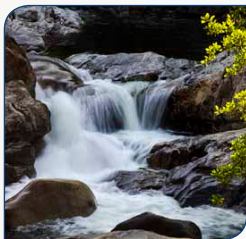




SAN JOAQUIN VALLEY Greenprint

State of the Valley Report

An overview of the characteristics and trends of natural resources in the San Joaquin Valley's rural spaces, with an eye on resource sustainability for the future



Aerial view of the San Joaquin Valley, © Patrick Huber



The San Joaquin Valley is the nation's leading producer of oranges, © stock photography

Executive Summary

The San Joaquin Valley of California is one of the world's most productive agricultural regions, is a vital link in California's complex water delivery and transportation systems, and provides important habitat to protect biodiversity. Growth, development patterns, and climate, however, pose ongoing challenges to this unique region.

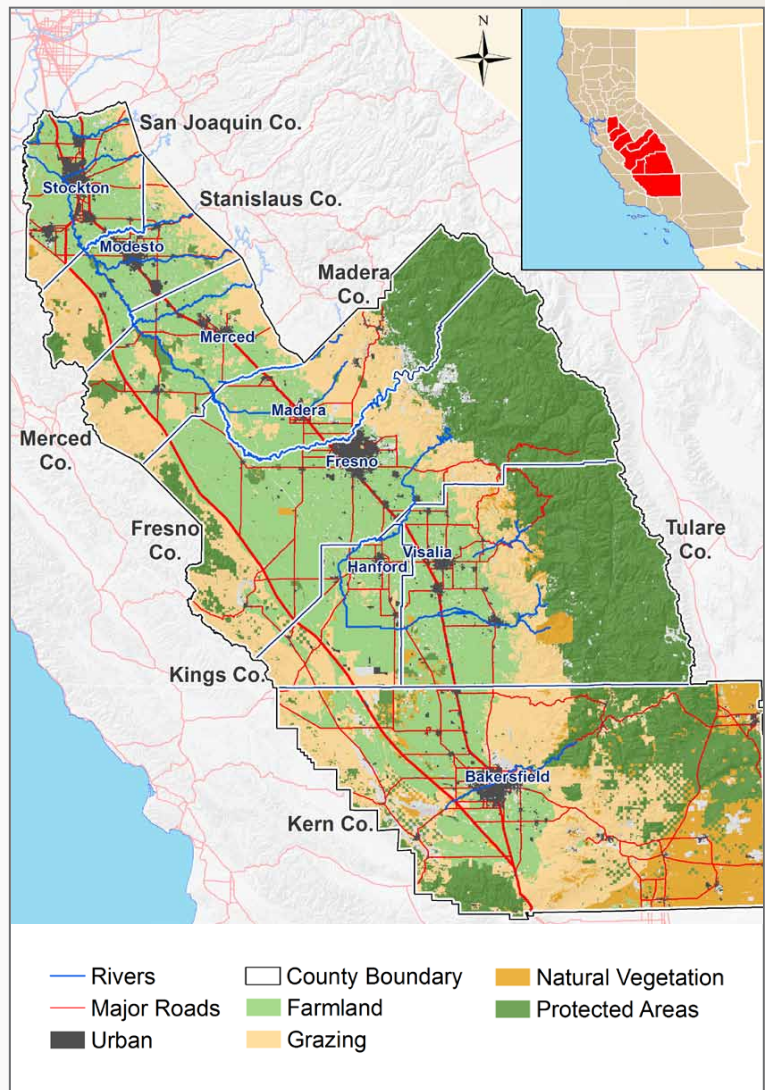
The San Joaquin Valley Greenprint was created as a voluntary, stakeholder-driven project to help the eight counties of the San Joaquin Valley create long-term environmental and economic sustainability in the face of these challenges. It serves as a resource that can inform land use and resource management decisions in the Valley, emphasizing the importance of crafting regional solutions because economic and environmental challenges and decisions cross jurisdictional boundaries. The SJV Greenprint can be used by Valley planners and decision-makers; local, state, and federal resource managers; and the general public to answer questions like:

