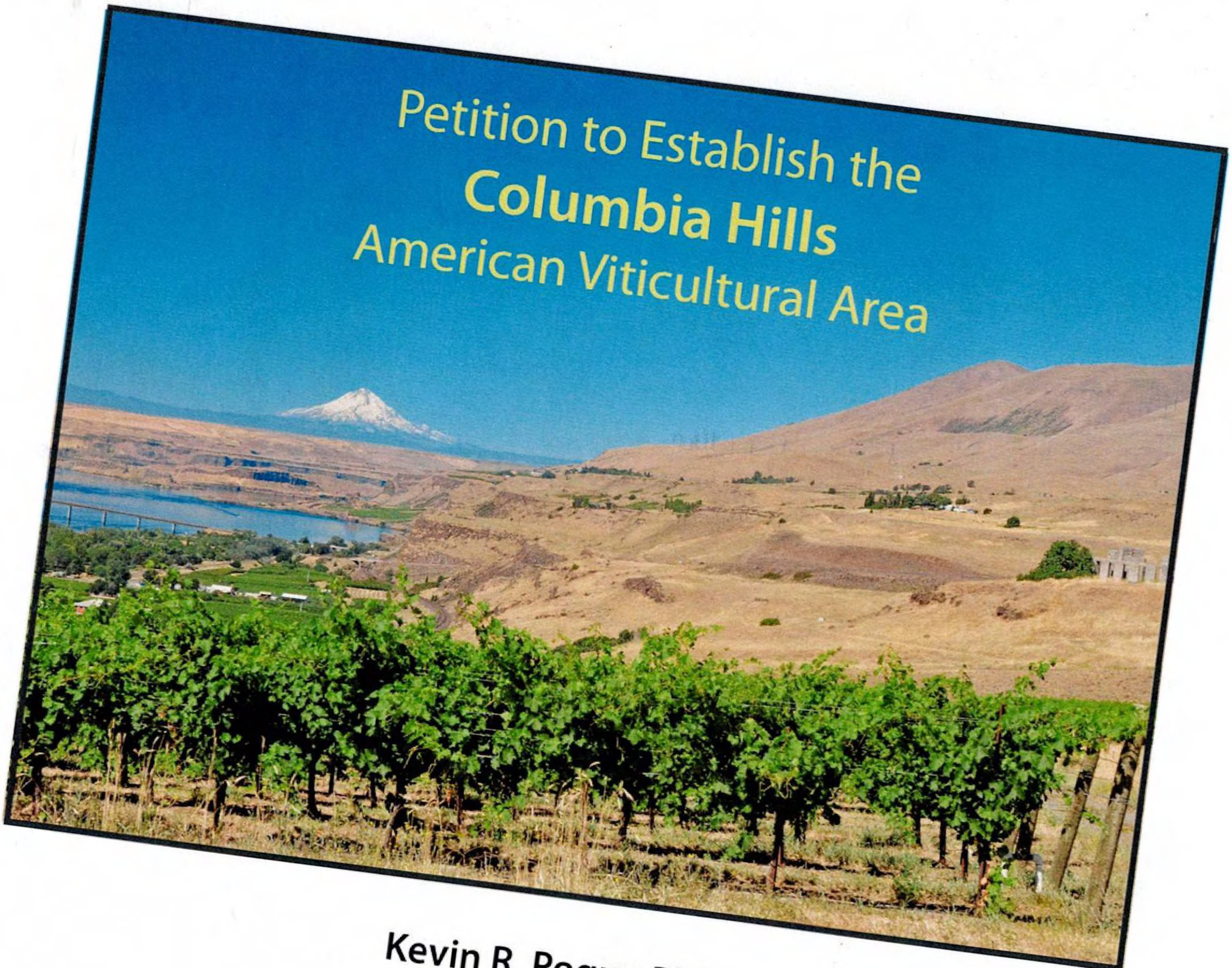

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Petition to Establish the Columbia Hills American Viticultural Area

Introduction

This petition proposes the establishment of a new American Viticultural Area (AVA) along the southern border of the State of Washington to be called "Columbia Hills" (figure 1). It is submitted on behalf of Robert Lorkowski, owner of Cascade Cliffs Vineyard and Winery, which lies within the boundaries of the proposed AVA. The proposed AVA is situated entirely within the boundaries of the 17,802 sq. mi. Columbia Valley AVA.

