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Napa Valley Vineyard Site Selection

Lesson Criteria:

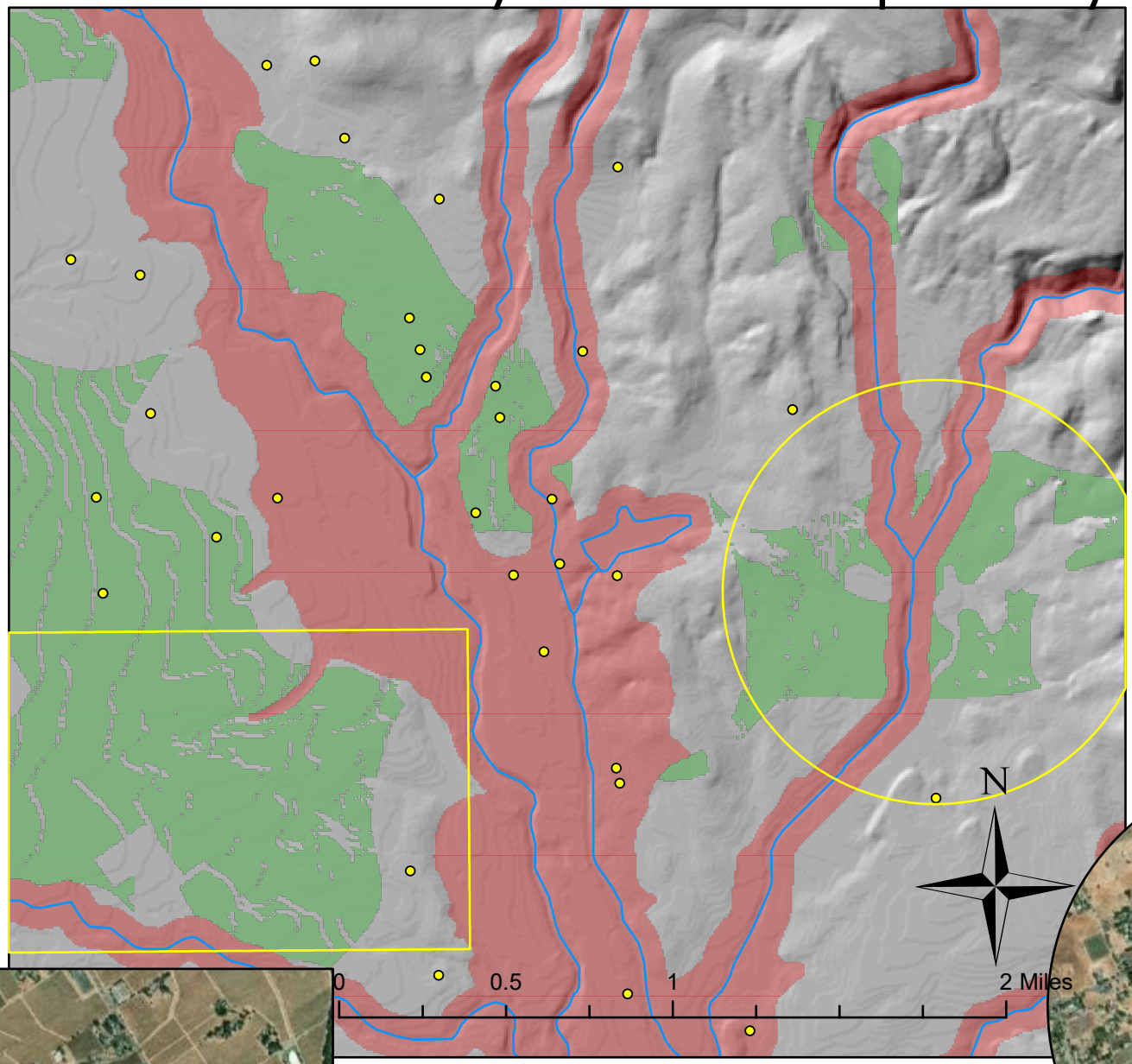
Our client in this lesson is looking to establish a vineyard in a particular area of Napa Valley, California. They have asked us to identify suitable sites for its establishment within the area of interest. Suitability criteria includes: sites outside of the floodplain and more than 100 meters from a stream; a land use designation of agriculture or undeveloped; flat land or sloped land with an aspect between 112-337 degrees; an average maximum wind speed of 25mph or less; a minimum average temperature greater than 35 degrees Fahrenheit; soil depth between 31 to 72 inches; and medium to highly drained soil. An additional criteria will also be included to identify private land within the suitable areas that may be obtained by our client.