- » How can we optimize the contributions of agriculture, water and ecological resources to the economy and quality of life in the Valley through regional planning?
- » Where are the most strategic locations for groundwater recharge and storage, and what management may be needed to maintain those for such purposes? And, how can we minimize flood damage and utilize excess water from flood years in times of drought?
- » How can we identify locations for urban growth while protecting economic and natural resources like prime farmland, oil, minerals, timber, and fisheries?
- » Where can we restore biodiversity and connect wildlife habitats, while also achieving other land use benefits like riverside parks for recreation?

The SJV Greenprint has compiled and evaluated a large collection of publicly funded maps and data that portray the Valley's water, agricultural, and ecological resources to create a single repository of information. The maps are publicly available through a single point of access, the SJV Greenprint website (sjvgreenprint.ice.ucdavis.edu), which provides an interactive mapping portal to create maps and explore conflicts and solutions related to the Valley's natural resources and non-urban spaces.

This report uses the collected maps to tell the story of the San Joaquin Valley, a unique, geographically-large, resource-rich, and growing region that faces both challenges and opportunities with impacts ranging from local to national significance. The report provides baseline information on the current conditions and trends of natural resources on the valley floor – Water, Agriculture, Biodiversity, and Energy. The map and data collection span the full extent of the eight San Joaquin Valley counties – Kern, Tulare, Kings, Fresno, Madera, Merced, Stanislaus, and San Joaquin Counties. Water is the first resource chapter because it is essential to the other resources the project analyzed. Agriculture, as the dominant driver of

The San Joaquin Valley



the region's economy is next, followed by Biodiversity – the native environmental richness of the Valley – and last but not least, Energy, as a significant economic and environmental factor for the Valley.

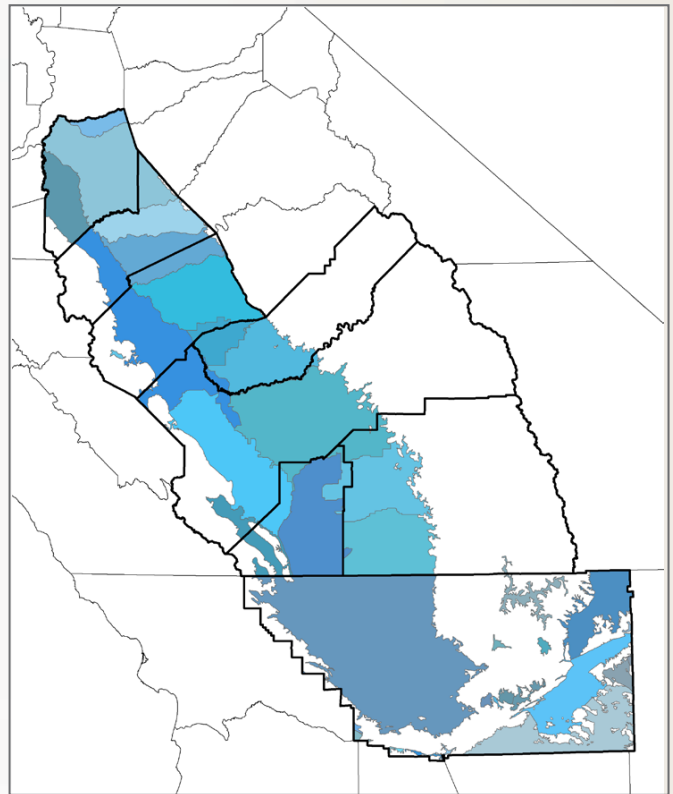
Water

Water is the foundation of the San Joaquin Valley's economy and quality of life: farming, ranching, urban users, industry, and natural ecosystems all depend upon water. But like much of California, the San Joaquin Valley faces a supply and demand challenge. Though much of the Valley's water is collected and stored in the Sierra Nevada Mountains, significant portions are also imported through a complex system of state and federal surface water channels and pumped from underground aquifers (also known as groundwater basins).

