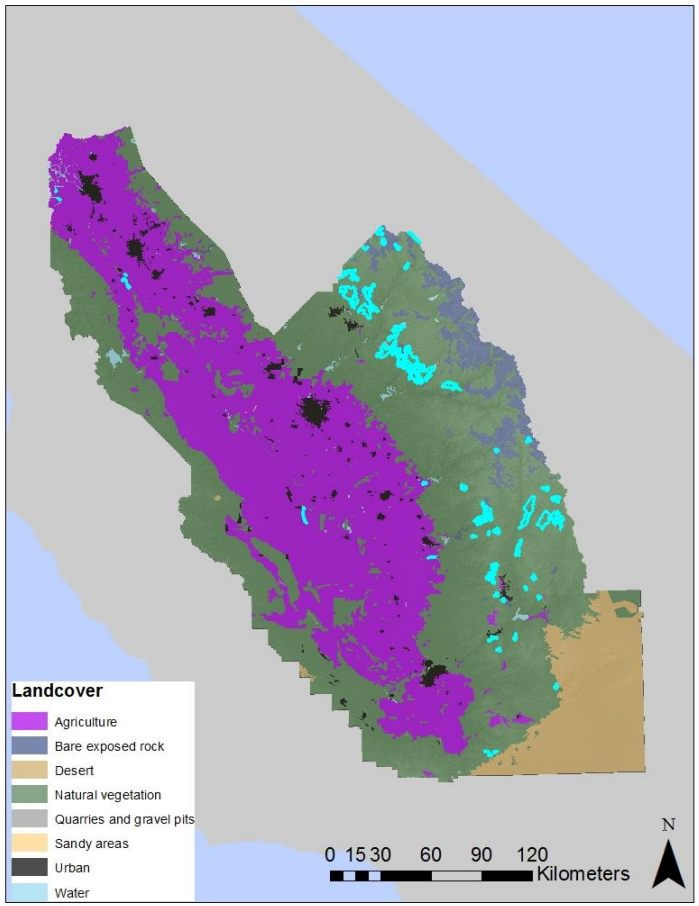
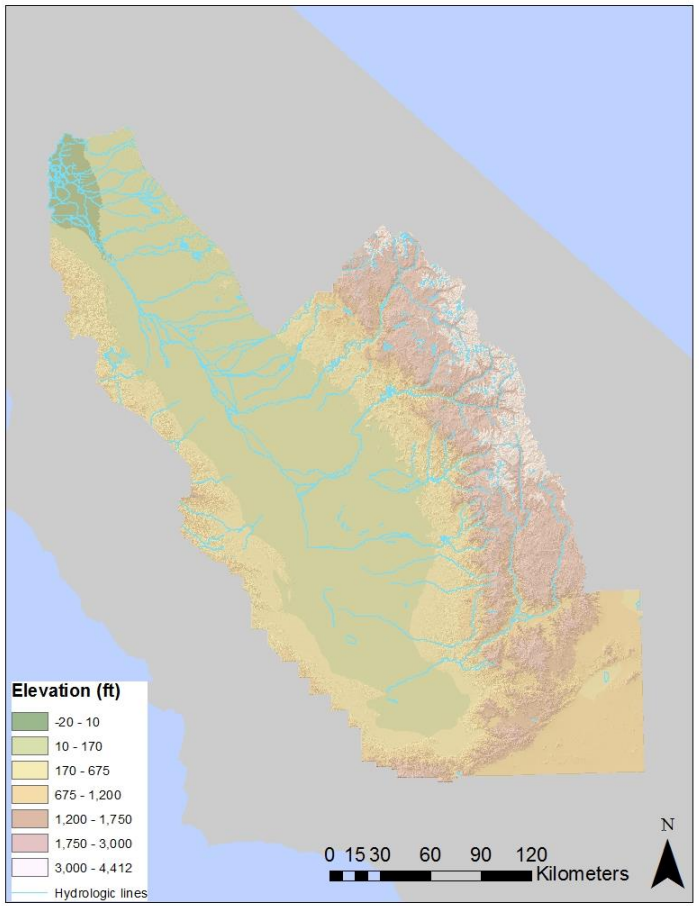
Landscape of the San Joaquin Valley

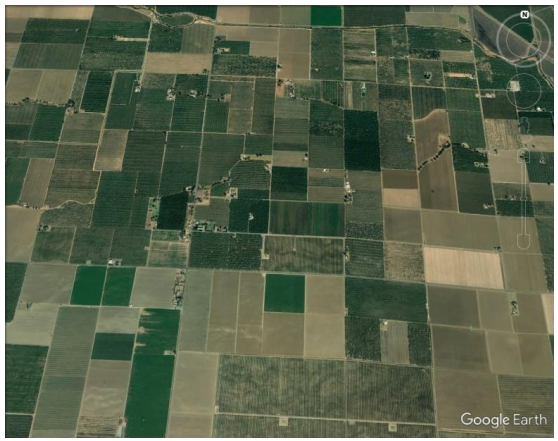
The San Joaquin Valley is a primarily agricultural based community. Higher elevations are less suited for agriculture and have more natural vegetation. The valley relies on snow melt from the higher elevations for much of its water supply. The agriculture of the valley relies on the water from rain and snowmelt for irrigation.



Landcover of the San Joaquin Valley.



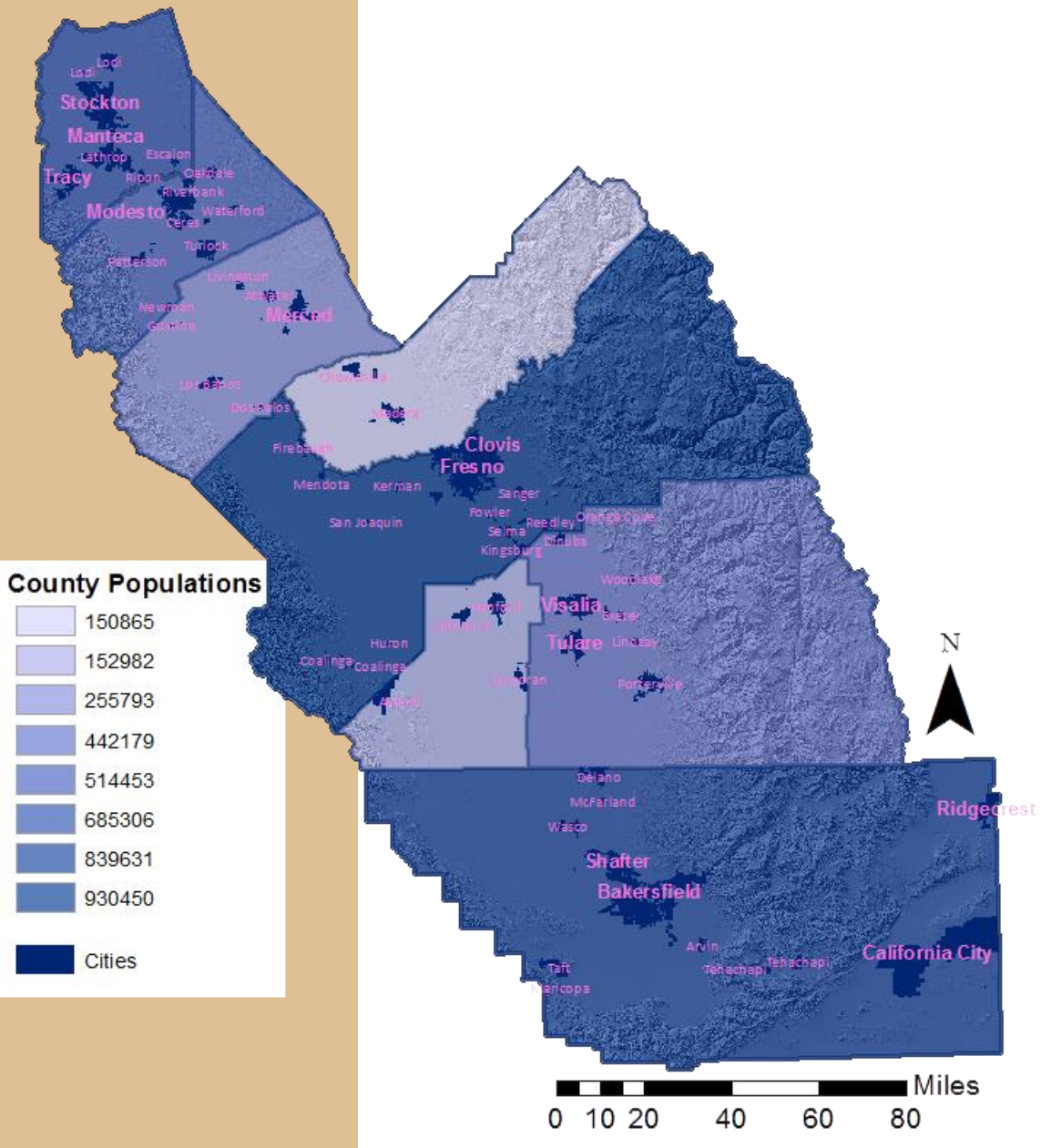
Hydrologic data overlaid onto the elevation data of the San Joaquin Valley.



Google Earth image of agricultural land in Merced county.

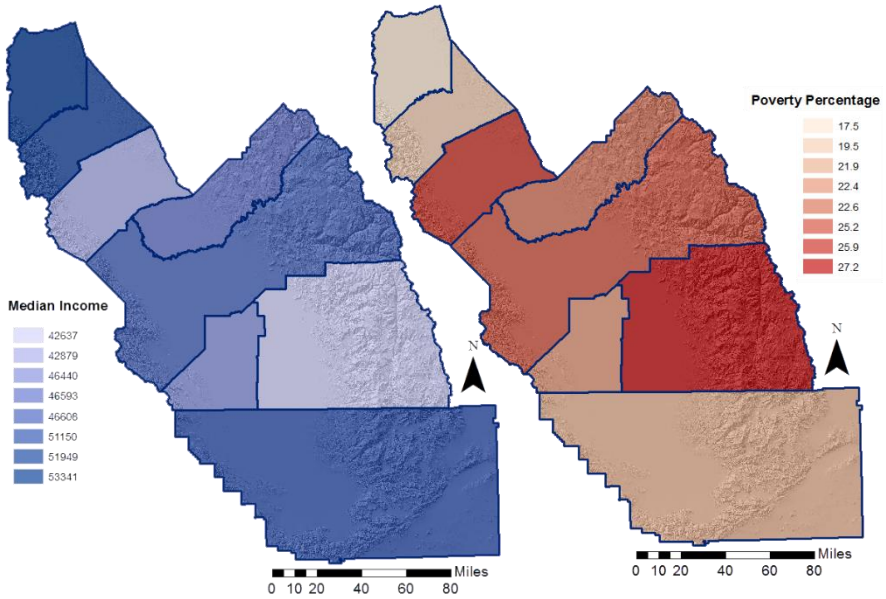
Google Earth image of mountains in Fresno county with natural vegetation coverage.

Population



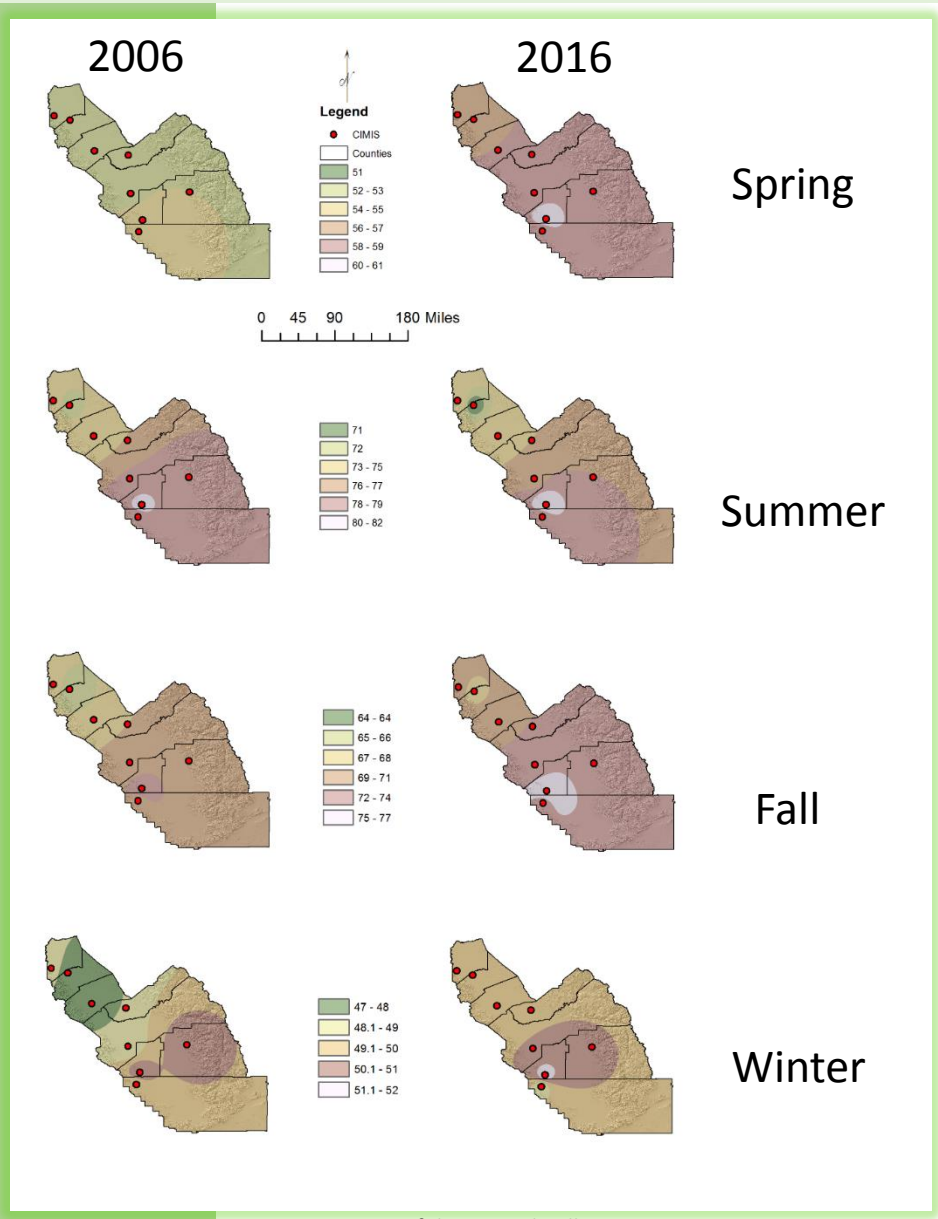
The San Joaquin valley region was home to almost four million people as of the 2010 census, most of whom make their homes along the major roads that run north to south through the middle of the valley.

Population and wealth both decrease with distance from these economic centers, but even in the cities, the populations and income tend to be lower than elsewhere in the generally affluent state of California.



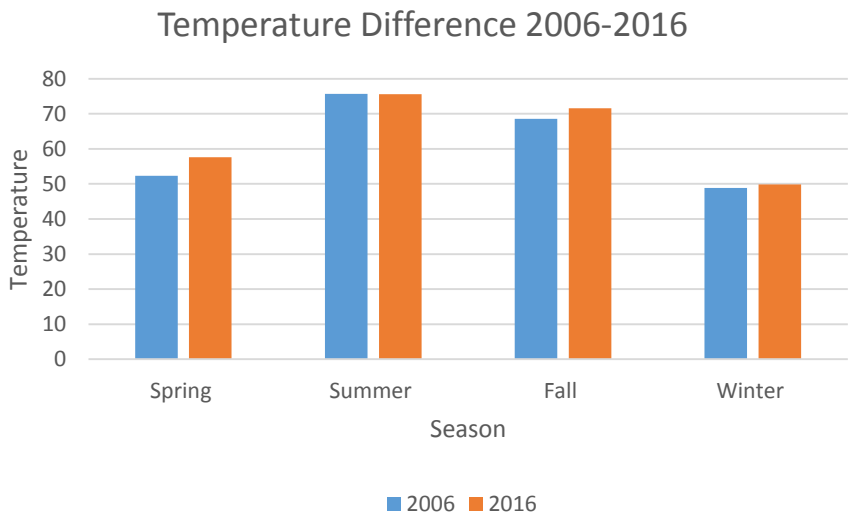
Most counties in the San Joaquin region have around $50,000 median income, and nearly a quarter of the region lives below the poverty line, making the San Joaquin valley one of the most economically disadvantaged regions in the state.

Temperature Change

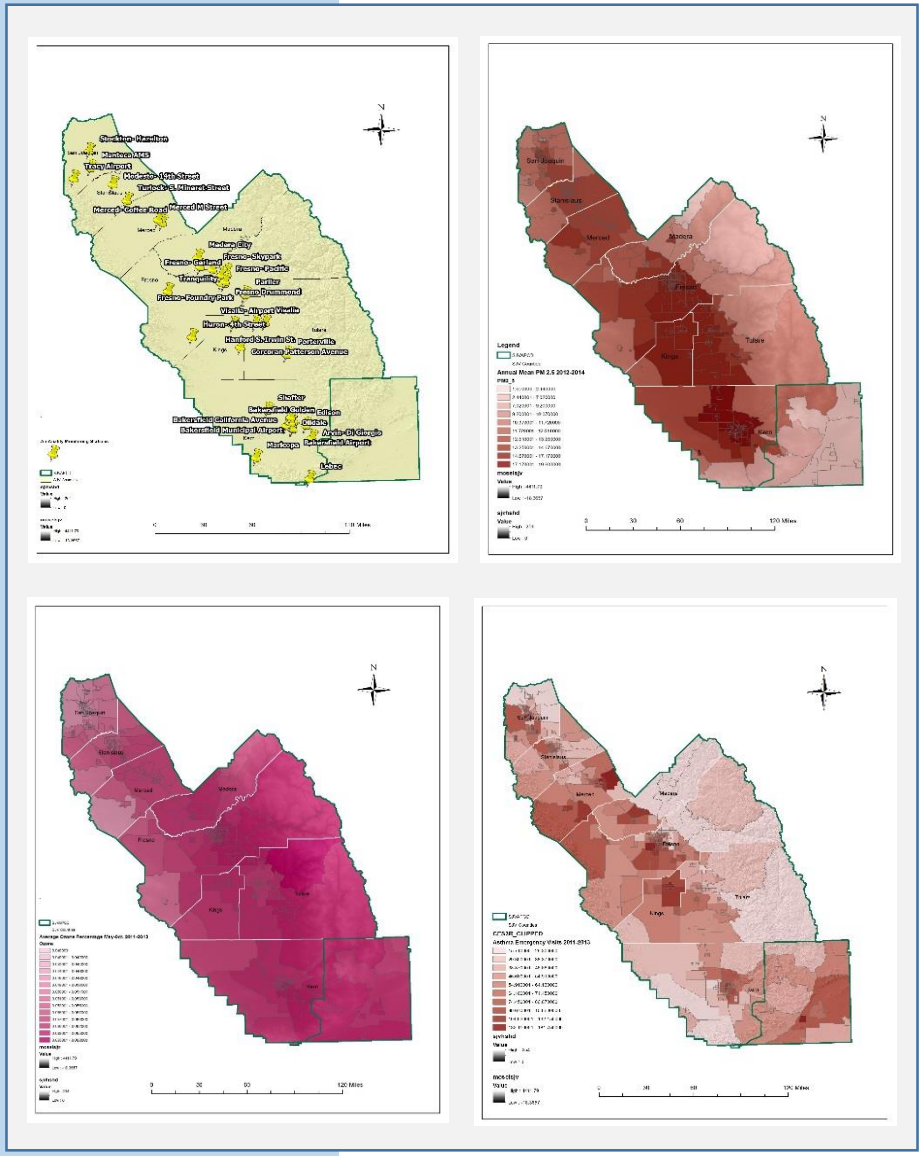


Temperature map of the Central Valley

Reviewing the past decade, average monthly temperatures were taken from 2006 and 2016. The months were divided into seasons and corresponding maps were created, one for 2006 and one 2016. What can be seen is a gradual climb in temperature over the past 10 years. What is interesting is how close the summer seasons are together. There is very little change in them, whereas there is a noticeable rise in the other seasons. This information was gathered from California Irrigation Management Information System (CIMIS), an irrigation management database that documents environmental factors, including air temperature. In summation, the conclusion of this research is that we have experienced a slight increase in temperature, when comparing 2006 to 2016.