As proposed, the Columbia Hills AVA encompasses 29,387 acres (46 sq. mi.) on the generally south-facing slopes of the Columbia Hills, which form a long ridgeline that parallels the Columbia River between Rowena Gap and the mouth of Rock Creek (figure 1). The western and eastern boundaries of the proposed AVA lie in close proximity to two established AVAs, the Columbia Gorge and The Burn of Columbia Valley. The western boundary of the proposed AVA lies 2 miles east of the eastern boundary of the Columbia Gorge AVA and the eastern boundary lies 0.33 mile west of the western boundary of The Burn of Columbia Valley AVA (figure 2).

Within the proposed AVA are currently 4 wineries, and 338 acres of vineyards (figure 3, table 1). The largest vineyard landowners are V75, Cherryhill, and Maryhill Museum of Fine Arts (table 1). The remaining vineyard acres are divided into smaller blocks that are scattered throughout the proposed AVA (figure 3).

The proposed AVA has viticultural characteristics, based on geomorphology, soils, and climate, which are distinctive from the surrounding areas. These characteristics derive from the unique geologic history of the proposed AVA, and its proximity to the Columbia River. The following sections will detail evidence in support of the name, boundaries, and distinguishing features of the proposed AVA. The petition also includes maps of the proposed AVA, a narrative boundary description, and a discussion of the shared and contrasting attributes of the Columbia Valley AVA and the proposed AVA.

Name Evidence

The name of the proposed AVA is "Columbia Hills." The name is applied to a 35-mile-long ridgeline that parallels the north side of the Columbia River between Rowena Gap and the mouth of Rock Creek (figure 1). The ridgeline averages 2500 ft in elevation, and its crest lies 2 to 3 miles north of the reservoirs along the Columbia River, created by Bonneville, The Dalles and John Day dams, which have pool elevations of approximately of 74 ft., 160 ft., and 265 ft., respectively. The proposed AVA is situated on the southern slopes of the Columbia Hills.

The name "Columbia Hills" appears on all current versions of US Geological Survey series topographic maps of scale 1:250,000 or greater (appendix 1). The Columbia Hills host the Columbia Hills Natural Area Preserve, and the Columbia Hills Historical State Park, both managed by the state of Washington (appendix 1). Numerous examples of the use of the term "Columbia Hills" for areas within the proposed AVA can be found on the internet (appendix 1).

Boundary Evidence

The boundary for the proposed AVA encompasses the lower predominantly south-facing slopes of the Columbia Hills that lie between the north shorelines of the Columbia River reservoir pools and the maximum elevation that was directly impacted by catastrophic ice age floods that repeatedly swept down the Columbia River during the last 1 million years. That elevation is approximately 300 meters in the western part of the proposed AVA and rises to approximately 320 meters in the eastern part of the proposed AVA (Benito and O'Connor, 2003). The western boundary of the proposed AVA is situated at the entrance to Rowena Gap, where the geologic structures that form the Columbia Hills cut cross the Columbia River, producing a pronounced change in topography. In Rowena Gap, the valley walls of the Columbia River are much steeper, consisting primarily of cliffs of basalt bedrock interspersed with talus. The eastern boundary of the proposed AVA coincides with the mouth of Rock Creek on the Columbia River. Near Rock Creek, the Columbia Hills ridgeline transitions into the Goodnoe Hills, which have lower relief and are separated from the Columbia River by a broad, relatively flat plateau called "The Burn".

Geology

The bedrock of the Columbia Hills consists almost entirely of a stacked sequence of basalt lava flows, known as the Columbia River Basalt, that were erupted from large fissure systems in the Columbia Basin during the Miocene Epoch, around 15 million years ago (figure 4, 5A). The only area in the proposed AVA with bedrock other than Columbia River Basalt is a small area (130 acres) near Maryhill that has basalt bedrock derived from the eruption of the nearby Haystack Butte volcano approximately 1 million years ago.

