**Appendix S8:** Website and query details for all external datasets used in analysis.

Historical fire perimeters data was obtained from CALFIRE at <https://frap.fire.ca.gov/frap-projects/fire-perimeters/>

Elevation was obtained from the USGS National Map Viewer’s data download application ( <https://apps.nationalmap.gov/downloader/> ) with the datasets query set to the spatial extent of the 2003 Piru fire (data in above layer). Data query was also set to “Elevation Products (3DEP)” sub category “1 arc-second DEM current”, Data Extent “1 x 1 degree”, File Formats “GeoTiff”.

Slope was calculated from the Elevation dataset in ArcGIS’s Surface toolset in the Spatial Analyst toolbox and run under default parameters for the slope tool.

Aspect was calculated from the Elevation dataset in ArcGIS’s Surface toolset in the Spatial Analyst toolbox and run under default parameters for the Aspect tool. Southwestness was then calculated as cos(aspect - 225⁰).

Solar radiation was calculated from the elevation dataset in ArcGIS’s Solar Radiation toolset in the Spatial Analyst toolbox. The Area Solar Radiation tool was used and run under default settings, except for the time configuration option, which was set to “special days”.

30-year mean annual precipitation normal was downloaded from the Parameter-elevation Regressions on Independent Slopes Model (PRISM) website “normals” tab ( <https://prism.oregonstate.edu/normals/> ), with spatial resolution needed set to “800m (18-350MB per data file; 5MB per full-size imagery)”, climate variable set to “Precipitation”, temporal period set to “annual values”, then clicking the “Download Data (.bill)” button.

30-year minimum January temperature normal was downloaded from the PRISM ) website “normals” tab (<https://prism.oregonstate.edu/normals/> ), with spatial resolution needed set to “800m (18-350MB per data file; 5MB per full-size imagery)”, climate variable set to “Minimum temperature”, temporal period set to “monthly values for January”, then clicking the “Download Data (.bill)” button.

30-year maximum August temperature normal was downloaded from the PRISM ) website “normals” tab (<https://prism.oregonstate.edu/normals/> ), with spatial resolution needed set to “800m (18-350MB per data file; 5MB per full-size imagery)”, climate variable set to “Maximum temperature”, temporal period set to “monthly values for August”, then clicking the “Download Data (.bill)” button.

30-year mean annual temperature normal was downloaded from the PRISM ) website “normals” tab (<https://prism.oregonstate.edu/normals/> ), with spatial resolution needed set to “800m (18-350MB per data file; 5MB per full-size imagery)”, climate variable set to “Mean temperature”, temporal period set to “annual values”, then clicking the “Download Data (.bill)” button.

30-year minimum January vapor pressure deficit (VPD) normal was downloaded from the PRISM ) website “normals” tab (<https://prism.oregonstate.edu/normals/> ), with spatial resolution needed set to “800m (18-350MB per data file; 5MB per full-size imagery)”, climate variable set to “Minimum vapor pressure deficit”, temporal period set to “monthly values for January”, then clicking the “Download Data (.bill)” button.

30-year maximum August vapor pressure deficit (VPD) normal was downloaded from the PRISM ) website “normals” tab (<https://prism.oregonstate.edu/normals/> ), with spatial resolution needed set to “800m (18-350MB per data file; 5MB per full-size imagery)”, climate variable set to “Maximum vapor pressure deficit”, temporal period set to “monthly values for August”, then clicking the “Download Data (.bill)” button.

Minimum precipitation anomalies were calculated by downloading the mean annual precipitation normal as described above, but at 4km spatial resolution instead of 800m spatial resolution. Then yearly annual precipitation values for 1912-1980 were downloaded from the PRISM website “Historical Past” tab (<https://prism.oregonstate.edu/historical/> ) by setting climate variable to “precipitation”, the blank box in temporal period each year in the span 1912-1980 and then clicking the “Download All Data for Year (.bil)” button. Of the downloaded files, the bil file ending with “just the year”\_bil corresponds to annual precipitation. For example, the desired data file in the 1912 folder would be “PRISM\_ppt\_stable\_4kmM2\_1912\_bil.bil”. For yearly precipitation values from 1981-2009, data were downloaded from the PRISM website “Recent Years” tab (<https://prism.oregonstate.edu/recent/> ) by setting climate variable to “precipitation”, temporal period to “monthly data x” with x representing each year from 1981-2009, annual values, then clicking the “Download Data (.bil)” button. Precipitation anomalies were then calculated as yearly precipitation – 30 year normal for every year.

All soil data was downloaded from the USDA’s web soil survey interactive map (<https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx> ). First, under the “Area of Interest (AOI)” tab and the “Area of Interest” subtab, the “Import AOI” option was selected and the “Create AOI from Shapefile” option was used to upload a shapefile of the 2003 Piru fire scar. Next, the “Soil Data Explorer” tab was selected and under the “Properties and Qualities Ratings” subtab the “Soil Physical Properties” option was selected. Then, for each “Available Water Supply (0-150cm)” “Bulk Density, One-Third Bar”, “Organic Matter”, “Percent Clay”, “Percent Sand”, and “Percent Silt” under “Advanced Options”, the “Aggregation Method” was set to “Weighted Average”, “Tie-break Rule” to “Higher”, and “Layer Options (Horizon Aggregation Method)” was set to “Depth Range (Weighted Average)” with Top Depth set to 0, Bottom Depth set to 150 and “centimeters” selected. Lastly for each of the layers, the “View Rating” button was clicked and then “Add to Shopping Cart”. Once all of the layers are successfully added to the shopping cart, the “Download Soils Data” tab was selected and under the “Your AOI (SSURGO)” sub tab, the “Create Download Link” button was clicked. This then creates a download link for all the desired data. Once all the data is downloaded, some processing in ArcMap or Rstudio is required. In the Spatial tab, the “soilmu\_a\_aoi” shapefile must be joined to the appropriate “rating” file in the thematic tab. For each soil variable downloaded, there will be a ratingxxxxxx file in the thematic tab. The summary text document in the thematic folder provides a key to which rating file corresponds to which variable. Lastly, the rating file and soilmu\_a\_aoi shapefile must be joined by their “MapUnitKey” (or MUKEY in the shapefile).

The Distance from roads data set was created by calculating a distance raster in ArcGIS using the Euclidean Distance tool in the Distance toolset in the Spatial Analyst toolbox. The input feature source data was a primary and secondary roads shapefile obtained from the United States Census Bureau’s Tiger/Line roads shapefiles (<https://www.census.gov/cgi-bin/geo/shapefiles/index.php?year=2017&layergroup=Roads> ) with the “primary and Secondary Roads” “Select a State” set to California. Then the “output cell size” was manually set to 10m.