Air Pollution in the San Joaquin Valley



The San Joaquin Valley has some of the most polluted air and accounts for the second worst air quality region in the United States. In the San Joaquin Valley, the mountain ranges trap air pollution in, where an inversion layer forms while keeping air contaminants confined and in high concentrations, especially on warm and hot summer days. Some of the main contributors to air pollution are agriculture, oil drilling operations, large industries, and traffic along interstate 5, and highway 99.There are roughly 3.9 million people in the San Joaquin Valley that are exposed to some of the nation's most polluted air. For example, fine particulate matter known as PM 2.5 causes health problems such as asthma to premature deaths. Also, breathing in ground level ozone is dangerous as it can trigger a variety of health problems like throat irritation, chest pain, and congestion, and can lead to severe lung damage making infants, and the elderly more vulnerable to health effects.

A smoggy day in California's Central Valley in January-2015, Earth Justice

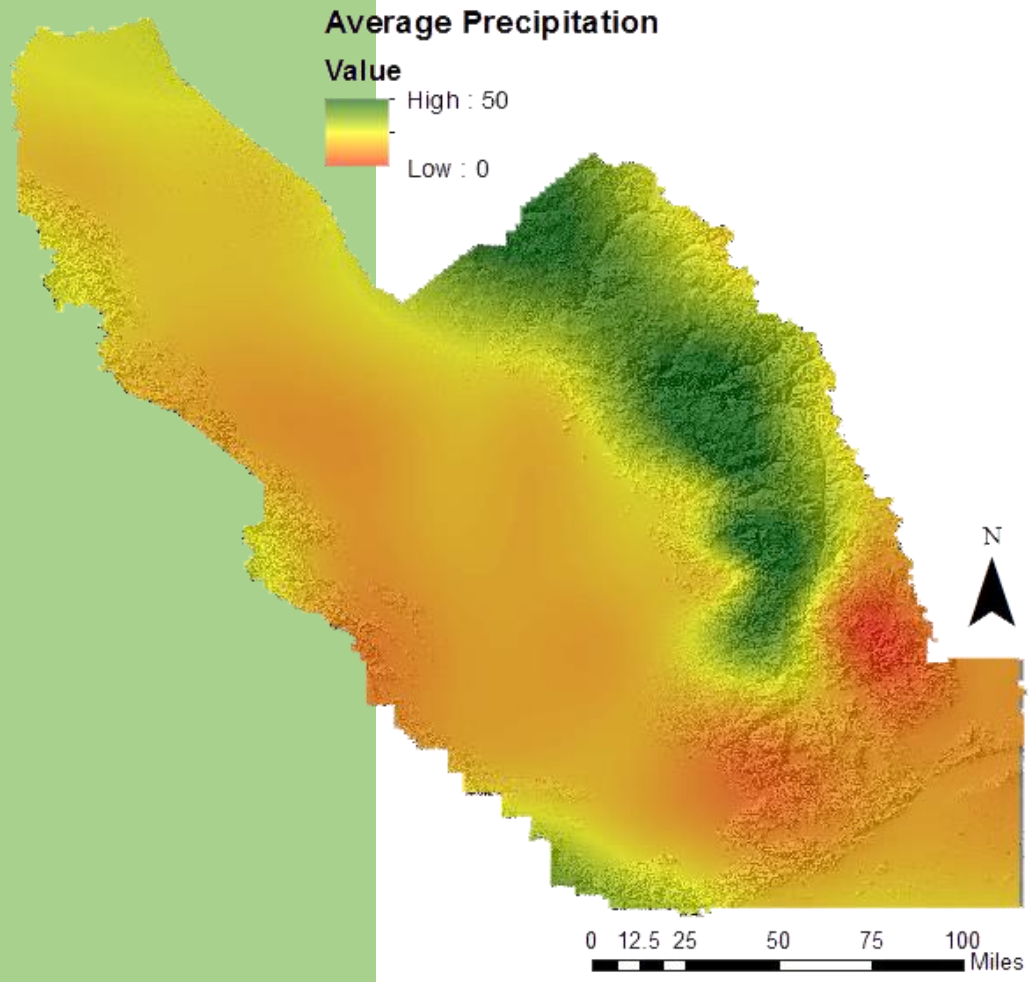
Oil drilling operation in Bakersfield, California- SF Chronicle, 2017

People at Risk In 25 U.S. Cities Most Polluted by Short-term Particle Pollution (24-hour $PM_{2.5}$)

2015 Rank[1]	Metropolitan Statistical Areas	Total Population[2]	Under 18[3]	65 and Over[3]	Pediatric Asthma[4,6]	Adult Asthma[5,6]	COPD[7]	CV Disease[8]	Diabetes[9]	Poverty[10]
1	Fresno-Madera, CA	1,107,661	320,969	122,769	28,434	68,326	35,215	50,742	76,410	302,747
2	Bakersfield, CA	864,124	256,286	83,355	22,704	52,702	26,422	37,419	57,022	189,029
3	Visalia-Porterville-Hanford, CA	605,103	186,336	59,173	16,507	36,242	18,179	25,830	39,162	161,927
4	Modesto-Merced, CA	788,719	225,161	88,537	19,947	49,080	25,498	36,795	55,529	176,917
5	Los Angeles-Long Beach, CA	18,351,929	4,449,763	2,197,260	394,199	1,212,912	633,626	915,447	1,383,294	3,173,150
6	San Jose-San Francisco-Oakland, CA	8,469,854	1,870,604	1,119,507	165,714	578,767	310,320	453,045	682,920	1,014,067
7	Salt Lake City-Provo-Orem, UT	2,389,225	743,554	213,920	45,611	148,651	64,220	99,124	113,349	284,263
8	Logan, UT-ID	129,763	40,841	11,495	2,622	7,895	3,295	5,091	5,762	17,613
9	Fairbanks, AK	100,436	24,790	7,558	2,180	7,074	3,810	4,402	4,592	8,497
10	Pittsburgh-New Castle-Weirton, PA-OH-WV	2,659,937	517,286	481,225	52,576	203,830	159,280	223,889	225,070	336,867

State of the Air Report-2015, American Lung Association

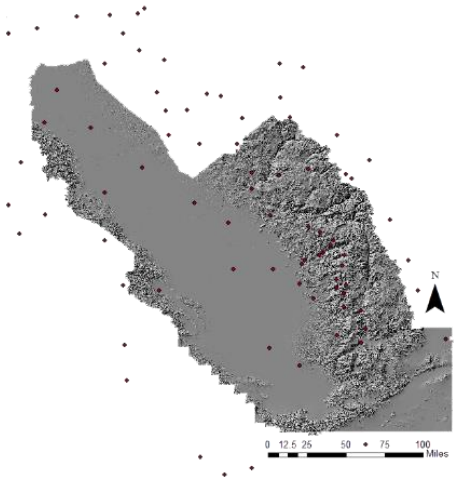
Precipitation



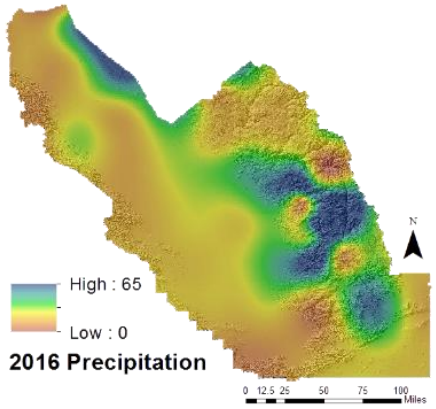
Annual average data is presented in total inches of rainfall. This information is calculated per water year, from October (which typically contains the first storm of the fall) through the following September (including months that typically lack precipitation in the preceding water year).

As a heavily agricultural region, water is very important to the San Joaquin valley. While much water is drawn from wells, this water isn't always renewable. The most agriculturally important regions in the low-lying valley itself receive relatively little rainfall, but rain in the foothills feeds rivers that surge in the rainy winters, and the snowfall in the higher mountains provides meltwaters that keep the rivers active throughout the year.

California in general is subject to drought, and economically sensitive regions like the San Joaquin valley are often especially impacted.



Precipitation data was collected from active weather stations within 75km of our San Joaquin Valley mapping extent



Individual annual data may contain substantial variation. Shown here, 2016's data shows much less consistent precipitation than the average implies.

Water Usage in the San Joaquin Valley

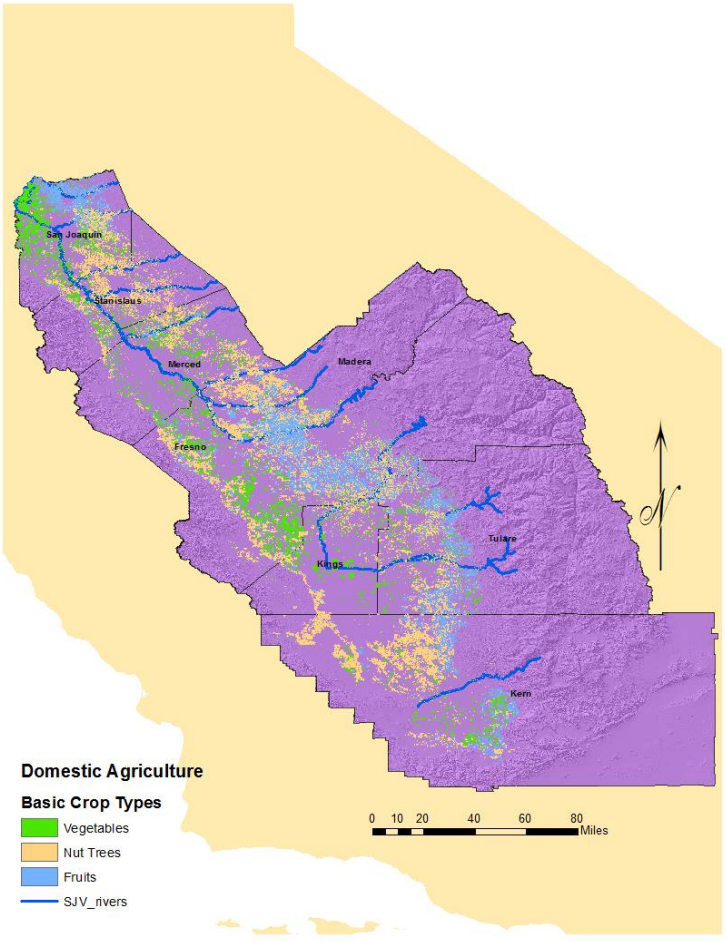
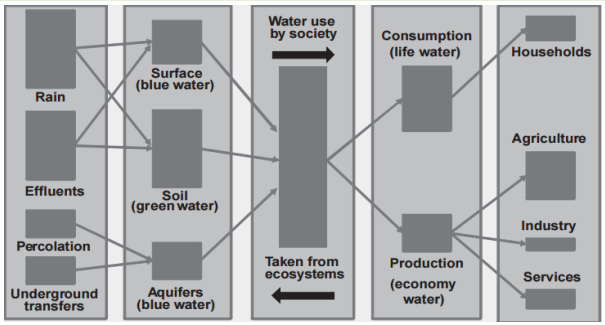


Fig .1



One of the earth's renewable resources, essential to life, is water. With regard to agriculture, water is the major limiting factor in terms of production. The titanic agricultural production of the San Joaquin Valley demands an enormous amount of water to irrigate. (Fig. 1 & 2)

Water shortages severely affect crops in all stages of development. Water stress limits the metabolism of nitrogen and other nutrients in crops.

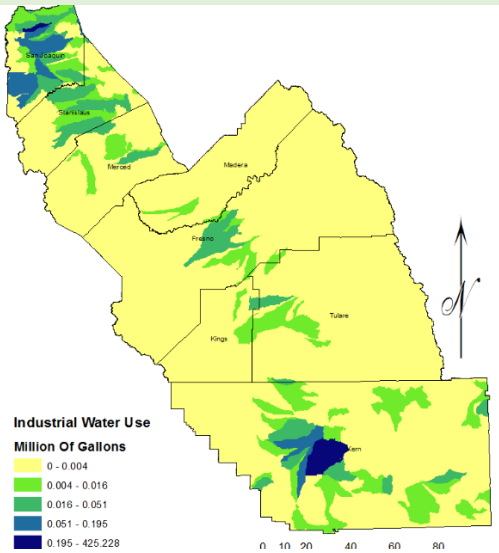


Fig. 4

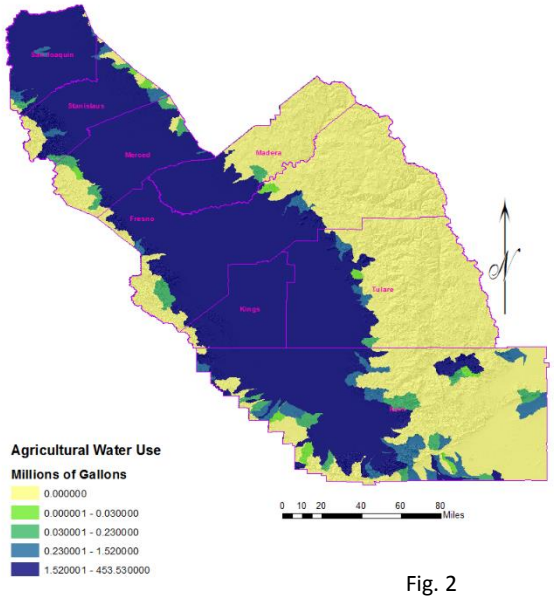


Fig. 2

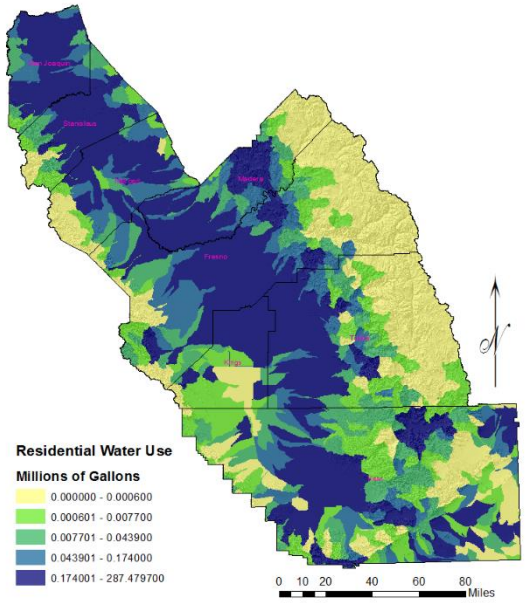


Fig. 3

Groundwater Usage in the San Joaquin Valley

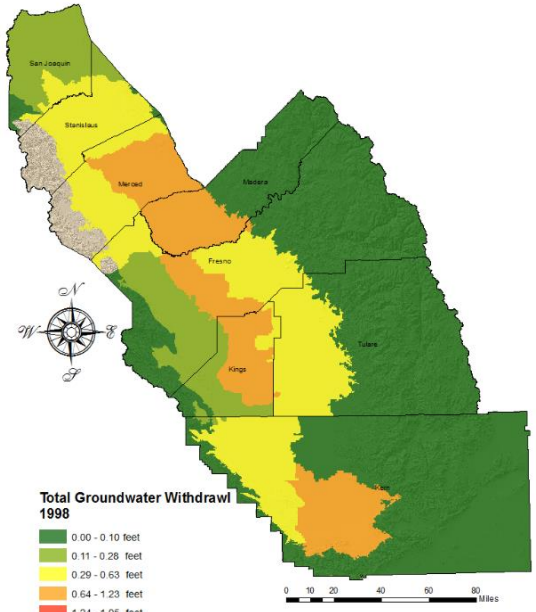


Fig. 1

Deep below the surface of the earth, lies a collection of water that has accumulated over millions of years, we call this groundwater, also known as “fossil water”.

Due to increases in population growth, agricultural expansion, and surface water deficits, groundwater is mined. Less than 1 percent of mined groundwater is replaced.

Water scarcity is a socially driven phenomenon called a “deep social inclusion”, where there is a clear mismatch between physical water availability and societal water.

Because of the large agricultural, urban, and environmental demand for water, water scarcity in the San Joaquin Valley has become a prime issue. As a result, farmers have resorted to groundwater pumping to meet demands for crops, which has taken a toll on the land, with lowering of its water table (Fig 1-4.) and in some locations, subsidence.