Shortly after the lava flows of the Columbia River Basalt were erupted, they started to be deformed by tectonic forces that compressed the Earth's crust from north to south. These forces caused the rocks to break along east-west oriented faults. Movement along these faults, known as thrust faults, pushed huge slabs of basalt bedrock to the north and south (figure 5B, 6). The movements of the thrust faults at depth uplifted and folded the rocks near the surface, creating arch-like structures called anticlines (figure 5B, 6). Today these anticlines are expressed as a series of long east-west oriented ridgelines that traverse the western half of the Columbia Basin. Collectively, these geologic structures are known as the Yakima Fold and thrust belt. The Columbia Hills were produced by deformation related to motion along the southernmost of the major thrust faults in the Yakima fold and thrust belt, which buckled the rocks on the surface, creating the Columbia Hills anticline (figure 5B).

By one million years ago, the valley of the Columbia River was established on the south side of the Columbia Hills, its location influenced by down-warping associated with a Yakima fold and thrust belt structure called The Dalles-Umatilla syncline (figure 5B, 6). Beginning approximately one million years ago, with the onset of the most recent ice age, the valley of the Columbia River was the conduit for several episodes of catastrophic floods derived from the failure of glacial ice dams far to the north. The most recent, and best documented of these flood sequences, called the Missoula Floods, resulted from the repeated failure of a glacial ice dam that had blocked the Clark Fork River in northern Idaho, creating glacial Lake Missoula in western Montana. Between 18 and 12 thousand years ago, repeated failures of the Clark Fork ice dam released an enormous volume of water (up to 2500 km^3), which surged out across the Columbia Basin and down the Columbia River. During the largest of the Missoula floods, the amount of water moving past the Columbia Hills was equivalent to 13 times the discharge of the modern Amazon River. The floodwaters overwhelmed the normal channel of the Columbia River and climbed to a height of over 300 m elevation along the flanks of the Columbia Hills. Below this elevation, the erosive force of the floodwaters had a profound influence on the landscape, sweeping away all loose materials and ripping away fractured bedrock to create flat-topped terraces (figure 5C). As each flood waned, coarse-grained gravel bars were deposited in areas where the water was substantially slowed by obstructions, which produced eddies in the turbulent flow. In some areas, erosion from the floods undermined the slopes, producing landslides. In the calm waters of back-flooded areas such as the lower Columbia Basin, Umatilla Basin, and Willamette Valley, layers of fine silt and sand were deposited by each flood. After each flood receded, the fine-grained sediments were picked up and redeposited by the wind. These wind-deposited sediments, known as loess, blanket most of the Columbia Basin and are the foundation of its agricultural soils. The soils of the proposed AVA were developed in a mixture of materials derived from hillslope debris, flood gravels, and wind-deposited (eolian) silt and sand (figure 5D). A more detailed summary of the history of Columbia Basin ice-age flooding and the flood-related erosional and depositional processes that shaped the landscape of the proposed AVA is presented in Baker (2009). The following sections will discuss how the geologic history outlined above directly influenced the geography, soils, and climate of the proposed AVA and how those characteristics create a viticultural environment that differs from the surrounding areas.

Geography

The principle geographical features that distinguish the proposed AVA from its surroundings are its restricted elevation, predominate southern aspect, and its geomorphology, which is dominated by features created by depositional and erosional processes associated with catastrophic ice-age flooding. The elevations within the proposed AVA are restricted to the interval between the pool levels of the reservoirs impounded behind the dams on the Columbia River (minimum elevation 23 m, 74 ft) and 320 m, (1050 ft) which corresponds to the maximum height of ice-age flooding (figure 7). This range of elevation provides a uniformity of grape-growing conditions by restricting the proposed AVA to areas where the climate is more likely to be affected by the proximity of the Columbia River and to elevations where the landscape and soils were directly impacted by ice-age flooding. Elevations rise steeply north of the proposed AVA to the crest of the Columbia Hills.