Characteristics and trends of the Valley's water include:

- » Water is a central resource management challenge in the San Joaquin Valley.
- » Across the Valley, agriculture is the single largest water user, accounting for 72.5% of all water applied in 2010, followed by environmental uses (21.8%) and urban uses (5.7%).
- » Of the total water applied in 2010 that was not reusable, agriculture represented 85.2%, environment 11%, and urban 3.9%.
- » Sources of water for the Valley vary from year to year based on precipitation totals and the availability of stored water (both reservoirs and banked groundwater).
- » The region's surface water resources are highly regulated and virtually all surface water is already claimed.
- » Groundwater is loosely regulated, compared with surface water.
- » Based on recent DWR data, groundwater levels in some portions of the Valley are more than 100 feet lower than they were between 1990 and 1998.
- » Groundwater pumping is leading to land subsidence across the valley floor. A recent report identified areas with subsidence approaching one foot per year 2008-2010.
- » Land subsidence threatens major infrastructure such as canals, roadways, and rail lines and reduces the ability of aquifers to recharge.
- » Large portions of the Valley have high nitrate levels in the aquifers that provide drinking water, posing potentially significant human health consequences.
- » As groundwater levels decline, irrigation wells draw from deeper aquifers that may be more saline, leading to potential soil salinization issues.

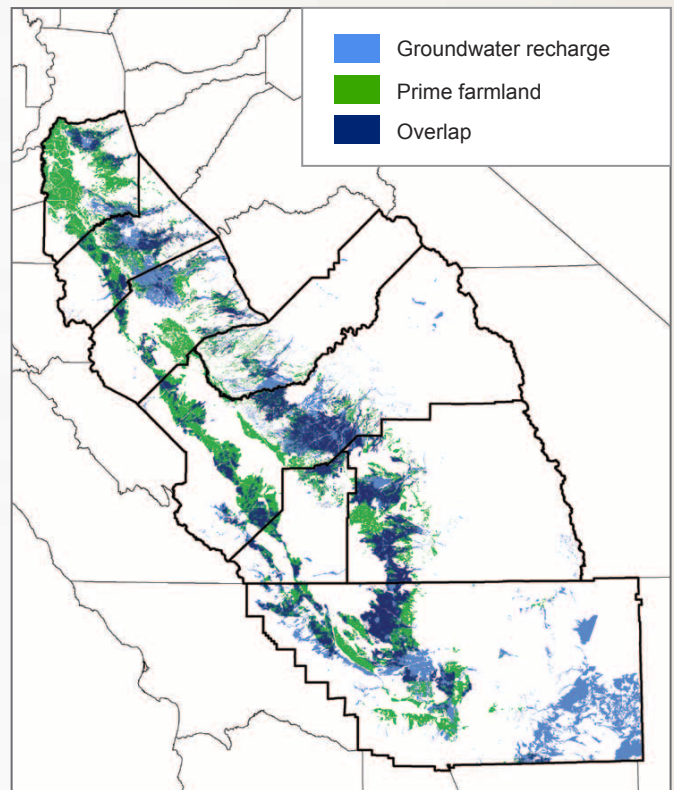
Groundwater basins of the Valley



Source: DWR

Note: Shades of blue represent individual groundwater basins

Potential groundwater recharge areas overlapping prime agricultural land



Source: DOC FMMP and California Water Institute, CSU Fresno



Walnut orchard, © John Greening

Agriculture

The San Joaquin Valley contains some of the richest agricultural lands in the world. Seven out of the ten most productive agricultural counties in the United States are located in the San Joaquin Valley, including the top three (Fresno, Tulare, and Kern Counties). This remarkable productivity results from the intersection of superior soils, plentiful sun, limited frost danger, favorable winter cooling patterns, and investments in infrastructure that provide water across an otherwise dry landscape.