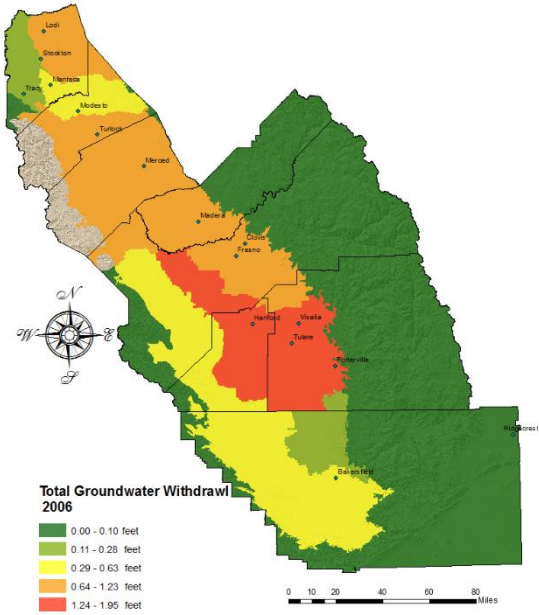


Fig. 3

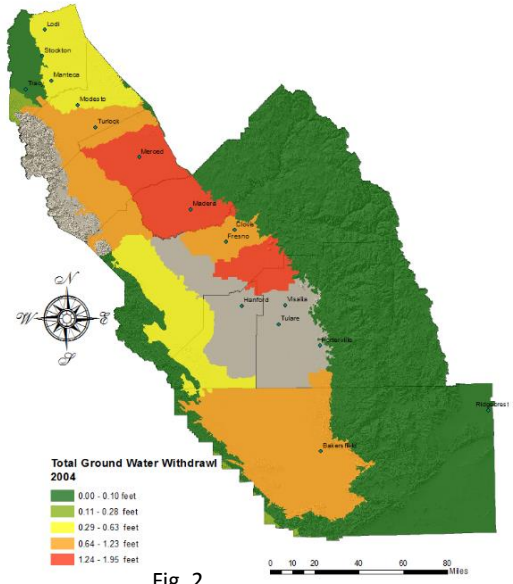


Fig. 2

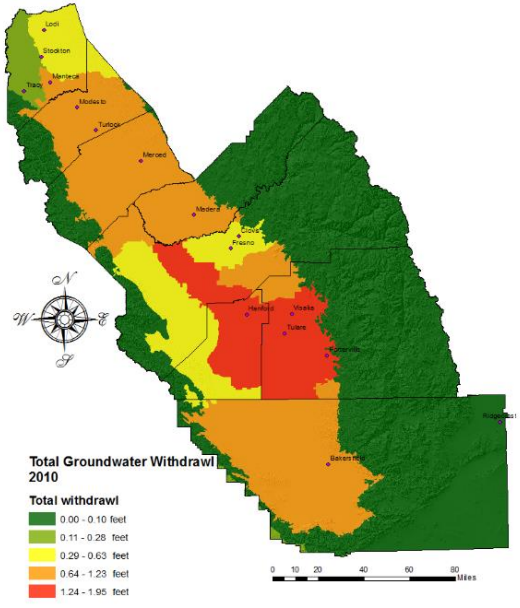
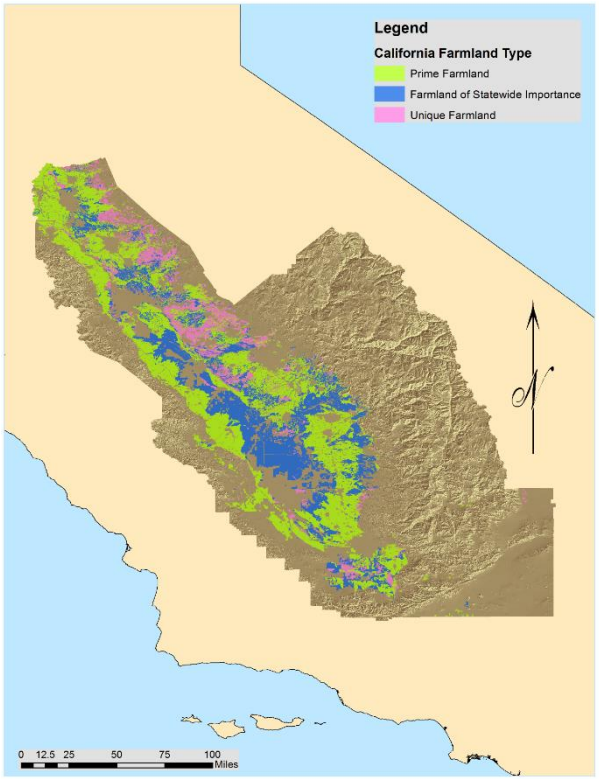
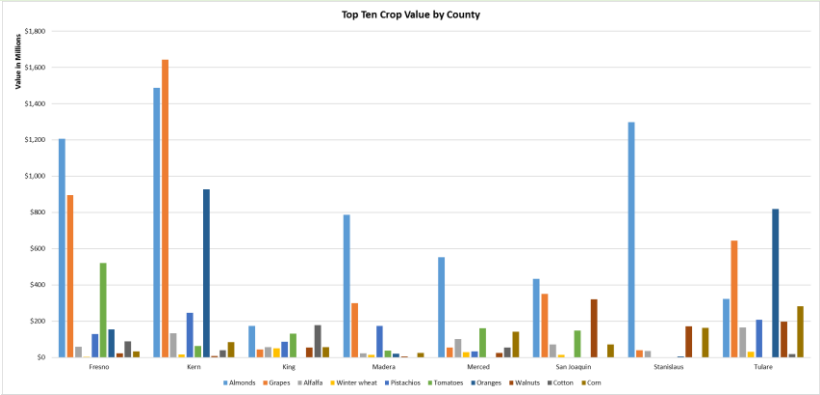
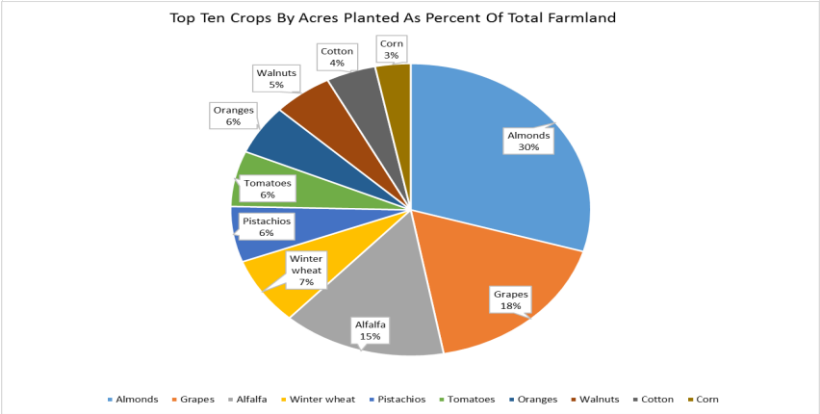


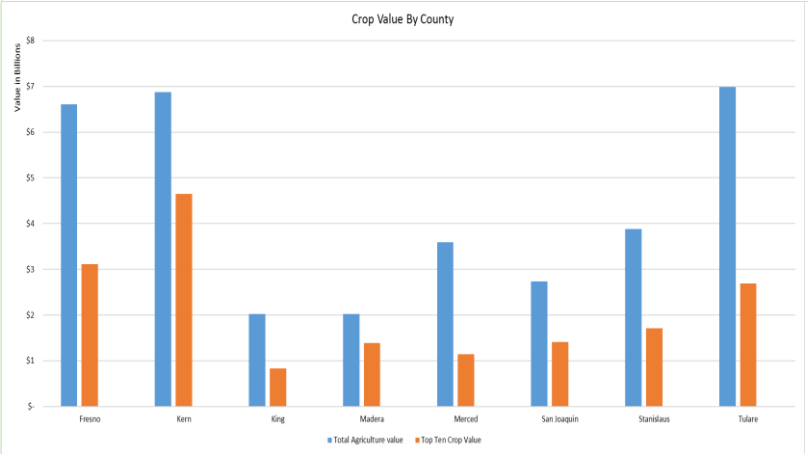
Fig. 4

San Joaquin Valley Agriculture









Above: Map showing the location of the three types of farmland designated by the California Department of Conservation.

Right Top: Graph showing the top ten crop values by county.

Right Middle: Graph showing Total Agriculture value and the value of the top ten crops.

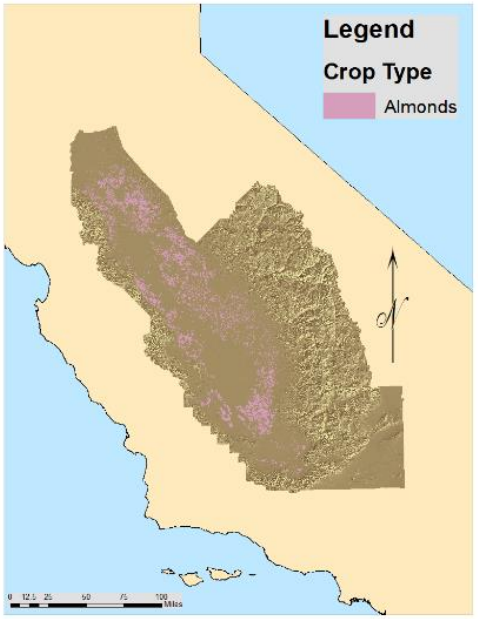
Right Bottom: Pie chart showing acreage by crop type of the San Joaquin Valley.

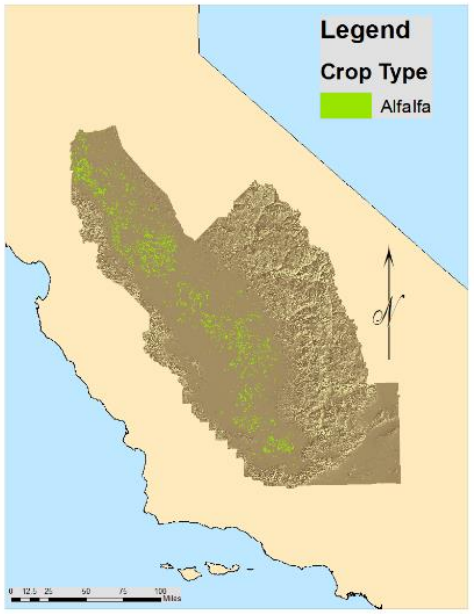
The Graphs and Charts are based on 2015 Crop Reports produced by the counties.

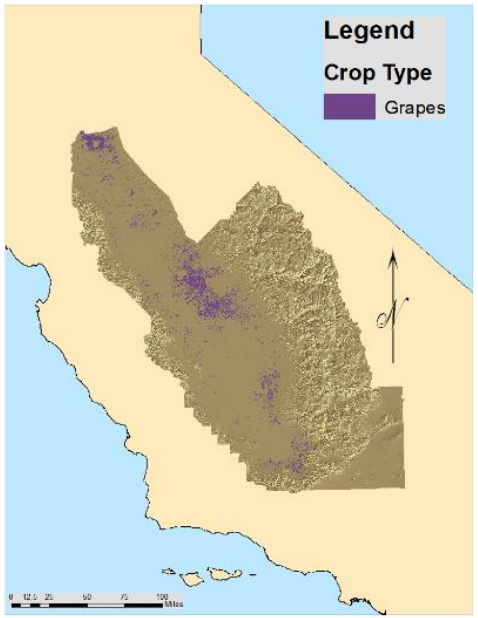
The San Joaquin Valley is home to some of the premier agricultural land in the United States. Our region produces a wide variety of Agriculture products that are exported around the world. The agriculture industry is a huge part of the economy of the San Joaquin Valley. According to the 2015 crop reports for the 8 counties in our region, the total value of agriculture products was $34,706,819,390. The top ten crops of the region in order are; Almonds, Grapes, Alfalfa, Wheat, Pistachios, Tomatoes, Oranges, Walnuts, Cotton, and Corn. These ten products contribute $ 16,575,261,000 or 48% to the total value of Agricultural products. The importance of Agriculture to the economy of the San Joaquin Valley cannot be overstated.

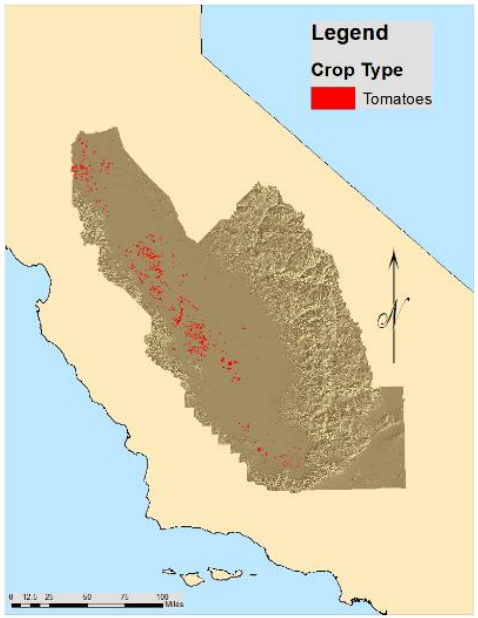
The San Joaquin Valley is approximately 27,478 square miles in area. Of this area, 7948 square miles are considered Prime Farmland, Farmland of Statewide Importance, or Unique Farmland. These classifications are based upon research done by the California Department of Conservation: Farmland Mapping and Monitoring Program. These designations are based on soil, climate, and terrain quality as it pertains to crop yields. The total acres of farmland is 5,087,200, of which 3,752,302 or 74% is planted with one of the top ten crops.

Top Five Crops By Water Use

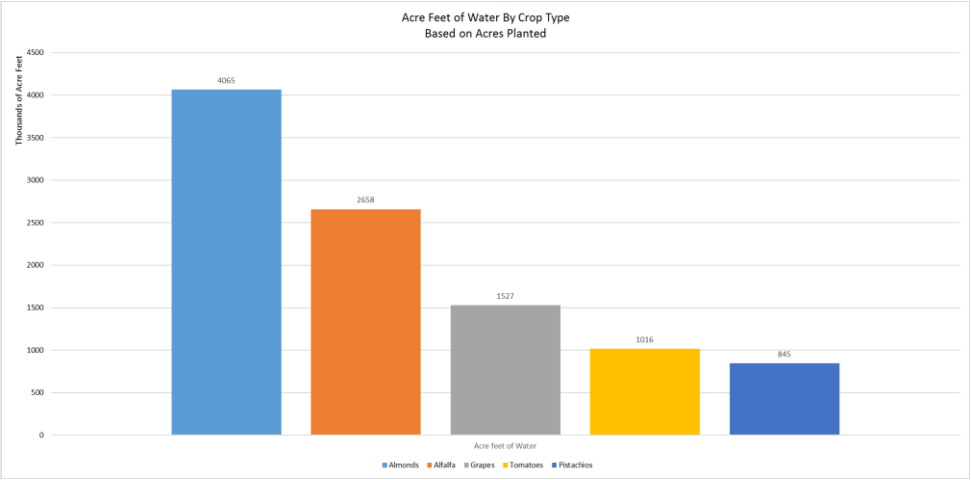


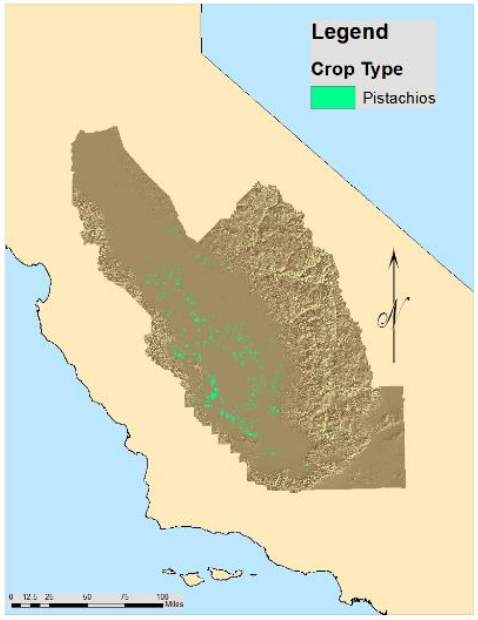






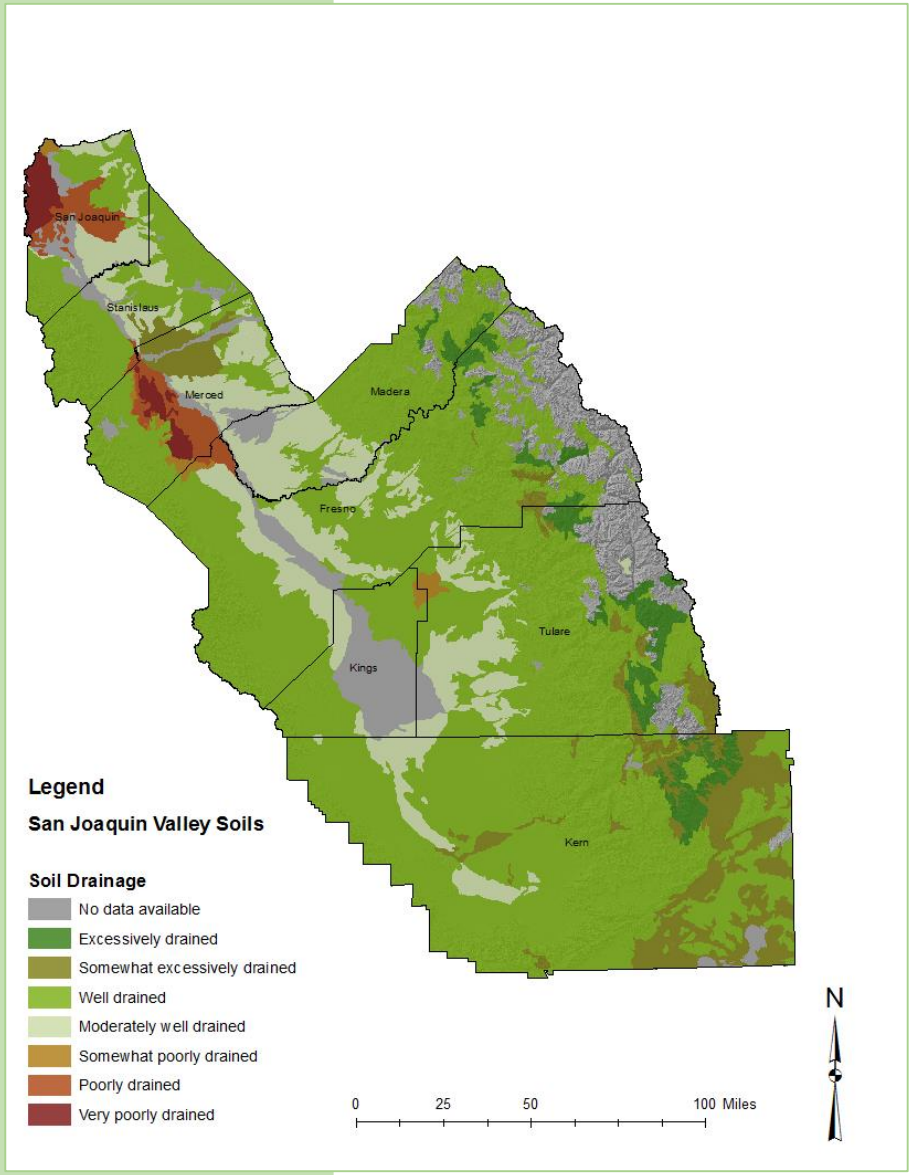
Water use in California is a hot topic. The narrative typically separates the urban water user from the farmer, but in the San Joaquin Valley water use is tied to agriculture. The top five crops in our region based on estimated water use per acre planted are; Almonds, Alfalfa, Grapes, Tomatoes, and Pistachios. The Data is based on the 2010 California Department of Water Resources Agriculture Report. The water used was calculated by averaging the acre foot of water per acre of the eight counties in our region, then multiplying the actual acres planted by the average acre foot of water. This value is an approximation only.