Summary of Project Goal:

The goal of this project is to produce useful maps for our client to inform their decision making processes of establishing a vineyard. Two maps will be produced, the first will identify all suitable sites within the area of interest and the second will identify suitable private land. In order to produce these maps we will need to convert vector (discrete) data to raster (continuous) data using our spatial analyst tools and then run a raster analysis to identify sites with our desired criteria. Conclusions drawn from the analysis and discussion of its limitations will be included at the end of this report.

Map 7-1

Suitable Vineyard Sites - Napa Valley



Suitable Area

Floodplain

Existing Vineyards

Suitable Land = 1270.9 Acres
Existing Vineyards = 989.1 Acres*

Not all Existing Vineyard Acreage exists inside of identified suitable areas

Created by: Kevin Price

Map 7-1

This map shows all suitable land in our area of interest (depicted in green) which amounts to approximately 1271 acres. Imagery inset maps of two large areas have been included that appear to have few established vineyards (based on publicly available information from Napa County) and large amounts of suitable land. Unfortunately, while agricultural and undeveloped land use was factored into our suitability analysis, it appears that the area to the west contains large neighborhood developments in about half of the identified suitable area and the area to the east is almost completely developed due to a country club and surrounding neighborhoods.

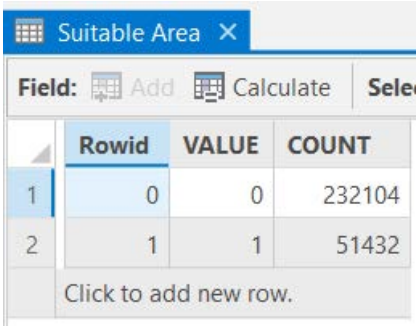


Table 7-1

Shown in this table is the amount of suitable and unsuitable land based on our analysis criteria. A value of 0 means that a particular cell did not meet one or more of the criteria. A value of 1 identifies a cell that met all of the criteria. Every cell in the analysis, represented by the count, is equivalent to a 100 square meter parcel of land. This was converted to acres for a final map presentation.

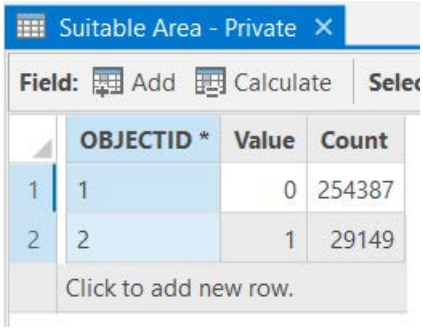
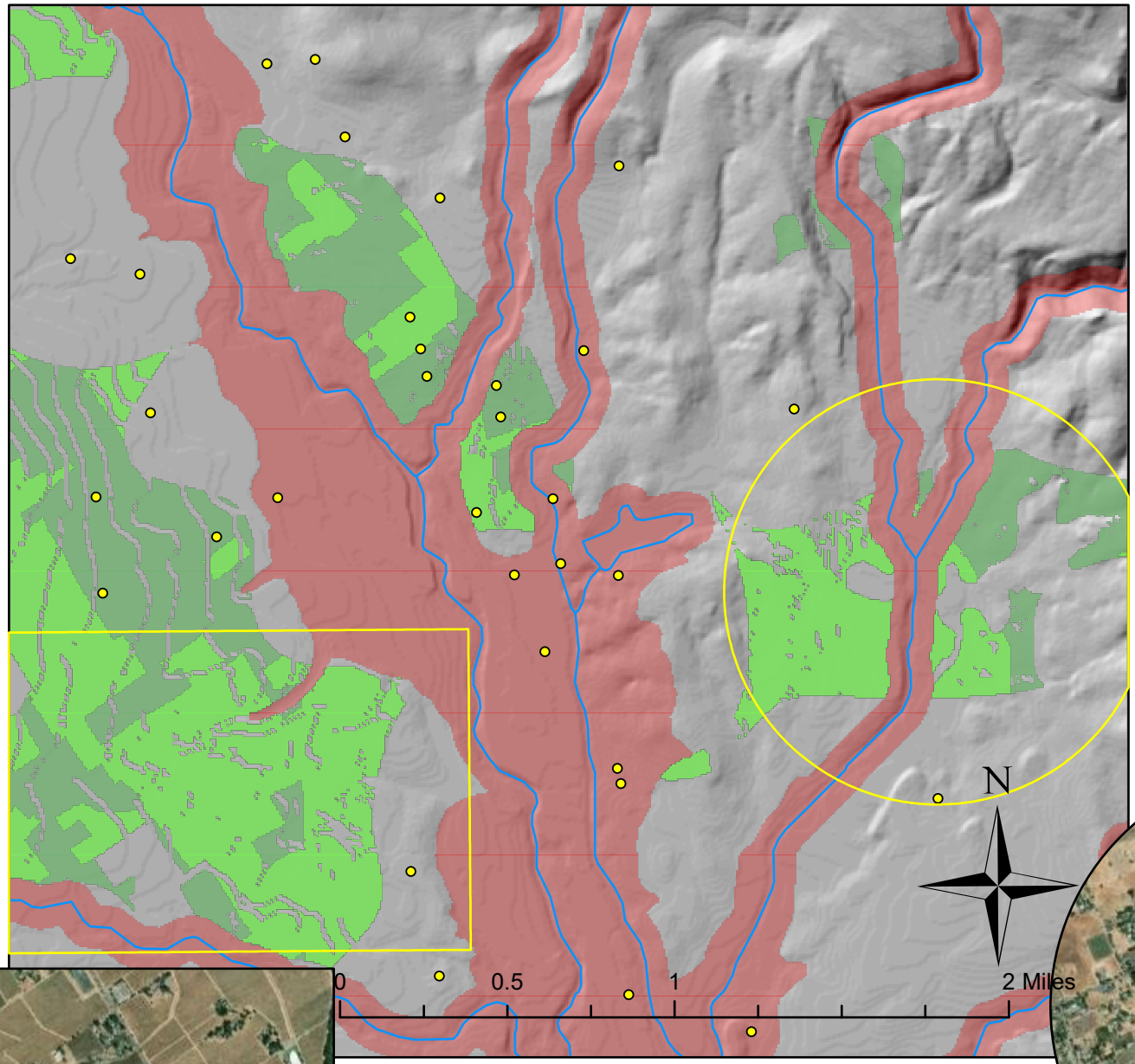