The topography in this area is much steeper and rockier than that of the proposed AVA, and its elevation effectively insulates it from the thermal effects of the Columbia River. East of the proposed AVA, elevations of The Burn of Columbia Valley AVA rise to as high as 445 m, which is well above the elevation of ice-age flooding. Approximately 33 percent of The Burn of Columbia Valley was never inundated by ice-age flooding, and those areas accumulated a thick blanket of wind-deposited soils unlike any in the proposed AVA (figure 8). The area west of the proposed AVA lies within the Columbia River Gorge AVA, which encompasses a diverse topography with elevations as high as 793 m. Only 26 percent of the Columbia Gorge AVA was inundated by the ice-age floods (figure 8).

The area of the proposed AVA is dominated by topography that faces south (azimuth 135° to 225°), the preferred direction for viticulture in the northern hemisphere, especially at higher latitudes (figure 9). South-facing slopes receive the greatest insolation, resulting in higher soil temperatures, which encourage the onset of the phenological stages of vine growth and speed ripening (Gladstones, 1992). The south-facing slopes of the proposed AVA are a consequence of its location on the southern limb of the Columbia Hills anticline. Many AVAs in the Columbia basin, including the Rattlesnake Hills, Red Mountain, Horse Heaven Hills, Candy Mountain, Wahluke Slope, and Royal Slope AVAs are similarly situated on the south-facing slopes of Yakima fold belt anticlines. The relatively uniform southern aspect of the proposed AVA distinguishes it from areas of similar elevation and topography on the southern side of the Columbia River that have a northern aspect. While the higher areas that border the proposed AVA on the north also have a dominantly southern aspect, they lie above the ice-age flood limit and are unlike the proposed AVA due to differences in soil and topography. East of the proposed AVA, a large percentage of The Burn of Columbia Valley AVA consists of relatively flat topography with varying aspect (figure 10). West of the proposed AVA, the aspect distribution within the Columbia Gorge AVA, which lies on both sides of the Columbia River, is essentially random (figure 10).

The landscape of the proposed AVA is largely a consequence of the impacts of catastrophic ice-age floods. Erosion by the floodwaters of the generally flat-lying layers of bedrock created a series of stepped terraces that correspond to specific lava flows within the Columbia River basalt (figures, 11 12). The gentle slopes of the terraces make ideal vineyard platforms within the otherwise steeply sloped valley of the Columbia River, and they are host to many of the vineyards in the proposed AVA (figure 10). Other vineyards within the proposed AVA are hosted by large gently sloped ice-age flood gravel bars (figure 13). In contrast, large percentages of both The Burn of Columbia Valley and the Columbia Gorge AVAs, which lie east and west of the proposed AVA, respectively, have no flood-related topography since they lie at elevations above the maximum flood height (figures 7, 8). Flood related topography is also absent from the region north of the proposed AVA, since it was also above the maximum flood elevation (figure 7). Low-lying areas south of Columbia River have similar flood-related topography, but have a dominantly northern aspect.

Soils

The general soil map of Klickitat County (figure 14) divides the soils of the proposed AVA into two general soil map units. Most of the area within the proposed AVA features soils mapped as the Cheviot-Horseflat-Rockly-Kiona unit. These soils are categorized as "well-drained soils that formed in colluvium and residuum derived from basalt mixed with loess" (appendix 2). In the western part of the proposed AVA near Dallesport are soils mapped as the Ewall-Dallesport-Rock outcrop unit. The Columbia River in this area makes a large southward bend around a low relief basalt plateau. The ice-age floods repeatedly swept across this plateau, carving into the bedrock and depositing gravel bars. The soils are largely developed in wind-deposited sand that was draped over the bedrock and gravel bars after ice-age flooding ceased. To the east of the proposed AVA, approximately 50 percent of the area of The Burn of Columbia Valley AVA contains soils of the Van Nostern-Morrow-Bakeoven unit (figure 14). These soils are in the areas that are mostly above the maximum elevation of the ice-age flooding. Since they were never subjected to flood erosion, they received long-term deposition of wind-deposited silt (loess). The Columbia Gorge AVA, west of the proposed AVA, contains a highly diverse suite of soils due to its large variations in bedrock, slope, aspect, precipitation, and elevation (figure 14). The broad plateau areas north and south of the proposed AVA generally feature deep soils derived from loess over basalt bedrock.