The maps shown were made from data compiled by the USDA: National Agricultural Statistics Service. The Graph data is based on data from the California Department of Water Resources.

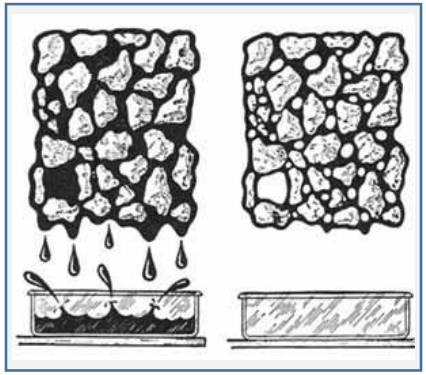
Soil Drainage in the San Joaquin Valley-Agriculture



Soil distribution and drainage throughout the San Joaquin Valley.

It is no secret that California has been home to thriving agricultural production. From the planning and practice of the farmers, to the natural environment in which the crop will be located a variety of things can affect productivity. To better understand why California, and the San Joaquin Valley in particular, does so well in Agriculture perhaps we need to start from the ground up.

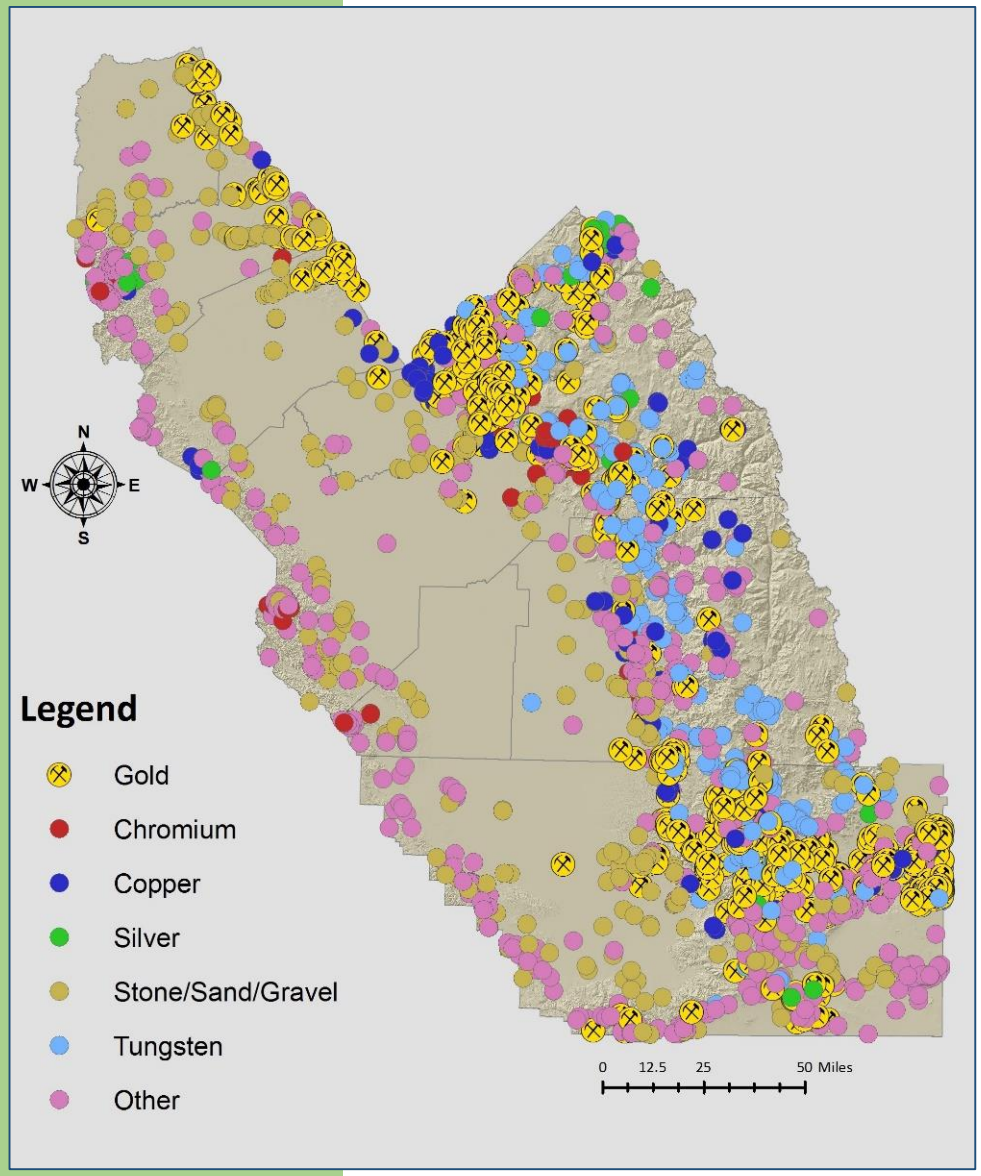
Quality of the soil is a huge contributor to the success of crop yields. In order for high production soil should act as a sponge by holding water and nutrients for the plants to absorb when ready. For this soil needs to have good drainage. The map to left represents soil distribution throughout the San Joaquin Valley with drainage representation. It's clear to see why this area is such an essential location for agricultural production.



An illustration of water holding capacity. More pore space means a higher capacity for holding and draining water. (Penn State University)

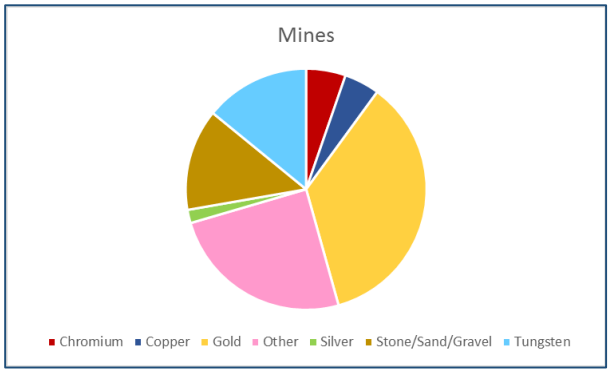
A healthy soil.

San Joaquin Valley Mining- Then



The map above represents recorded mine operations from the late 1800's to 1950

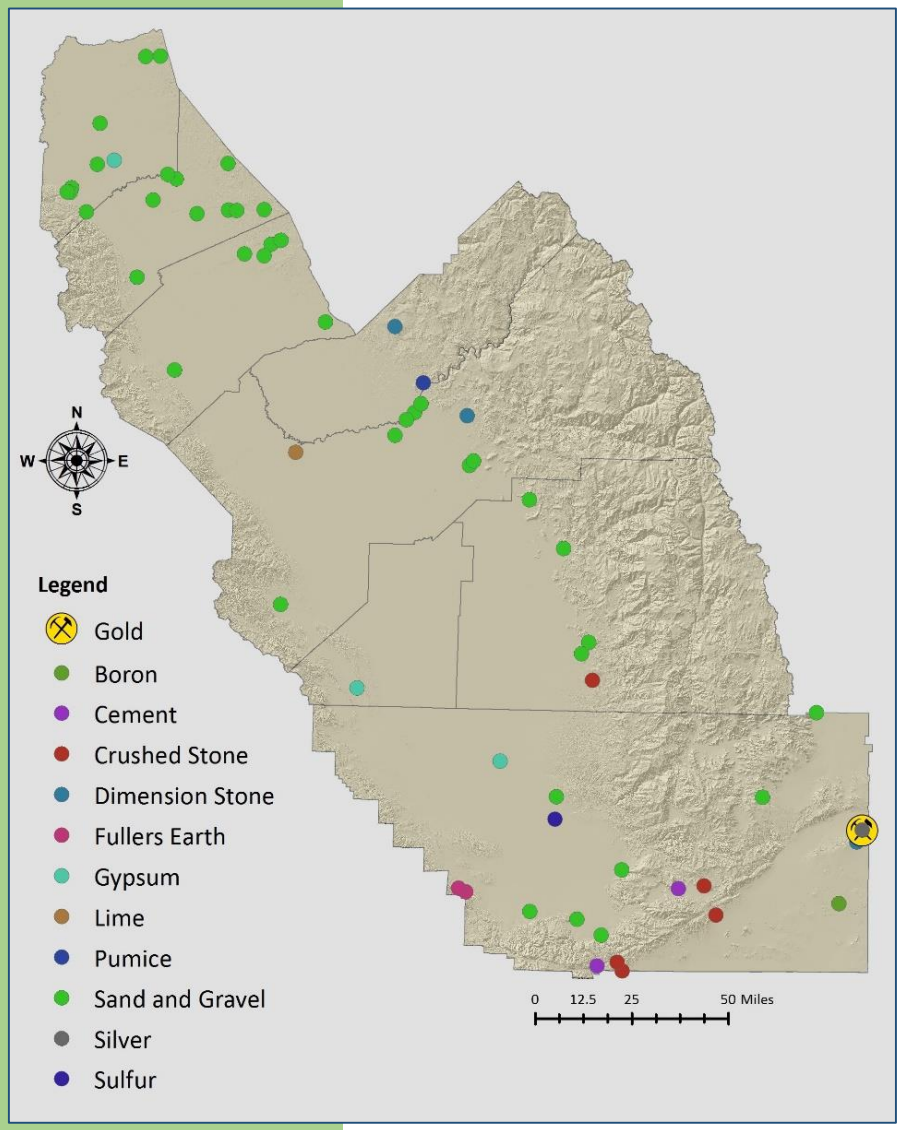
California claimed its fame in the mid 1800's with the sudden boom of the gold rush, and the mass migration of people looking to strike it rich across the state. The map to the left characterizes the mine locations recorded from the late 1800's to 1950. While it was gold that many sought during this time, you can see from the map that gold only represented a fraction of the materials mined from the San Joaquin Valley.



Molybdenite crystals that contain tungsten, the second largest mineral in production of the time. Found in Madera County, CA

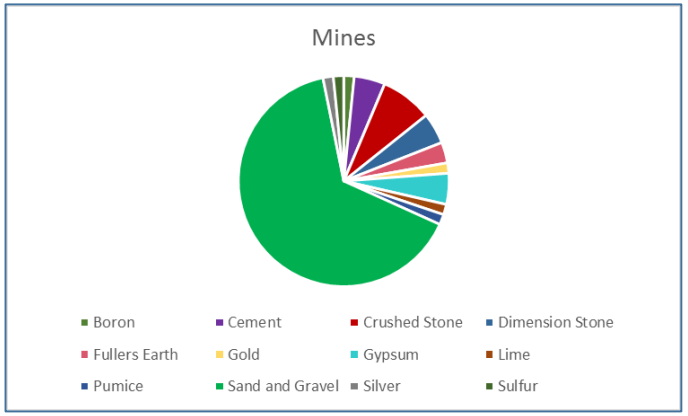
Gold Panner- Late 1800's to Early 1900's in Coarsegold, Madera County, CA

San Joaquin Valley Mining- Now



The map above represents modern mine operations recorded during the 2003 census

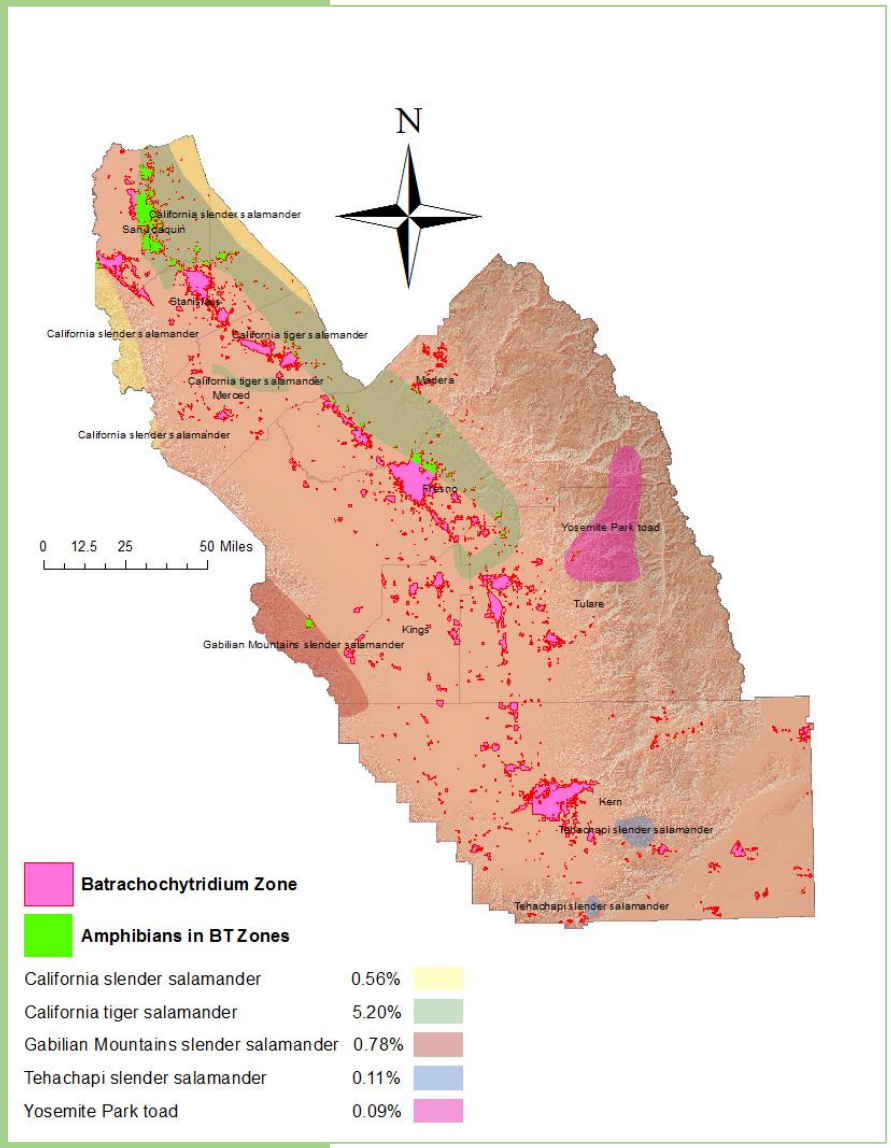
With the passing of the gold rush, along with the technological advances made by modern society, growing environmental concerns, and importation of minerals at lower costs that otherwise would have been mined locally, the demand for previously sought after minerals diminished. Today, in the San Joaquin Valley, many of the mines of the past have been closed down and many are being reclaimed to promote ecological succession.



Rand Mine, Kern County CA- The only operating gold mine left in the San Joaquin Valley

Sand, gravel, and rock mine

Amphibians Threatened by Chytridiomycosis

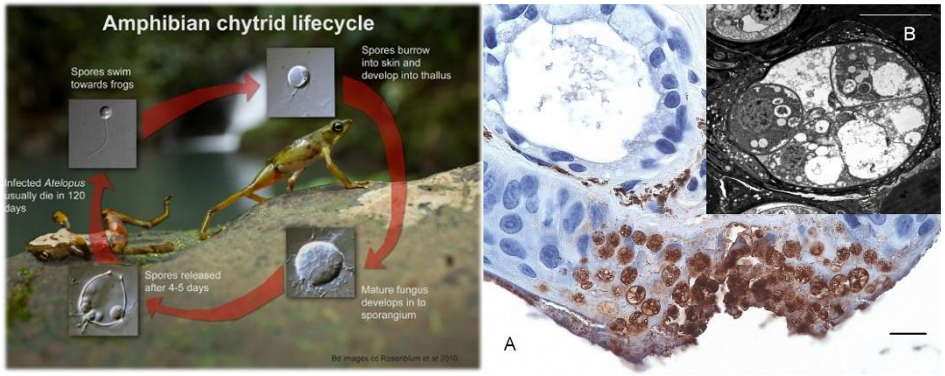


Threatened and endangered amphibian species habitats within the San Joaquin Valley alongside areas infested with *Batrachochytrium* fungus, with percentage of at-risk species within their habitats (2006).

For the rest of the world outside of California's San Joaquin Valley, *Batrachochytrium dendrobatidis* (Bt) is taking a major toll on amphibian species by killing off nearly half of the known species. Along with deforestation, pollution and climate change this fungal infestation is quickly wiping out large numbers of frogs and salamanders, even in our own backyard.

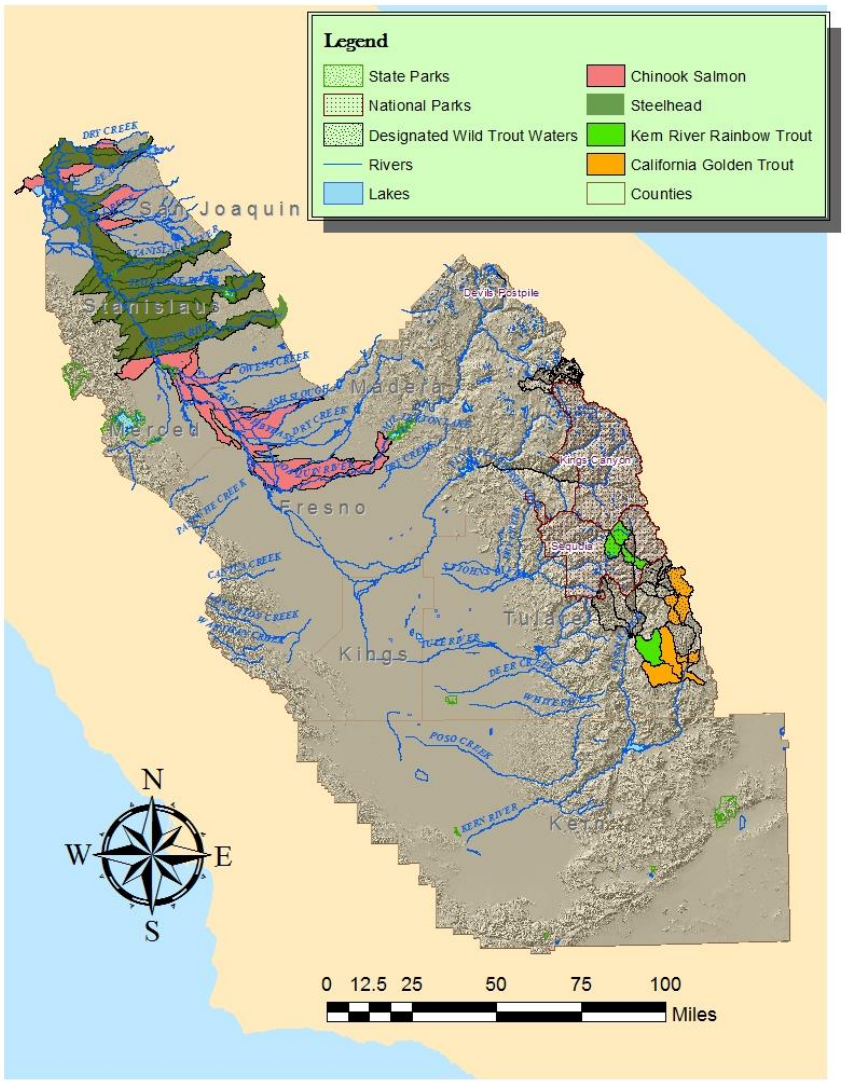
The San Joaquin Valley includes the native habitats of five of the state's threatened or critically endangered amphibian species. In concordance with positive-testing Bt sites and its ability to be passed from person to person (and animal to animal) in highly populated areas, we can assume that those zones of infection will remain prevalent under stable conditions. The increase in global temperatures including those in our valley are spurring the growth of Bt into regions populated with the five at-risk amphibian species.