Table 7-2

This table shows the results once public/private land data was included into our analysis. A value of 0 identifies unsuitable land and a value of 1 is suitable land. Every cell in the analysis, represented by the count, is equivalent to a 100 square meter parcel of land. This was converted to acres for a final map presentation.

Map 7-2

Suitable Vineyard Sites - Napa Valley (Private)



Suitable Area

Suitable Area - Private

Floodplain

Existing Vineyards

Suitable Land = 1270.9 Acres
Suitable Private Land = 720.3 Acres
Existing Vineyards = 989.1 Acres*

Not all Existing Vineyard Acreage exists inside of identified suitable areas

Created by: Kevin Price

Map 7-2

This map expands on Map 7-1 and filters the suitable land identified in that map for suitable private land, displayed in light green. This is land that may be acquired for the purpose of establishing a vineyard. However, the same issue exists that much of the land identified as suitable appears to be developed already according to our imagery inset maps. You can also see that there is already more established vineyard acreage in our area of interest than private land our analysis identified as suitable.

Conclusions and Discussion

This analysis initially returned ~1271 acres of suitable land for viticulture purposes within our client's area of interest. Once that land was filtered for private designation ~720 acres were returned as suitable, a decrease of 551 acres (~43% decrease). Publicly available data indicates that there are 32 established vineyards in the area that equate to to a total land use of 989 acres, not all of this area is located within our area designated as suitable. However, there are large swathes of land within our suitable area that appear to be heavily developed despite one criteria of our analysis being land designated as undeveloped or for agriculture. These numbers and observations have important implications for our client and our analysis.

One implication for our client is that it may be much more difficult to establish a vineyard in this area than expected due to heavy development and previously established vineyards. It may be pertinent for them to investigate other suitable areas or do more research into this particular region so that analysis criteria may be refined. There are established vineyards outside our identified suitable land, including withing the floodplain. It is possible that these sites may be adequately suitable for our clients purposes and could increase the amount of available land.

There are also many implications for our analysis in these results. First is that much of our data appears to be inaccurate or out of date, observed through aerial imagery. Finding more up to date and accurate information to work with will improve the viability of our analysis greatly. It would also benefit our analysis to increase the data's resolution because our resolution of 10 by 10 meters is potentially too coarse to depict the spatial variability of our area of interest (Mathews, 2013). Increasing the resolution could better capture this variability and open up more suitable land with greater accuracy for our client. This is of great importance considering the amount of unexpected development and previously established vineyards in the area.

References

- Mathews, A. J. (2013). Applying geospatial tools and techniques to viticulture. Geography Compass, 7(1), 22–34. https://doi.org/10.1111/gec3.12018
- Wineries public. ArcGIS Hub. (n.d.). Retrieved April 13, 2022, from https://hub.arcgis.com/datasets/napacounty::wineries-public/about