The soils of the proposed AVA are distinctive because they are directly related to ice-age flooding. Many of the soils are developed in wind deposited silt and sand that covers either flood-eroded basalt bedrock, flood-deposited gravel bars, or coarse textured hillslope or landslide deposits (colluvium) that mantles flood-carved terraces (figure 4D). The thickness of the soils is highly variable and they are typically much coarser textured than the loess-based soils that are common in The Burn of Columbia Valley and throughout the Columbia Basin. Due to their coarse texture, the soils tend to be well drained to excessively well drained. They warm more quickly than their finer-grained counterparts and encourage vines to root deeply. In many areas, the shallowness of the soils allows vine roots to encounter the underlying basalt bedrock or gravel substrate, which is uncommon in the deep loess-derived soils. When the roots penetrate through the soil into the underlying flood gravel, and especially the basalt bedrock, they are exposed to a new suite of minerals, and, as a result, concentrations of nutritive elements that are distinct from those present in the wind-deposited surficial soils (Pogue, 2009).

Climate

The climate of the proposed AVA can be distinguished from the surrounding areas by the influences of its relatively low elevation and proximity to the temperature moderating effects of the Columbia River. The proposed AVA is situated at relatively low elevations (74 -1050 ft.) along the northern shoreline of the Columbia River, which is incised approximately 1000 ft into the surrounding plateau. The large volume of water impounded by the Columbia River reservoirs acts as a thermal reservoir that moderates the climate near its shores. Mitham (2013) summarized a study that measured the effects of these moderating influences on vineyards near the Columbia River. The effects of the proposed AVA's relatively low elevation and proximity to the Columbia River can be readily observed by comparing weather data from two stations within the proposed AVA (The Dalles Airport and Maryhill) with two nearby stations that are at higher elevations on the surrounding plateau and beyond the influence of the Columbia River (Goldendale and Moro) (figure 15). Five years of data (2017-2021) from these 4 stations is summarized in table 2. The average of the average growing season (Apr 1-Oct 31) temperatures (GST) was approximately 7° F warmer for the stations in the proposed AVA relative to the plateau stations, and the proposed AVA stations averaged over 1000 more growing degree-days (GDD) than the plateau stations. These differences are mostly related to the effects of the Columbia River on morning low temperatures. Morning low temperatures averaged 8-12° F warmer at the stations within the proposed AVA, while afternoon high temperatures averaged only 2-5° warmer. Early morning temperatures are more affected because the temperature of the Columbia River each day remains relatively constant, while air temperatures reach their minimum around sunrise.

The thermal effects of the Columbia also help to dramatically extend the number of frost-free days in the proposed AVA relative to the surrounding plateau. From mid-August to mid-January the average temperature of the Columbia River exceeds the average air temperature in the proposed AVA (figure 16). Heat from the river is transmitted to the air, especially in the early morning when the temperature contrast is greatest, and the air near the river is warmed, inhibiting frost and freeze events. As a result, the growing season (GSD) in the proposed AVA averages 60 days longer than on the surrounding plateau.

Since the Columbia River reservoirs constitute a long narrow body of water, their thermal effects are limited to a narrow swath of land along each shore. Relative to The Burn of Columbia Valley and Columbia Gorge AVAs, which lie to its east and west respectively, the proposed AVA contains a much higher percentage of land that is in close proximity to the river and its thermal effects. The majority (80%) of the proposed AVA lies within one mile of the Columbia River reservoirs, while only 41% of The Burn of Columbia Valley AVA and 16% of the Columbia Gorge AVA are that close (figure 17). Higher values for GSD, GST, and GDD in the proposed AVA, relative to adjacent areas that are farther from the Columbia River, aids and accelerates ripening and permits the cultivation of warmer climate varieties such as Grenache and Mourvedre (Jones et al., 2012).