The chart (left) shows the five species ranges within our valley where Bt has already encroached, with the percent of habitat predicted to be lost to Chytridiomycosis.



Lifecycle of the Batrachochytrium fungus which leads to Chytridiomycosis in frogs and salamanders (left), along with infected skin tissue (A) and microscopic view of Bt fungus within the eroded lesion (B). (PNAS, vol. 110 no. 38)

Habitat Extent of San Joaquin Valley Salmonids



This map displays the habitat extent of select native species of salmonid fish in California's San Joaquin Valley. In fall and winter, the threatened Chinook Salmon and Steelhead species travel south into the San Joaquin. Extensive damming of their native rivers and streams has put the two species in danger. Limitations have been placed on the recreational fishing for these species: all landed fish of these species' must be documented.

Chinook Salmon

The California Golden Trout and the Kern River Trout, conversely, are considered excellent catches. Their native habitat is depicted in the eastern portion of the San Joaquin Valley. Much of their habitat coincides with San Joaquin Valley's Designated Wild Trout Waters and with the area's National Parks. State Parks are also depicted.

Steelhead

Habitat range of the Coastal Rainbow Trout.

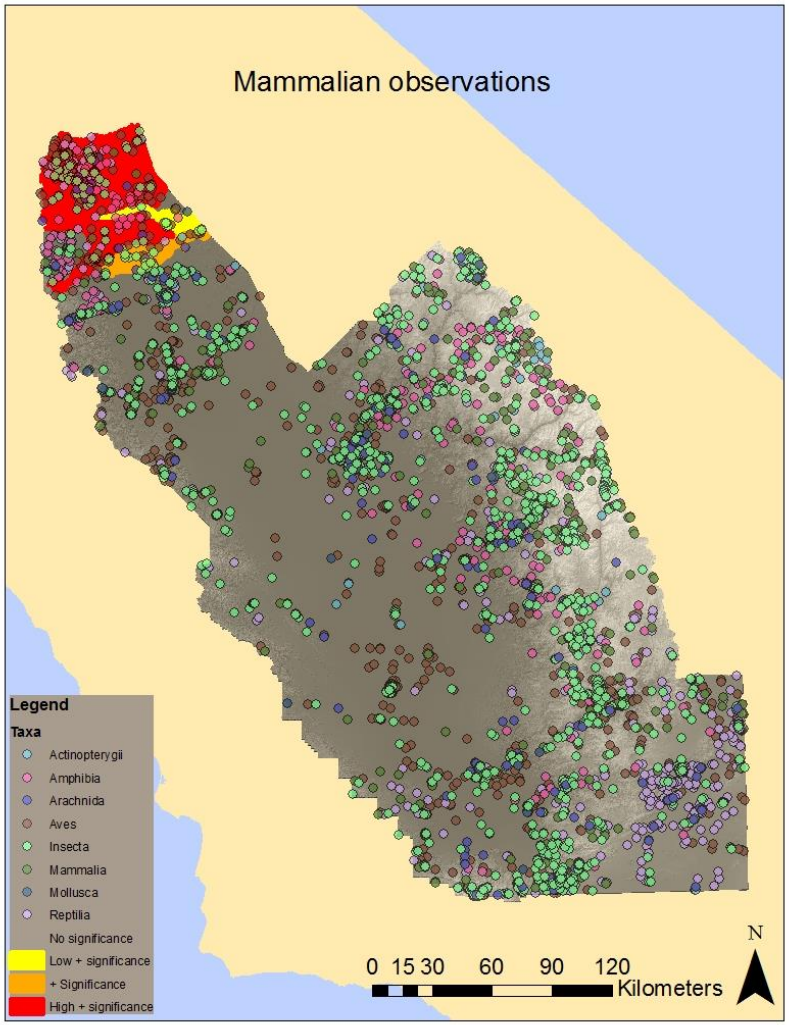
Coastal Rainbow Trout

Kern River Rainbow Trout

Finally, the Coastal Rainbow Trout is good fishing almost everywhere in the San Joaquin Valley, as depicted to the left.

California Golden Trout

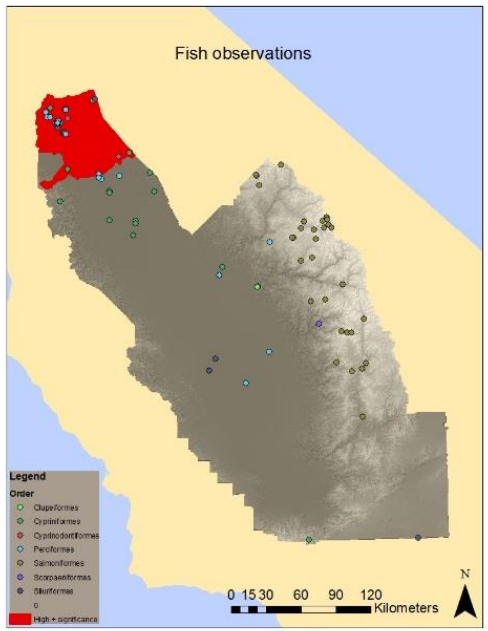
Wildlife Observations and Hotspots



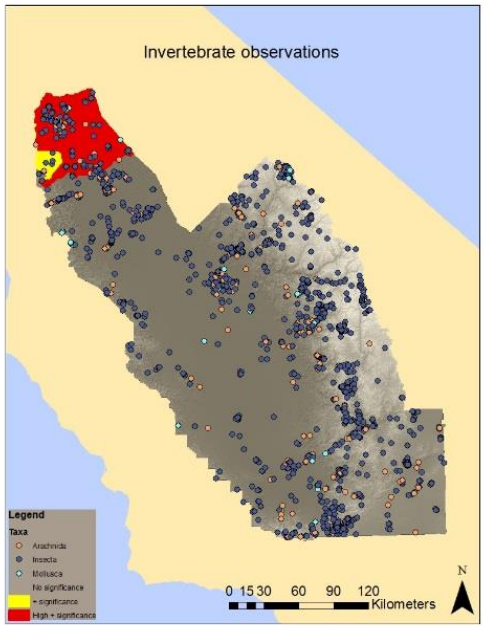
Observations of the 8 main wildlife taxa shown as point data. Optimized Hot Spot Analysis used with wildlife observation points aggregated into WBDHU10 watershed data.

iNaturalist is a crowd sourced nature observational application for the phone and computer. It allows the public to mark locations and associate pictures for identification of observed natural life.

These maps depict the wildlife (Animalia) observations within the San Joaquin Valley and the wildlife hot spots. All wildlife taxa had hot spots in the northern San Joaquin Valley, possibly due to higher human population.



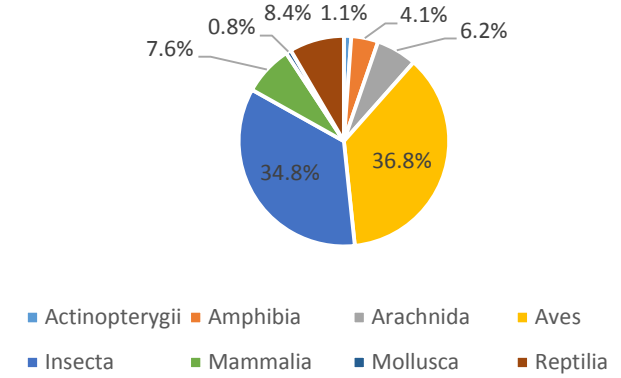
Observations of the fish orders shown as point data. Optimized Hot Spot Analysis used with wildlife observation points aggregated into WBDHU10 watershed data.



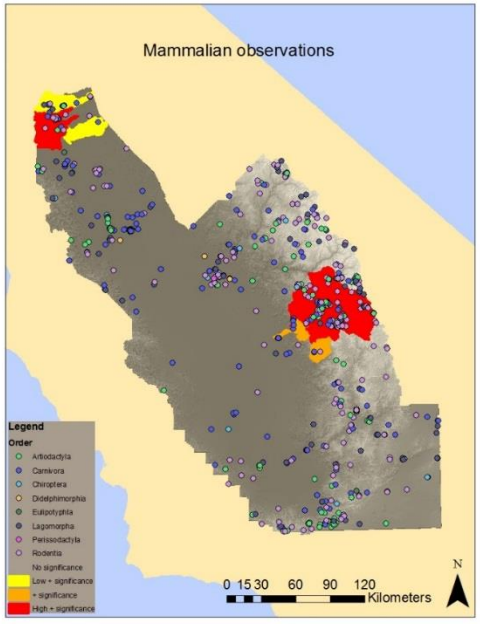
Observations of the invertebrate orders shown as point data. Optimized Hot Spot Analysis used with wildlife observation points aggregated into WBDHU10 watershed data.

Wildlife Observations and Hotspots

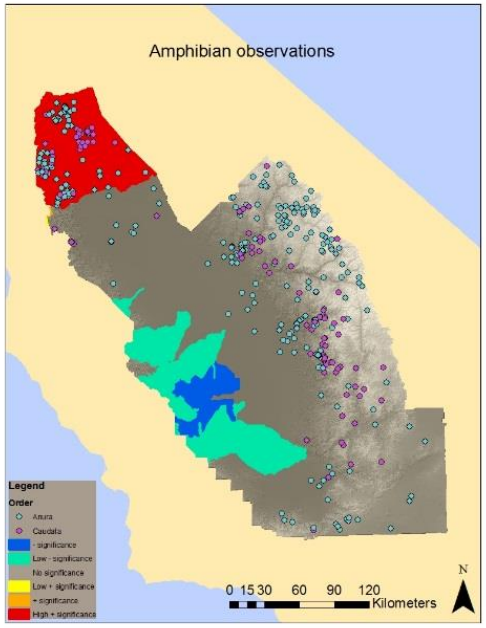
All wildlife taxa had hot spots in the northern San Joaquin Valley. The eastern hot spot for mammals is associated with the Natural Park Service land (Sequoia National Park) The hot spot for birds around Merced county is associated with a large open grassland. Reptiles had an additional hotspot in the desert area of the valley. Cold spots in the amphibian and reptile maps are associated with areas of overall lower observations in all wildlife.



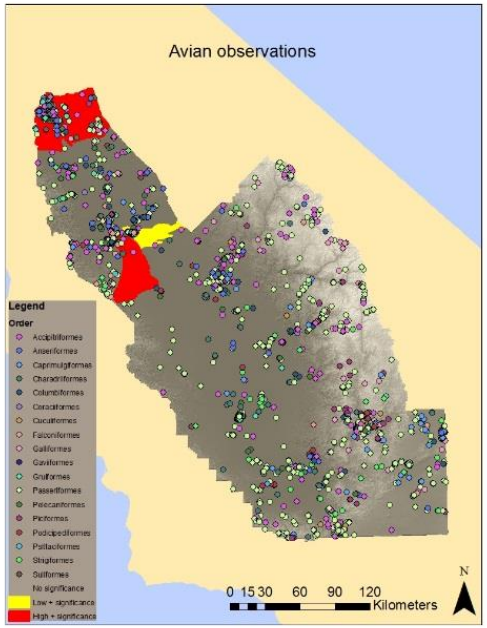
Distribution of overall wildlife observations from iNaturalist.



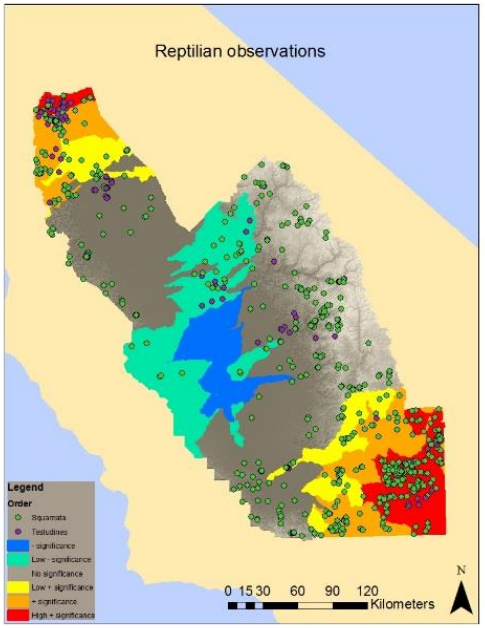
Observations of the mammal orders shown as point data. Optimized Hot Spot Analysis used with wildlife observation points aggregated into WBDHU10 watershed data.



Observations of the amphibian orders shown as point data. Optimized Hot Spot Analysis used with wildlife observation points aggregated into WBDHU10 watershed data.

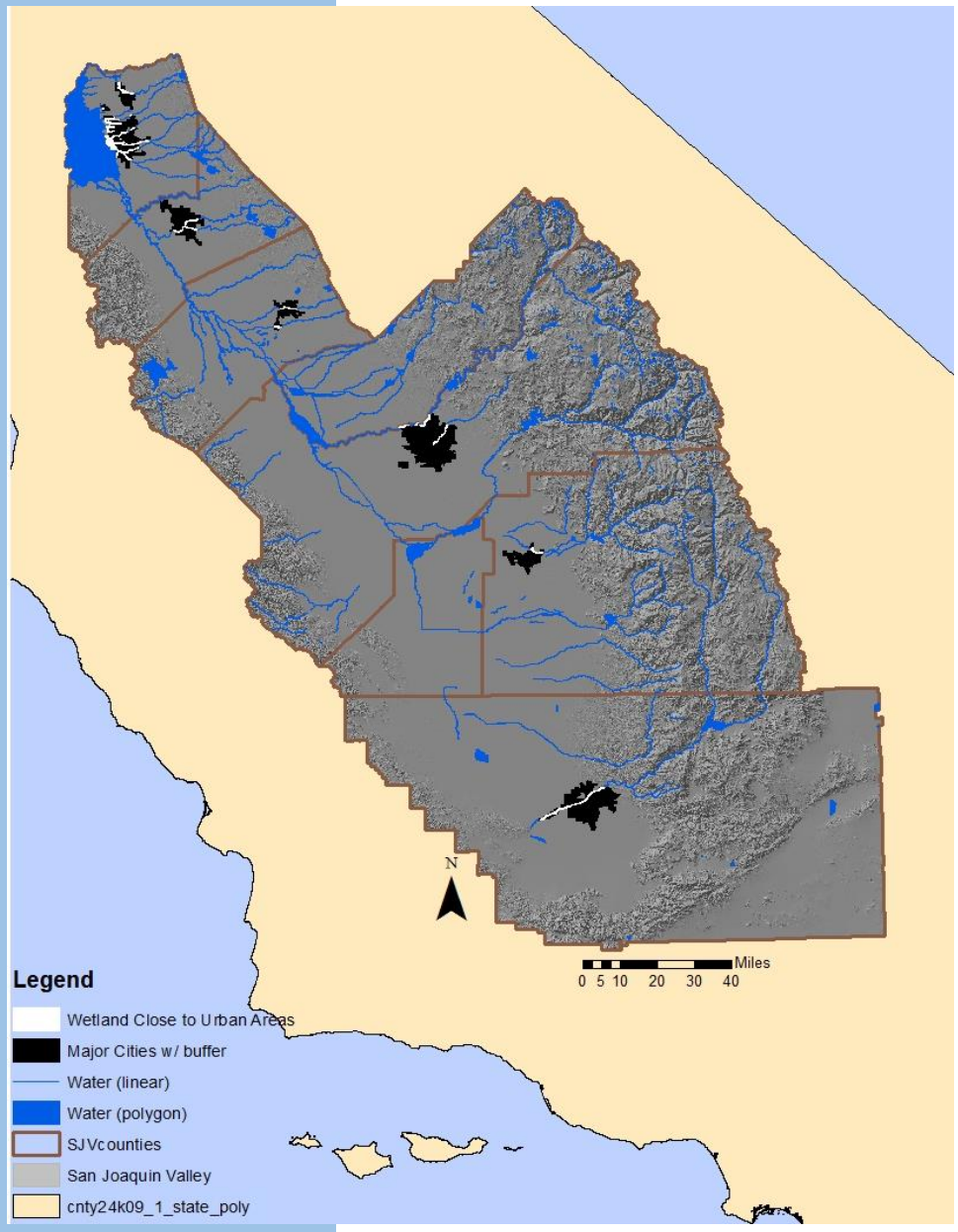


Observations of the bird orders shown as point data. Optimized Hot Spot Analysis used with wildlife observation points aggregated into WBDHU10 watershed data.



Observations of the reptile orders shown as point data. Optimized Hot Spot Analysis used with wildlife observation points aggregated into WBDHU10 watershed data.

San Joaquin Valley Water Near Urban Areas



The San Joaquin Valley has a stake in water, as we need it for agriculture, residential, trade, and industrial use. Major rivers in the valley are the San Joaquin, Merced, Tuolumne, and Stanislaus rivers.