Some of the trends and pressures facing Valley agriculture include:

- » In 2012, the San Joaquin Valley's total agricultural market value was \$24.2 billion (2013 inflation-adjusted terms) or 56% of the State's agricultural market value.
- » Agricultural revenues across the Valley grew almost 50% (from \$16.2 billion to \$24.2 billion, 2013 dollars) between 2002 and 2012.
- » Valley counties are nationally-leading producers of almonds, pistachios, oranges, tomatoes, grapes, cotton, and milk/dairy production.
- » The Valley's shift to permanent crops (orchards and vineyards) has increased the region's agricultural revenues, but reduced flexibility to respond to drought.
- » Virtually the entire valley floor can support commercial agriculture.
- » 10.5 million acres (60%) of the Valley's land area is in agricultural use.
- » Important farmland makes up 5.6 million acres (32%) of the Valley's total land area.
- » Grazing lands occupy most of the foothills surrounding the valley floor.
- » Most of the Valley's cities are surrounded by high-

quality farmland.

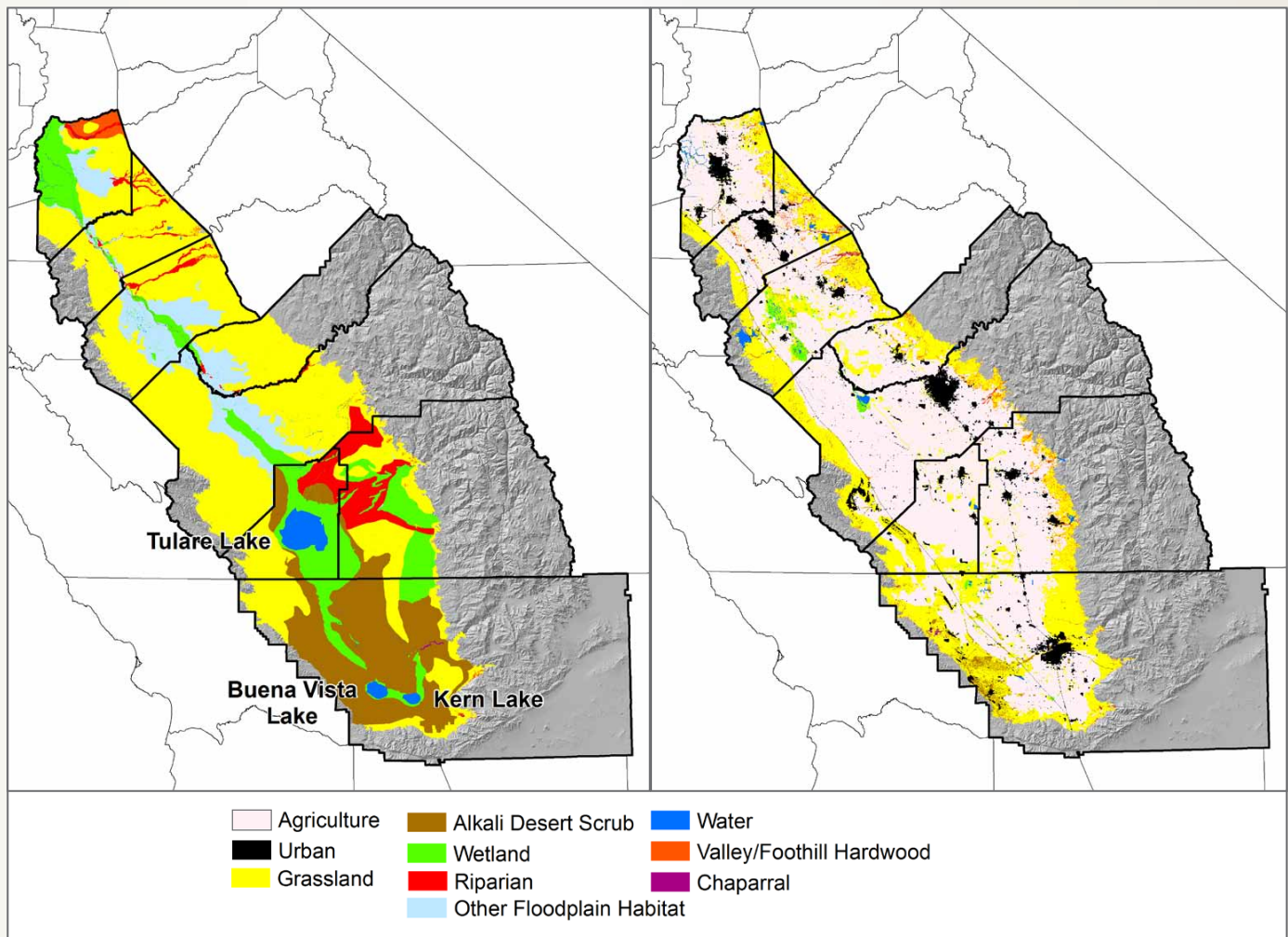
- » Approximately 740,000 acres of the San Joaquin Valley in 2010 are defined as urban and built-up and rural residential; formerly high-quality agricultural soils, this represents a conversion of about 12% of the Valley's potential important farmland since the establishment of these cities.
- » Almost 25% of urban and built-up land use is new since 1984.
- » Almost 50% of the region's potential groundwater recharge areas are also prime agricultural land.