Approximately 20 miles downstream of the proposed AVA, the Columbia River enters a near sea-level gap through the Cascade Mountains known as the Columbia River Gorge. This is the only low elevation gap in the range, and the only area where the moist marine air that is common on the western side of the Cascade Range can enter the Columbia Basin and influence its climate. The exchange of air through the Columbia Gorge is referred to by meteorologists as "Columbia Gorge gap flow" (Sharp and Mass, 2002). Gap flow through the Columbia Gorge is responsible for increased cloudiness and precipitation and cooler average temperatures in the area near its eastern entrance, where the Columbia Gorge AVA is situated. A large percentage of that AVA receives over 30 inches of annual precipitation, and viticulture without supplemental irrigation is possible in some areas (figure 18). Moving east from the entrance to the Columbia Gorge, gap flow effects rapidly diminish, reducing annual precipitation to only 10-20 inches in the area of the proposed AVA, so that irrigation is required in all vineyards. Near the eastern end of the proposed AVA, the boundary of The Burn of Columbia Valley AVA is also the boundary of the vast Columbia Basin desert, where annual precipitation drops below 10 in.

Average growing season temperatures and growing degree-days in the Columbia Gorge AVA are generally lower than in the proposed AVA due to its proximity to gap flow effects and higher average elevations. Data averaged for 2017-2021 from the two Washington Ag Weather Net Stations in the Columbia Gorge AVA (Husum and Underwood) revealed GST values that were 4° cooler on average and approximately 800 fewer GDD when compared to weather stations in the proposed AVA (table 3).

Boundary description

The boundary of the proposed Columbia Hills AVA falls within two United States Geological Survey 1:100,000 scale topographic maps. They are:

(1) Hood River, Washington-Oregon (1982)

(2) Goldendale, Washington-Oregon (1980)

The proposed AVA is located in Klickitat County, Washington. The boundary is described below:

(1) The beginning point is on the Hood River map at the intersection of an unnamed stream with the 300 m topographic contour, just east of the words "Cold Spring", near the center of section 8, Township 2 North, Range 13 East.

(2) Follow the 300 m contour line to the east until the eastern boundary of the Hood River map with the western boundary of the Goldendale map is encountered.

(3) Follow the boundary approximately 400 ft north until it reaches the intersection with the 320 m contour line on the western edge of the Goldendale map.

(4) Follow the 320 m contour line to the east on the Goldendale map until it intersects the boundary between Range 18 East and Range 19 East, south of Sand Spring Canyon.

(5) From this point, proceed in a straight line for 9000 feet (1.71 miles) to the southeast to the intersection of the boundary between sections 31 and 32, Township 3 North, Range 19 East with the northern shoreline of the Columbia River (Lake Umatilla).

(6) Follow the northern shoreline of the Columbia River to west, passing onto the Hood River map until the intersection of the small stream in step (1) with the Columbia River Shoreline is reached.

(7) Follow the small stream northward until the starting point is reached.

Shared and Contrasting attributes of the Columbia Valley and Proposed Columbia Hills American Viticultural Areas

Attributes of the Proposed Columbia Hills AVA Consistent with the Columbia Valley AVA

According to the petitioner, the Columbia Valley AVA typically has a growing season of greater than 150 days, growing degree-days exceeding 2000, and average annual precipitation of less than 15 inches (Clore, 1982, appendix 4). All of these criteria apply to the area included within the boundaries proposed for the Columbia Hills AVA.

Distinctions Between the Proposed Columbia Hills AVA and the Columbia Valley AVA

The Columbia Valley, as described in petition for the Columbia Valley AVA, is a "large treeless plain surrounding the Yakima, Columbia, and Snake Rivers". The area within the proposed AVA consists of hillslopes and flood-carved terraces within a deeply incised river valley, and has unique characteristics of geology and climate, detailed elsewhere in this petition, that distinguish it from the surrounding plains.

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