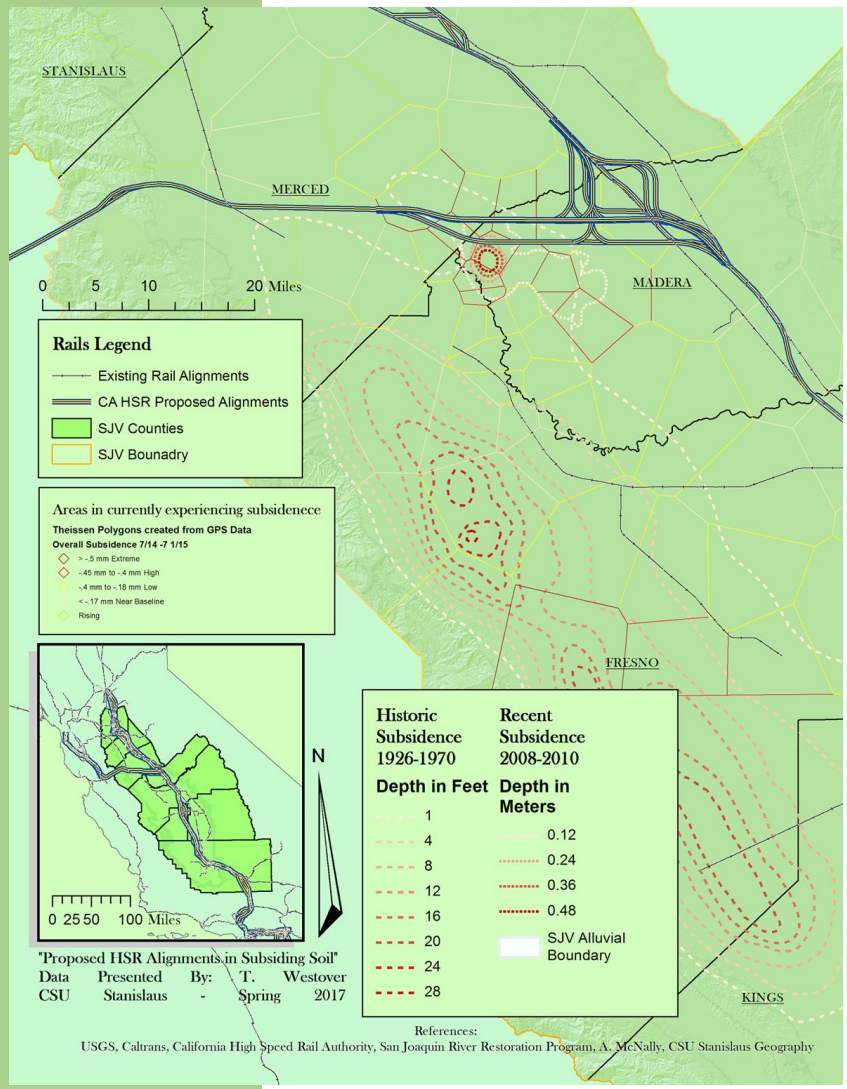
Therefore, the proximity of urban centers to rivers is important to understand. There is guidance on how large a buffer zone should be around water bodies. The recommended buffer zone for bodies of water with an unknown level of risk from human activity is 300 feet. Thus, any body of water that comes within 300 feet of an urban area has some level of risk.

The area of water in the San Joaquin Valley that should have a 300 foot buffer in major urban areas is 95,499,323.69 meters squared. Stockton (the northernmost city) seems to be the city closest to a largest area of water and probably accounts for a better portion of this number. They have a port and levees built along the delta that may have a large impact on the rivers.

Fig. 1: Port of Stockton

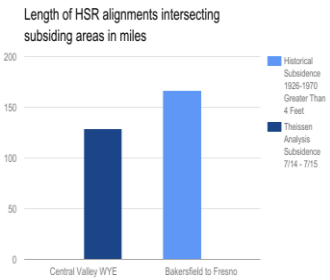
Fig.2: San Joaquin River near Vernalis

Proposed HSR Alignments in Subsiding Soil



Lightly highlighted within the San Joaquin Valley region of both maps is the Alluvial Boundary for the Central Valley. (Inset) Small scale view of entire San Joaquin Valley showing proposed HSR alignments proposed through the region.

By 2029, California aims to be the first state in the nation with a High-Speed Rail System. The CA High-Speed Rail **(HSR)** Authority's goal is to connect 'mega-regions' within the state in order to reduce traffic congestion and pollution. Anticipated benefits include an efficient system to connect CA's economic centers and direct financial benefits to local communities in the form of construction and planning jobs. The main arterial alignment is planned to lay directly across the Central Valley. The northern fork is located in Madera County. This is where the Sacramento and San Francisco alignments join the main route heading south through the Central Valley. This map examines proposed alignments at this crucial junction of the HSR and the extent of their spatial relationship to land subsidence recorded during the last century by the USGS. To the layman, there is a fair degree of concern regarding the fact that extensive sections of the proposed HSR alignments traverse areas that have experienced over 5 feet of vertical subsidence historically and even some alignments in areas where GPS receivers are currently tracking active subsidence. Based on available data the USGS has published studies indicating there is a measurable correlation between subsidence and groundwater pumping during drought conditions in the Central Valley. Hopefully the engineers and geologist have exercised due diligence in their research, so this map should serve to illustrate there are numerous (even subterranean) considerations necessary with any large scale public development project. In addition to that this also highlights the importance of well managed water resources in CA to protect public investment. Will CA's billion dollar investment turn into a literal money pit? Hopefully, no.



Analysis of the length of proposed segments that intersect locations that experience subsidence.

According to a new survey of the San Joaquin Valley conducted by the Institute for Leadership and Public Policy at Fresno State, a majority of respondents (58 percent) support the construction of the high-speed rail project.

Table 1: Percentage who Support High-Speed Rail

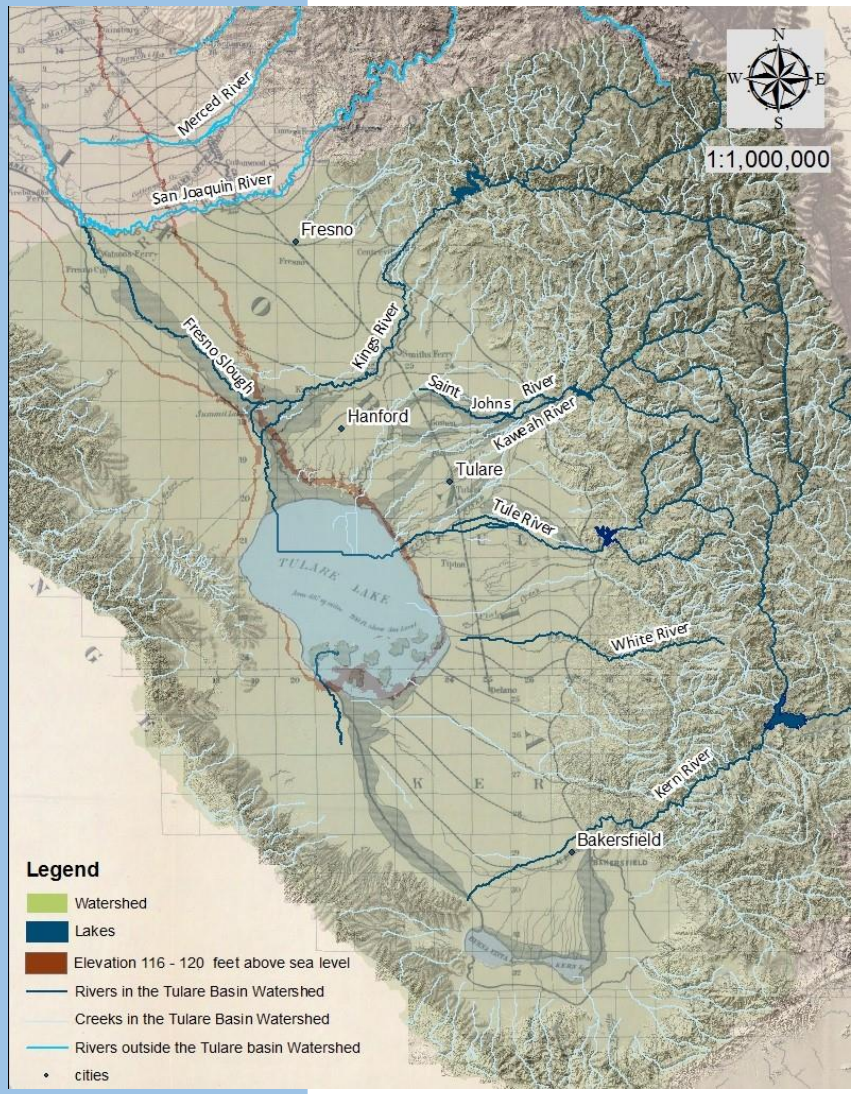
	All (%)	Trump Supporter		Party Registration			Voted in Presidential Election		Race/Ethnicity		
		Yes	No	Dem	Rep	Ind.	Yes	No	White	Latino	Other
Support	58	33	68	74	35	59	47	74	29	76	60
Oppose	35	62	23	21	58	33	46	18	64	15	36
Don't know	7	5	9	5	7	8	7	8	7	9	4

Note: Trump supporter is respondent that indicated that he/she voted for Donald Trump or would have voted for Donald Trump if she/he had voted in the election. Other for race/ethnicity includes blacks and Asians. Numbers may not add to 100 due to rounding.

The Tulare Basin Watershed

A Map of the Natural Rivers and Streams

During the early history of California and dating back for thousands of years, Tulare Lake existed in the Southern San Joaquin Valley as the second largest fresh water lake in the United States. Today, the dry lake bed is one of the most fertile producers of agricultural land in the world.



Tulare Lake was once home to thousands of migratory birds, numerous land and water species and provided for a population of up to 70,000 Native American Yokut people.

Between 1850 and 1900, Tulare Lake was known to have varied in size between wet and dry years. At times it was a dry lake bed and other years it swelled to an area of nearly 800 square miles .

The lake is the terminal point for 4 primary rivers in the watershed basin; the Kings, Kaweah, Kern, and Tule Rivers. During the wettest years the lake would rise above the elevation of its natural spillway (approximately 216 feet above sea level) and flow north into the San Joaquin River system.

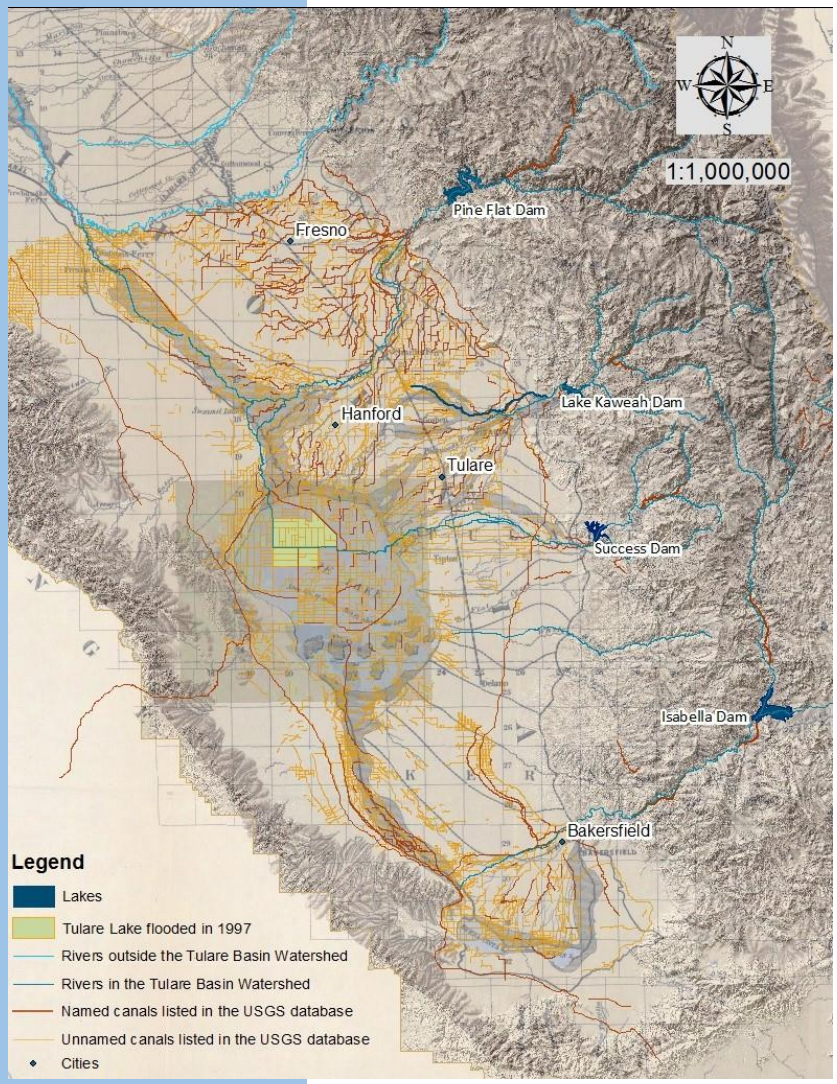
This view of the Tule marshes in the Kern National Wildlife Refuge gives us a glimpse in to the past

A hut constructed of Tule reeds
1903

The Tulare Basin Watershed

A Map of the Manmade Canal Systems

Today Tulare is a dry lake bed of occupied primarily by farmland. Over 8,000 miles of manmade canals convey irrigation water throughout the region. In 2015, the combined agricultural production of Tulare, Kern and Fresno Counties exceeded $20 billion.



In the 1860's settlers began to divert water from the natural courses to provide for early agriculture.

Between 1954 and 1962 a number of dams were built on the four main rivers. These dams formed Pine Flat Lake, Lake Kaweah, Lake Success and Lake Isabella.

There are years in which Tulare lake reappears. In 1997 the lake covered an area of 64 square miles. As a precaution to agricultural losses, many miles of levees have been constructed to contain the floods. In 2017, concerns of flooding in the city of Corcoran led to a $14 million levee improvement project.

There are concerns regarding the overuse of water resources in the region including the loss of ground water, land subsidence and the loss of domestic water for residents of rural communities in the region.

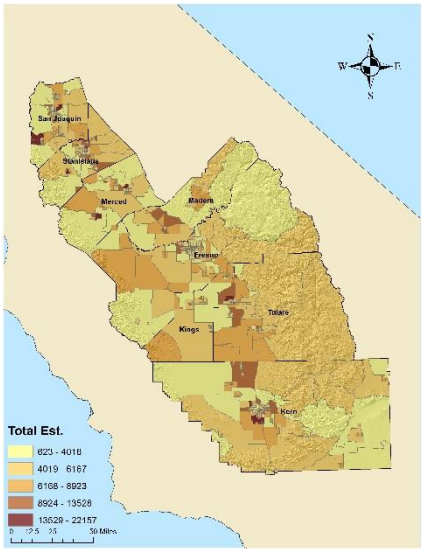
It is estimated that the State of California has spent more than $148 million bringing domestic drinking water to communities in Tulare County.