Biodiversity

Historic vegetation and landcover maps of the San Joaquin Valley floor in 1850 cover 7,660,484 acres. They show that about 62% of the region was in grasslands, 38% of the region was in wetlands, water, or riparian habitats, and 20% was covered by Alkali scrub. About 69% of the valley floor has been brought into agricultural production, used for urban purposes, or committed to other human use, including energy production. Conservation of the highlands is fairly well established, which permits the continued delivery of water as an ecosystem benefit to the valley floor. The valley floor contains many species that are legally protected and that are in danger of extinction.

- » Land conversion since 1850 occupies about 69% of the valley floor, with the largest unconverted lands being annual grasslands used for grazing.
- » Overall, for the region, there are 3,043 plant species and 499 vertebrate species; which include 66 state- and federally-listed threatened or endangered species.
- » The forested and alpine lands of the Sierra Nevada are the water towers of the region, supplying both surface water and groundwater, an essential ecosystem service for the region.
- » Over 38% of all vernal pools in the region have been

Comparison of landcover patterns: 1850 (left) and 2002 (right)



Source: Central Valley Historic Mapping Project, Chico State, 2003 (left) and Fire and Resource Assessment Program, 2002 (right)

destroyed, and 8% are classed as degraded.

- » Better quality vegetation maps are needed for large parts of the valley floor and foothills, particularly for riparian vegetation to properly ascertain the extent of native vegetation and habitats.

Energy

The San Joaquin Valley is a center for both energy production and transmission in California. More than 250 power generation facilities make their home in the Valley, though the majority of electricity production in the Valley comes from conventional oil/gas. Renewable energy sources such as wind and solar, however, are on the rise and could prove to be a significant economic driver for the region.

Some of the trends defining and shaping energy resources in the Valley include:

- » The Valley has more than 63,000 active oil and gas wells, with the majority located in Kern County.
- » The San Joaquin Valley accounts for 80% of the State's oil production (6% nationally), valued at approximately \$16.4 billion (2012).
- » 2012 natural gas production was worth approximately \$480 million.
- » Almost 90% of the active wells are on vacant or disturbed land, much of which would otherwise be grazing land.
- » Hydraulic fracturing in California uses an average of about 164,000 gallons of water per well.
- » Wind power is the second largest energy source generated by the Valley (3,650 MW), followed closely by hydropower (3,600 MW).
- » Most of the Valley's wind is generated in the Tehachapi (3,000 MW).
- » The San Joaquin Valley has 27 major active solar generation facilities, capable of producing almost 500 MW.
- » Fresno County has more solar power plants (12) than

any other county, but Kern County can produce almost as much power from its three larger plants.