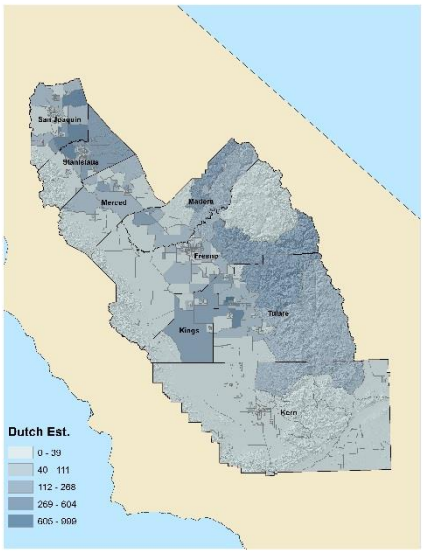
1997 satellite imagery

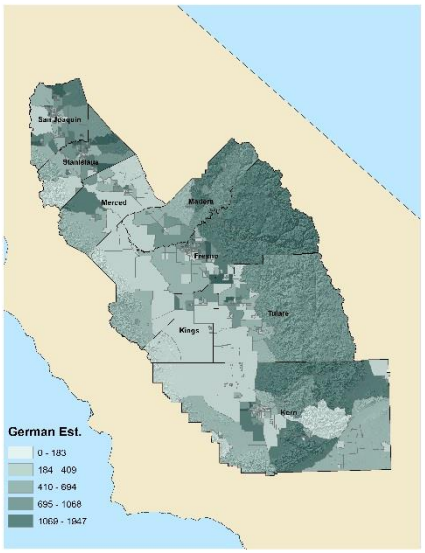
Pine Flat Dam, Kings River

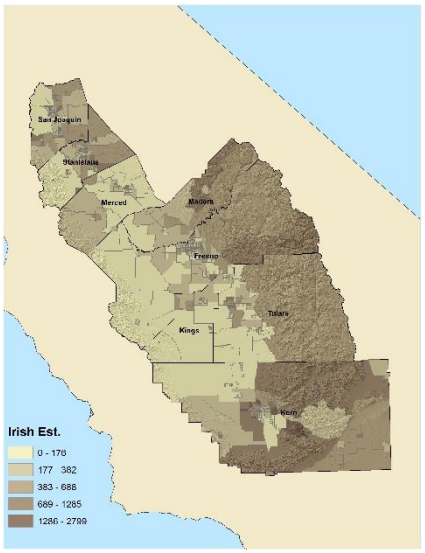
Bridge over the Fraint-Kern Canal

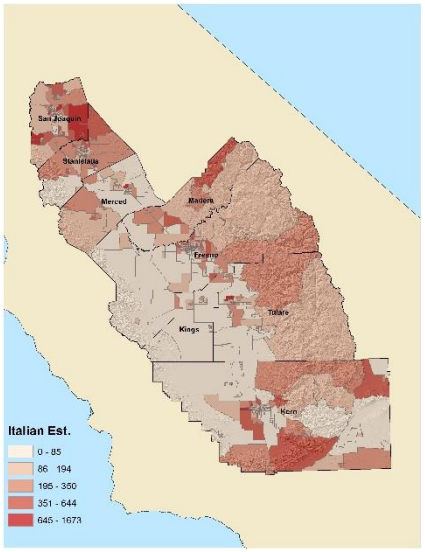
Ancestry in the San Joaquin Valley

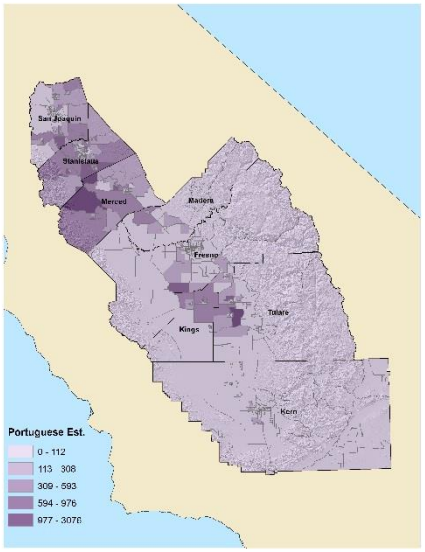












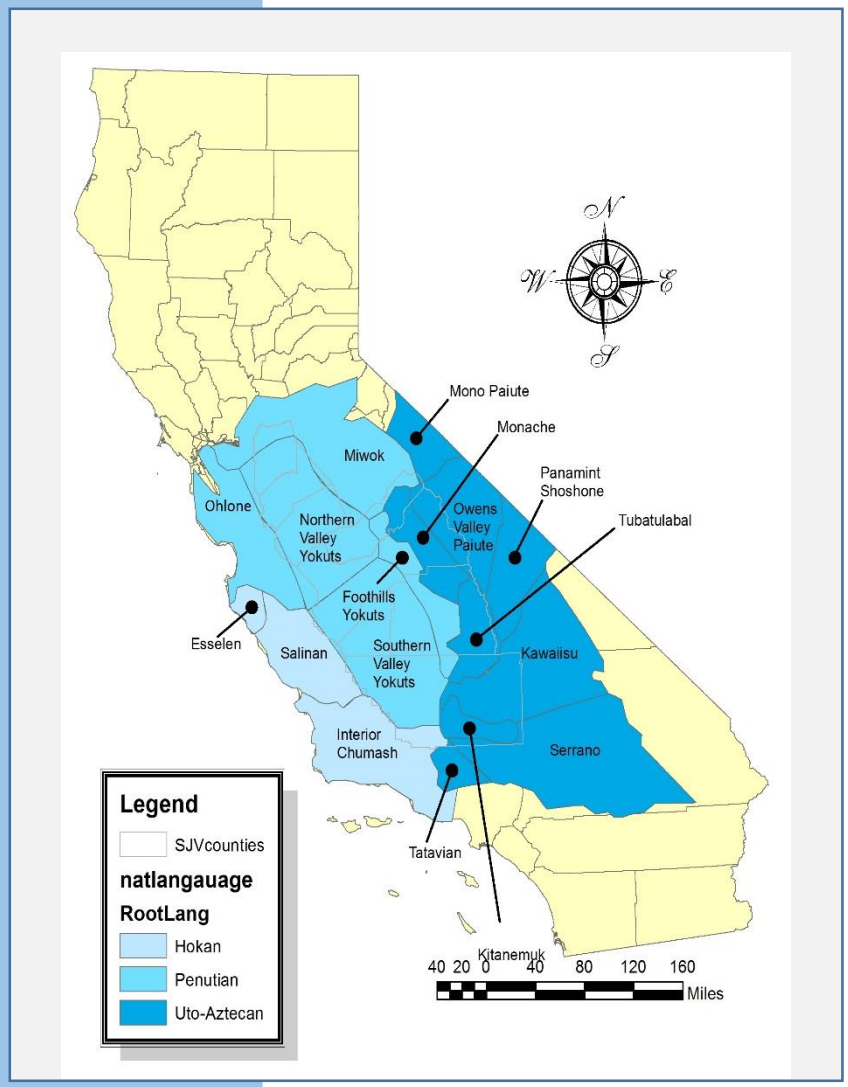
From Left to Right and Top to Bottom: Total Population, Est. Dutch Population, Est. German Population, Est. Irish Population, Est. Italian Population and Est. Portuguese Population

Examining ancestry is one lens though which we examine history. While viewing the ancestry of the San Joaquin Valley we can begin to tell the story of how people, under the greater identity of the Valley, create individual identity. Ancestry data may also be used to identify hotspots and the communities that develop around them.

- Fresno County has the highest estimated total population with 956,749 and the highest estimated German population with 78,086.
- San Joaquin County has the highest estimated Dutch population with 9,286 and the highest estimated Italian population with 32,638.
- Kern County has the highest estimated Irish population with 69,747.
- Stanislaus County has the highest estimated Portuguese population with 23,200.

Population and ancestry data for the San Joaquin Valley were provided by United States Census Bureau's 2010 census. Census tracts for the San Joaquin Valley were also provided by the United States Census Bureau. The ranges for each map are displayed using Jenks natural breaks method. This method was used to display accuracy for each respective ancestry and total population and

Languages: Voices of the Past

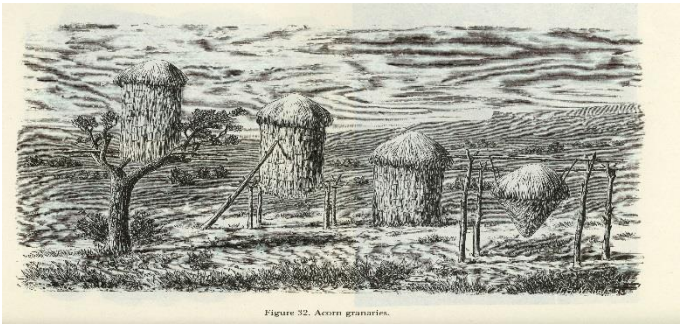


By the 1800's native languages in California were very diverse. This map shows the tribes that were found in the San Joaquin Valley. Along with that, this map also shows the root languages that were found in the valley. For reference there is an outline of the San Joaquin Valley and its counties embedded in the map.

Stephen Powers was a man with many interests. However, the one interest he enjoyed the most is what he called "vagabondizing." That is to say, what he enjoyed the most was exploring places.

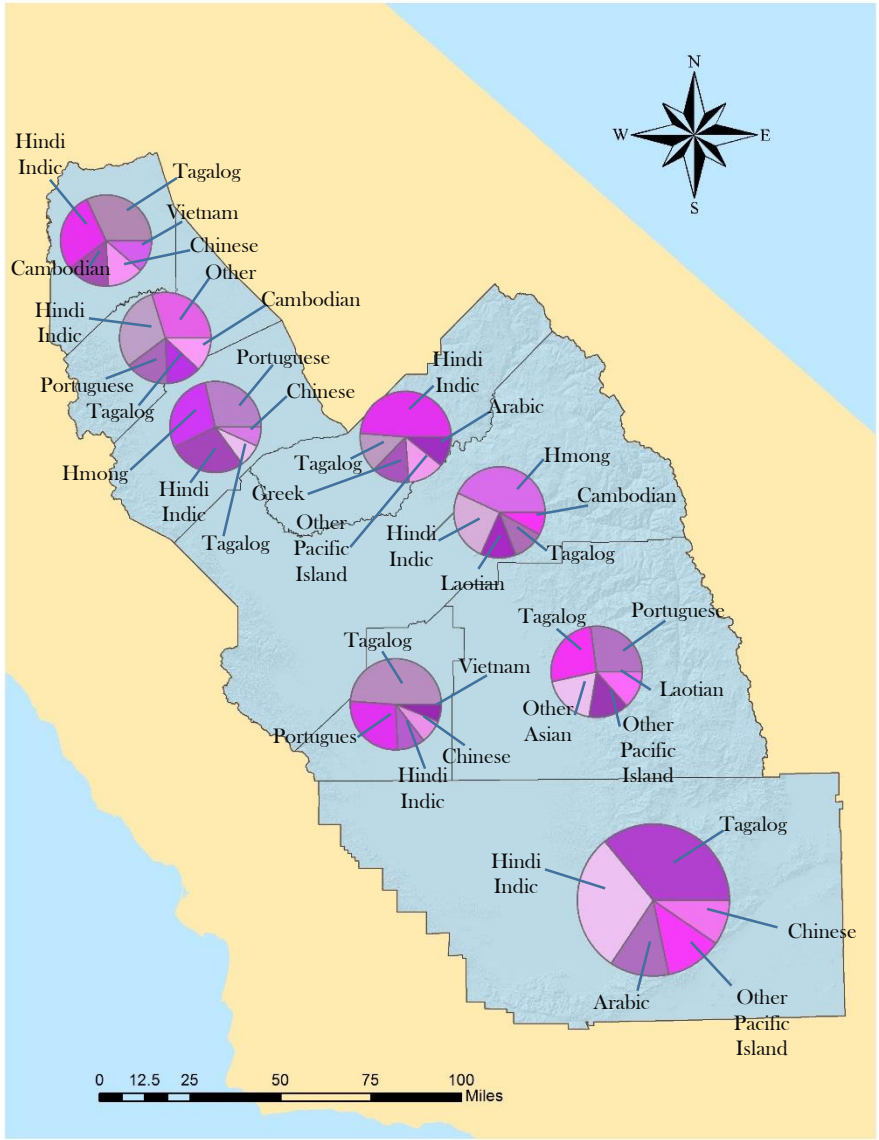
On January 1, 1869 Powers started a walking trip across the United States. On November 3, 1869 he arrived in San Francisco, California. Following that arrival, it was during the summers of 1871 and 1872 that Powers lived amongst the Native Indians. He hoped to learn as much as he could about their daily life. He recognized that their way of life was quickly changing at an alarming rate. After gathering as much information as he could he published his work in the book titled *Tribes of California.*

Until the 1800's, native languages were very diverse in California. Some of them were heard by Powers and some, as he noted, had already disappeared. He noted in *Tribes of California*, "…but with these few exceptions the numerous languages of the State are beautiful for their simplicity, the brevity of their words, their melody, and their harmonic sequences."



This image was hand drawn by Stephen Powers. In his work he noted how the California Native Americans used these. Powers stated, "When the crop was good and they harvested more than they wished to carry from camp…Selecting a tree which presented a couple of forks a few feet from the ground…they filled with acorns and covered with thatch.

Languages: Current Voices



These are the languages being spoken in California's San Joaquin Valley according to the 2015 US Census. After English and Spanish these pie graphs do reflect the languages spoken in the valley. ~By Silvia Wall ~

The San Joaquin Valley is linguistically diverse. Well over forty languages are spoken in the valley. English is the most widespread language followed by Spanish. Tagalog follows closely after that. Each of the eight counties that make up the San Joaquin Valley have their own unique linguistic diversity. No two counties have the same combination of languages. This makes each county culturally rich in their own unique way.

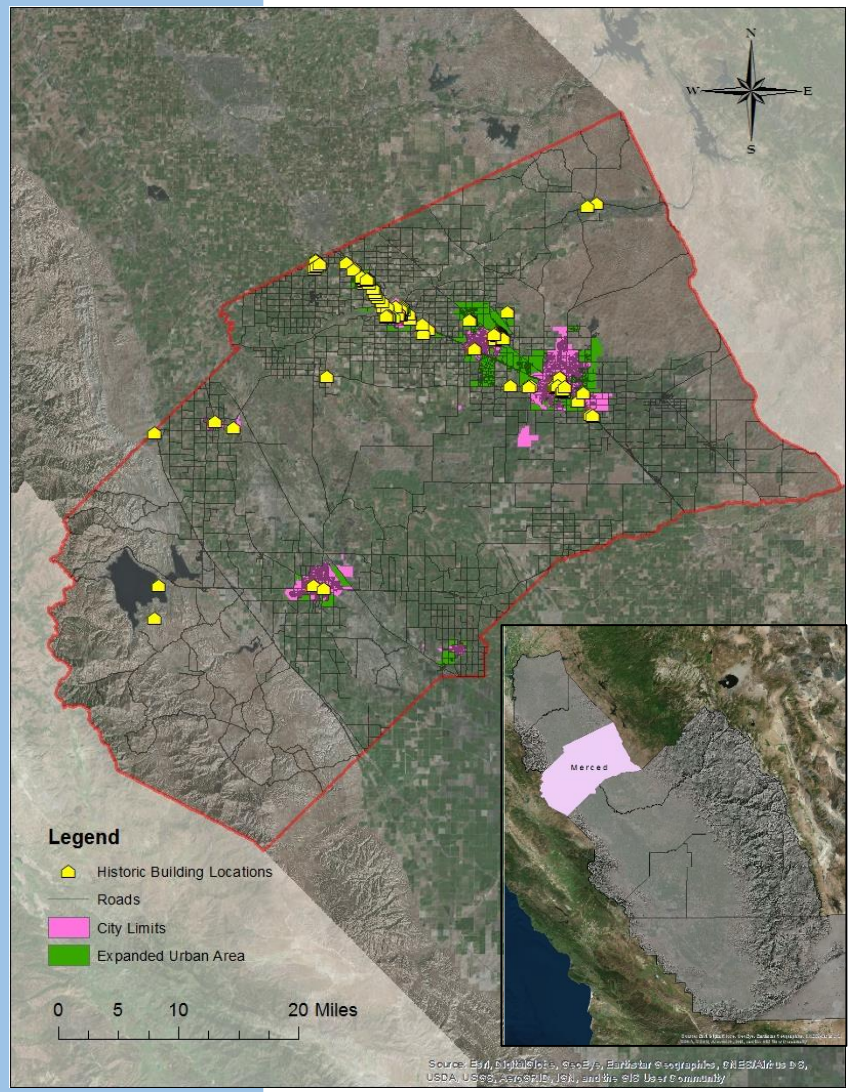
It is certain that some of the factors that influenced people from different cultures to migrate to the San Joaquin Valley were climate, fertile land and its central location to many of California's destinations.

The languages reflected in this map of the San Joaquin Valley are the five most spoken languages per county next to English and Spanish. The five languages represent those individuals who "only" spoke those languages at home per the 2015 US Census.

English Walnut 1901 - A.W. Mumford

San Joaquin Valley has a very diverse population, which also reflects the language diversity that is found in the valley.

Historic Building Locations in Merced County, CA



The locations represented on this map are only a fraction of what was in the data set. Due to time constraints and geocoding limitations, this had to be done by one person by hand on a location by location basis.

This project was meant to locate and record the historic buildings found within Merced County in the San Joaquin Valley. These historic buildings are important as they show where people lived in the county and what architecture that they used. Due to urbanization and the repurposing of land, many of these buildings have been torn down or lost, although some of them did survive.

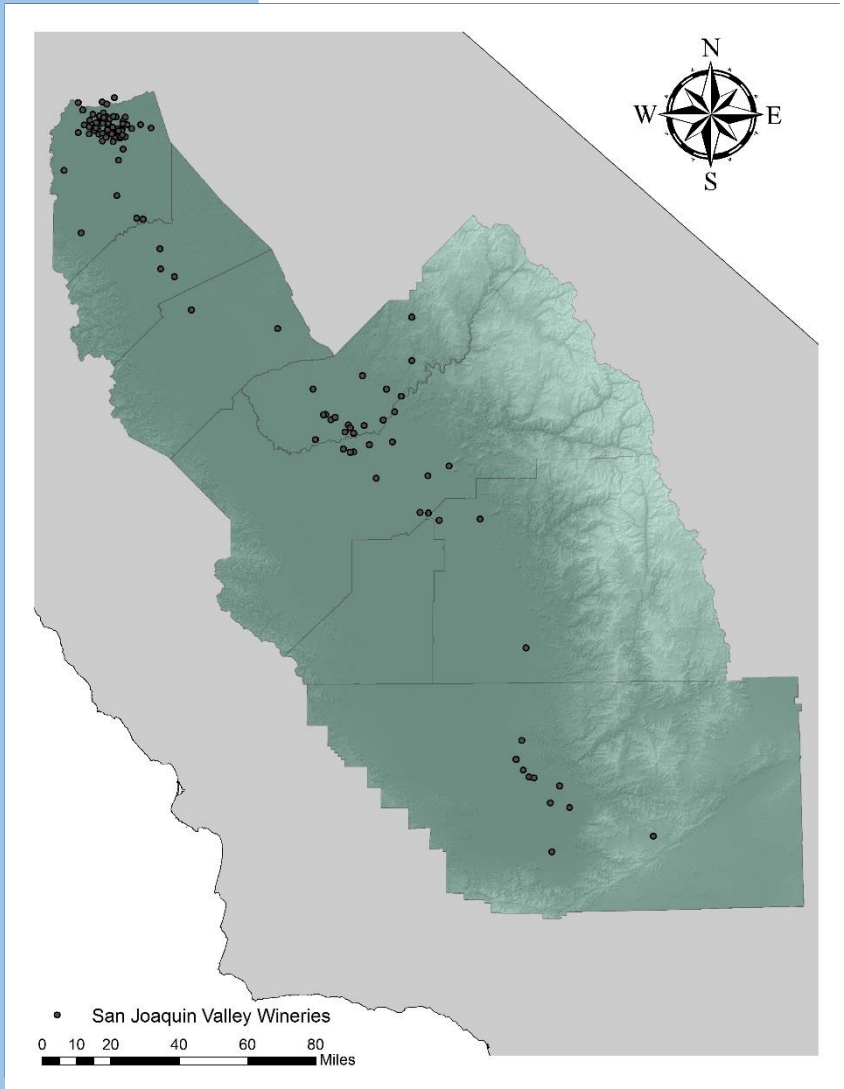
When it came to doing this project, there were some ups and downs. There was initially going to be a geocoder that would help locate most the building locations, however this did not work with the formatting of the excel file. So, Plan B was to identify and place the points by hand in Google Earth and then transfer them from there into ArcGIS. There was the first challenge, as many of the buildings are gone for urban development (or underwater). Roads have changed names and locations from the initial evaluations that were done and trying to figure out which road is now called what was time consuming. The maps that were drawn for the reports ranged from exact coordinates on a detailed map to a single black box on a road with no other landmarks to help triangulate where the building is/was. Once the buildings were pinned, converting the files from .kml to a shape file was simple.

This project is important because when people think of historic buildings, minds go to big cities on the coasts. However, historic buildings can be found everywhere and need to be seen for their significance.

Castle Air Force Base in 1942, buildings still standing

Basalt Hill Fire Lookout Station built in 1947

Wineries in the San Joaquin Valley



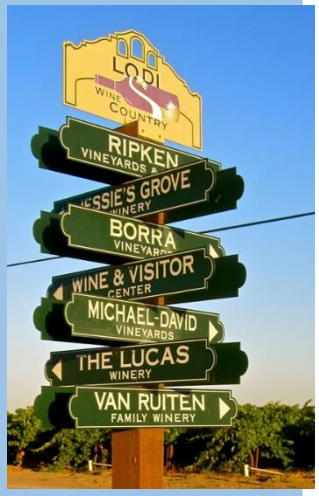
Wineries located throughout the San Joaquin Valley. There is a high concentration of wineries in San Joaquin County.

Over the past decade wineries have been developing throughout California to keep up with the culture of drinking wine. The demand for wine has wine makers adding tasting rooms to their vineyards as a way to welcome consumers and build relationships as opposed to the consumer just buying product off a grocery store shelf. Wineries opening up to the public allow consumers to become more interested in the wine making process. For decades, wine has become less of a symbol of high status and more of a social drink for everyone.

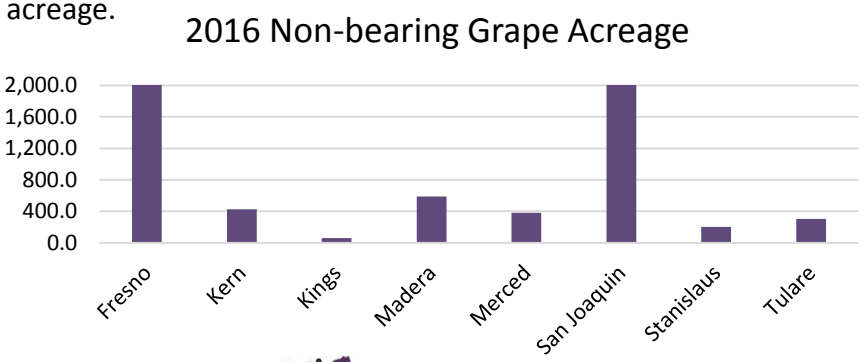
California's Napa region is world renowned for the wineries and wines they produce, however wine regions in San Joaquin County, Fresno County, and Madera County are all expanding their own vineyards and opening tasting rooms. Although the San Joaquin Valley is home to the United States' most diverse agricultural region, irrigation costs and drought pose a challenge for wine makers.

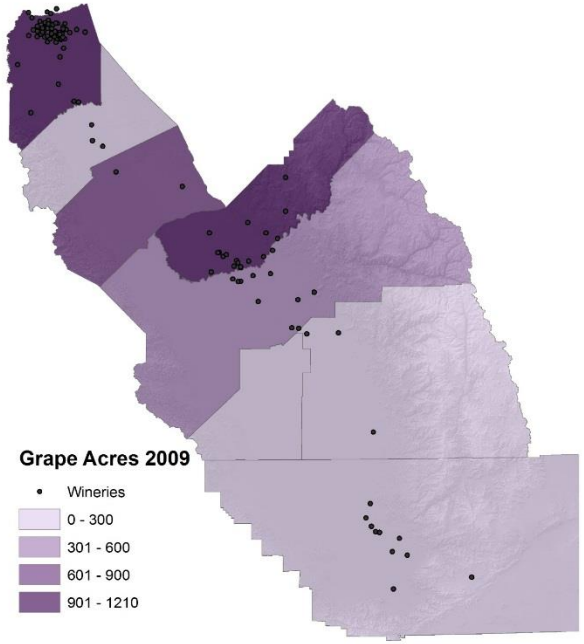
The San Joaquin Valley lies within a few American Viticultural Areas (AVA's), which are appellations of origins that are defined by either political boundaries or federally-recognized growing regions. These AVA's are San Benito, Sierra Foothills, and Paso Robles.

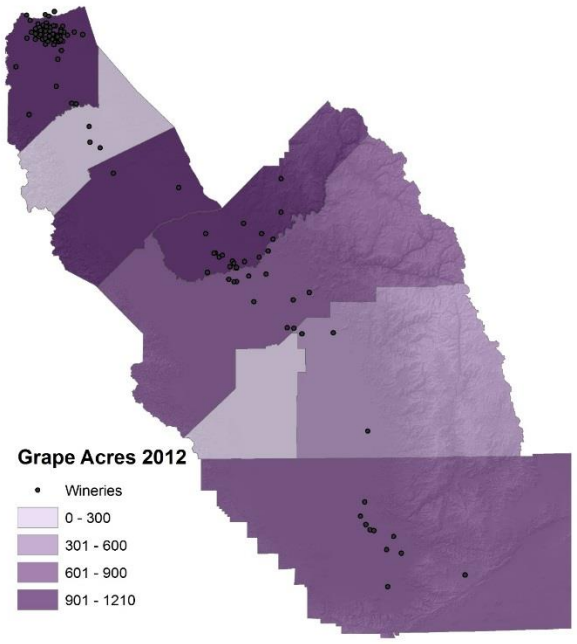
Wine Acreage the in San Joaquin Valley

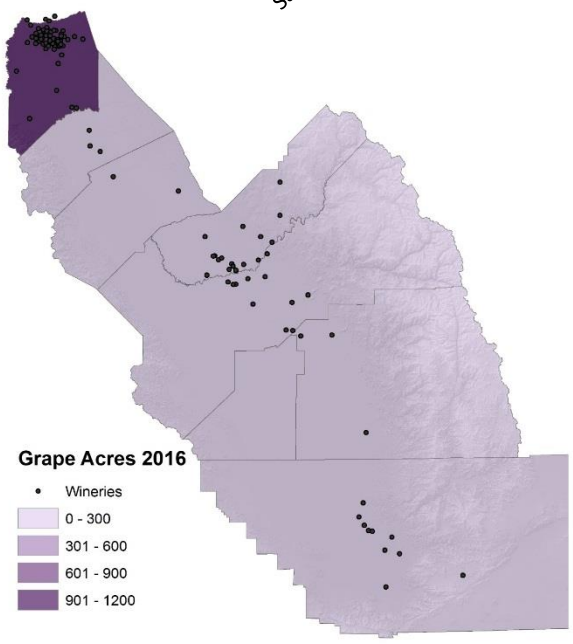


The maps on this page show wine grape bearing acreages. Bearing acreages contain vines that are older than three years of age. Non-bearing grapes are newly planted grapes that are less than three years of age. The USDA considers all varieties non-bearing grapes for three years. Because a large amount of vines were planted between 2012-2016, many of the acres in 2016 are newly considered bearing acreage.









Wine Grapes of the San Joaquin Valley

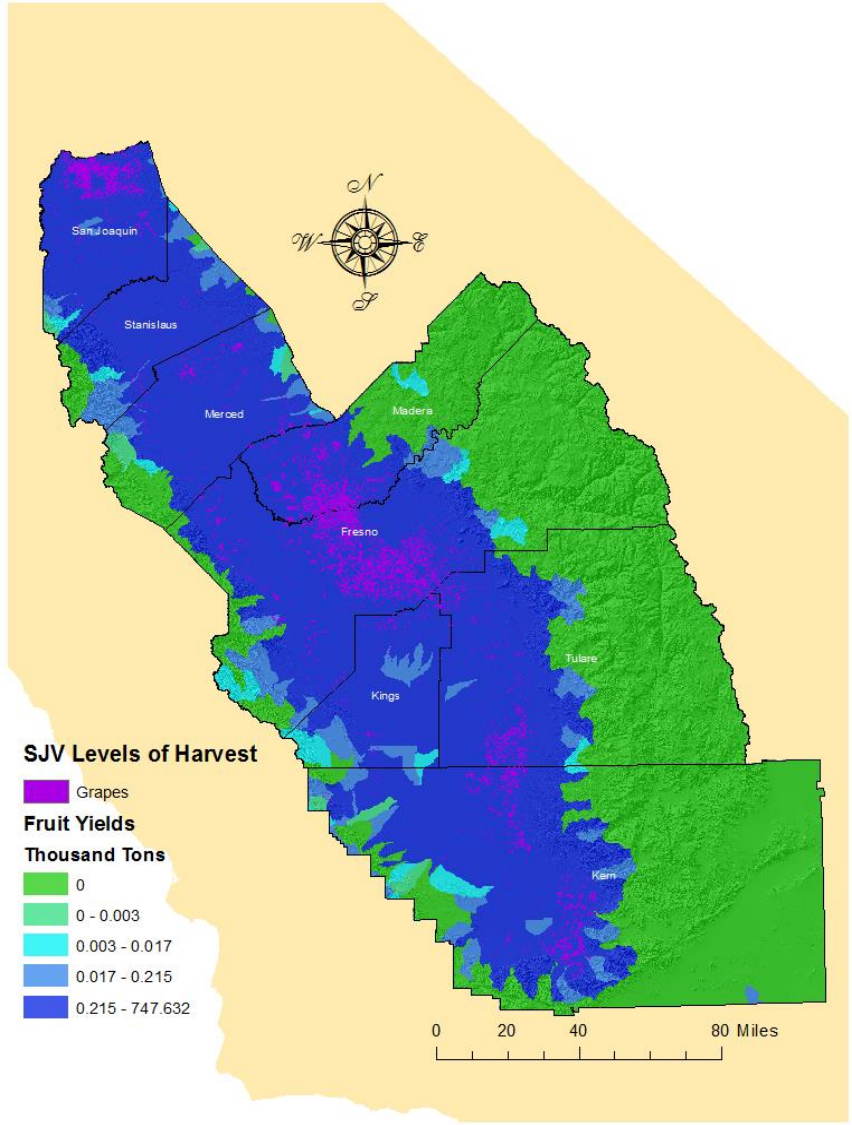


Fig. 1

The San Joaquin Valley is home to one of the most fertile agricultural regions in the world, especially in wine grape production. In terms of quantity, the San Joaquin Valley produces a quarter of the total production by California, (Fig. 2).

Most recently, California has gone through a dry spell of a drought, causing a severe decrease in acreage, (Fig. 4).

Another problem that has hit the valley has been a loss of soil nutrients and soil salinity, which is the seen as the 'black plague' to farmers because of the in inability to produce crops in that area, (Fig 3.)

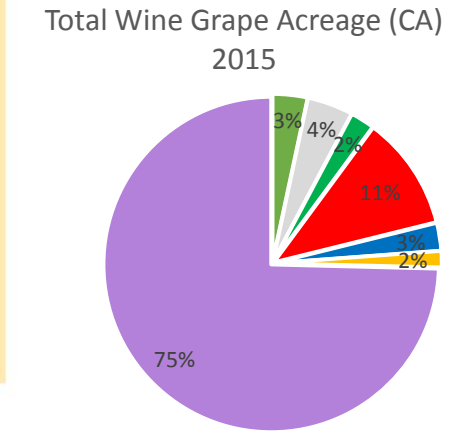


Fig. 2

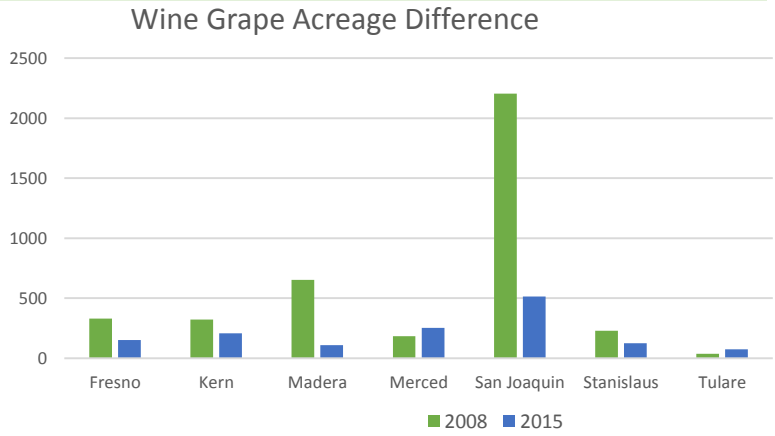


Fig. 4

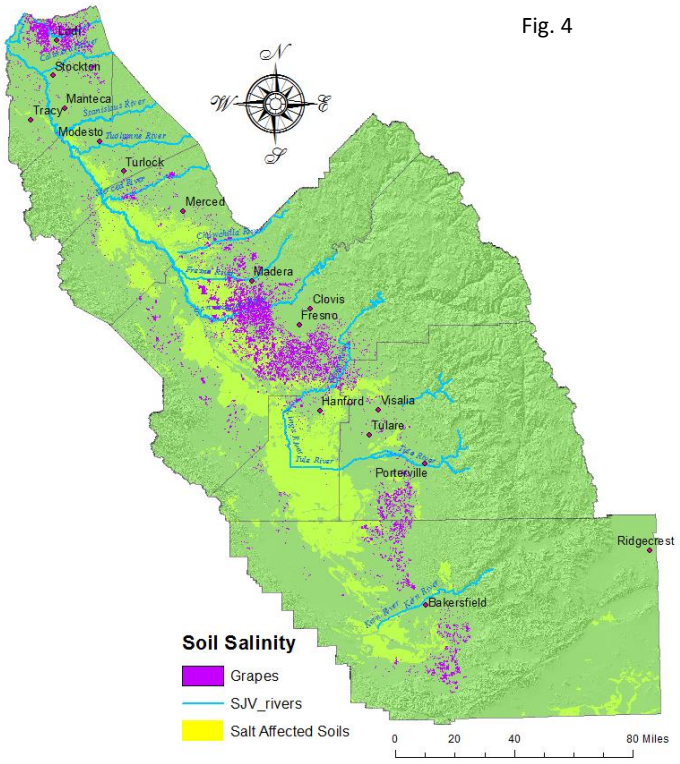


Fig. 3

Terroir of the San Joaquin Valley

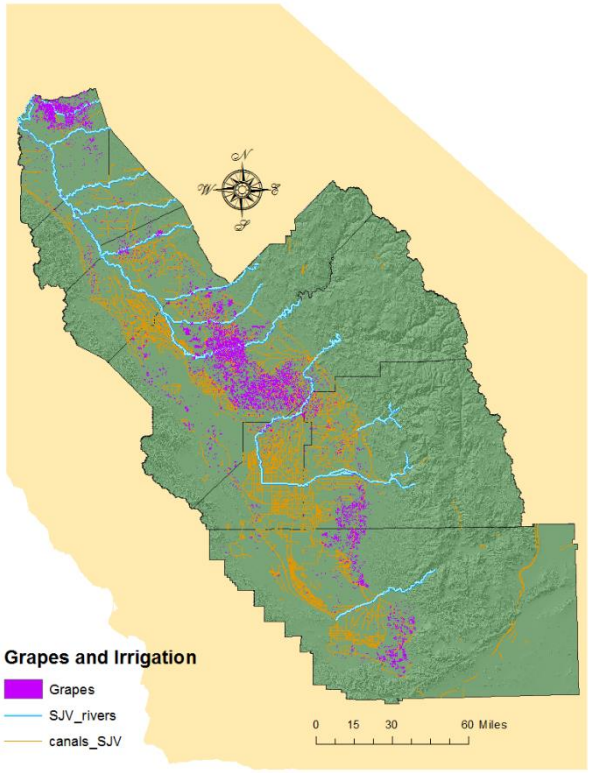


Fig. 1

Vitis Vinifera has been the single source for the vast majority of the wine grapes of today, and most of the production grapes come from just a few varieties of *vinifera*. Examples of grapes that have comes from *vinifera* that are grown in the San Joaquin Valley, include: chardonnay, sauvignon blanc, cabernet sauvignon, merlot and pinot noir.

These grapes are extremely responsive to their physical environment, moisture, soil composition, soil pH (Fig.6), hours exposure to sunlight, temperature, and even the way that they leaves drape over the berries. To grow *vinifera* in in the valley, irrigation through canals is necessary, (Fig 1.) All of these factors determine the nature of the terroir that gives the wine a specific uniqueness.

In terms of climate, *vitis vinifera*, requires long, warm to hot summers, and cool winters for their best development. When looking at the climate where the most production of grapes has been observed in the Valley, locations such as Lodi, Fresno, Madera, and Bakersfield (Fig. 2-5) come to mind.

Rising temperatures allow for a longer "hang time", fruit staying on the vine longer. Through this process, the sugar concentration increases in the grape, which in turn, means a higher alcohol content when converted by yeast.

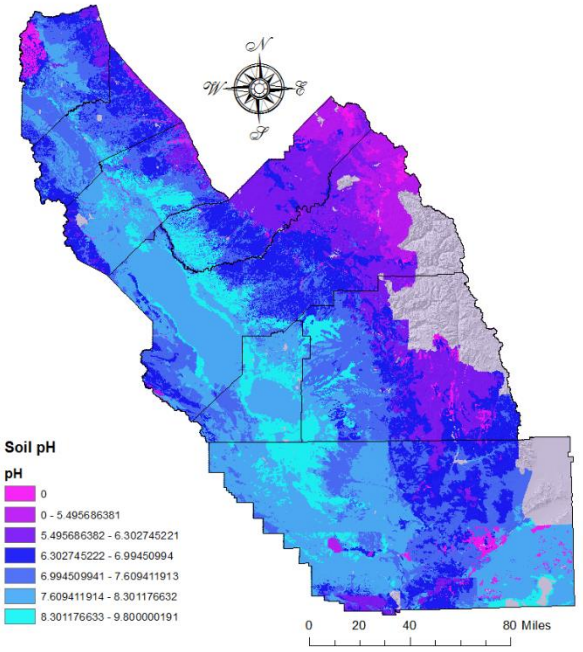


Fig. 6

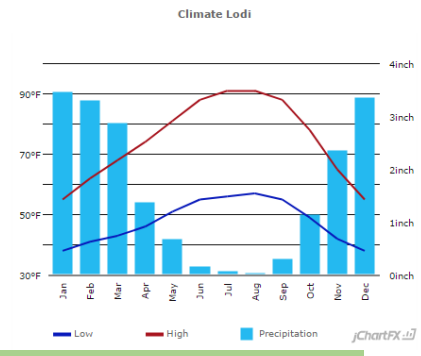


Fig. 2

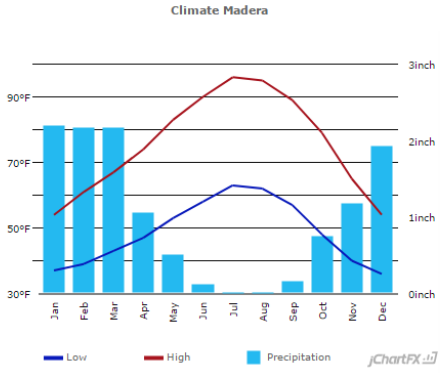


Fig. 3

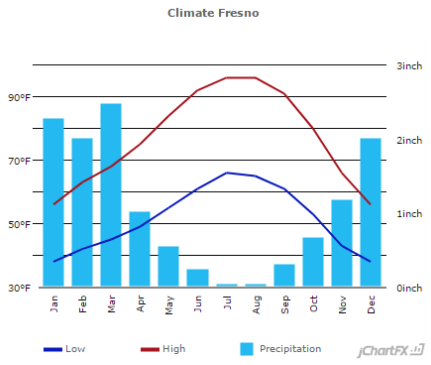


Fig. 4

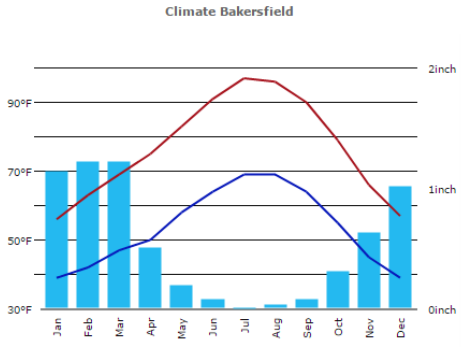


Fig. 5