- » Energy groups have mapped many suitable solar and wind power generation sites for future development in the Valley.

Next Steps

The completion of this report, available online, and the full launch of the SJV Greenprint website — sjvgreenprint.ice.ucdavis.edu/ — signal the close of the first phase of the San Joaquin Valley Greenprint. To date, the Greenprint team has consulted with more than 400 individuals and experts to gather information that has shaped the process and the ultimate presentation of the materials. The data and maps, publicly accessible, provide current and comprehensive information to aid in understanding the status of the Valley's resources, how these interrelate with one another, and how they intersect with local and regional planning.

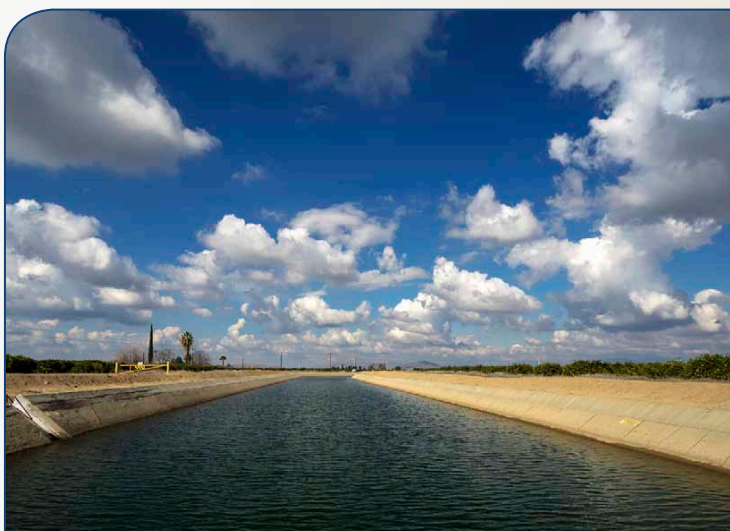
As the Valley faces increasingly tough resource management questions in the face of growth and limited resource challenges, the SJV Greenprint provides a regional tool to find multiple-benefit solutions, reduce conflict, and achieve an economically and environmentally sustainable future for the Valley, as a whole.

Looking ahead, the next phase of the project will focus on applications of the data and maps. The Greenprint's next steps will include the following tasks:

- » Outreach and convening — increase awareness and utility of SJV Greenprint mapping resources, especially to the eight counties; present trends and conditions in the Valley, as determined by Greenprint mapping and analysis; and convene experts to explore implications of data.
- » Pilot projects — incorporate Greenprint map resources into local land use planning that provide real world utility and value.
- » Look for opportunities to align the Greenprint with State and Federal initiatives — enhance relevance and secure resources for an ongoing Greenprint resource mapping program (e.g. Central Valley Ag Plus, AB 32 Five-year Roadmap).
- » Review and document existing policies, programs and implementation tools in use in the Valley.
- » Identify conflicts in regulations, policies, or government actions.
- » Identify strategies and tools — help the Valley achieve economic growth and resource sustainability.
- » Additional mapping and analysis — identify shortfalls or gaps, provide training to access and interpret maps, update and incorporate new maps as information becomes available.
- » Publish a guide for resource management to provide a range of specific policies and implementation tools that governments, businesses and communities can self-select to address their economic and resource objectives.



Tulare County orange orchard, © John Greening



Friant-Kern Canal, © John Greening



White egret on restored wetlands, © Steve Laymon



SAN JOAQUIN VALLEY
Greenprint

The *State of the Valley* report is a final deliverable for the first phase of the San Joaquin Valley Greenprint. The project is funded by a grant from the California Strategic Growth Council and managed by the San Joaquin Valley Greenprint Steering Committee, with support provided by a team of consultants.

The full report and data catalog can be accessed online at:
sjvgreenprint.ice.ucdavis.edu

