

Rural Migration News

Blog 322

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SJV: Adjusting to Sustainable Water

California received more precipitation than normal in 2022-2023. There were record levels of levels of snow in the Sierra Nevada mountains; the snow melts in summer and provides water for people and crops.

California reservoirs that store winter precipitation and summer snowmelt and convey water south via the Sacramento-San Joaquin river delta filled to capacity in 2023, up from very low levels during the previous three years of drought.

Farmers want to capture more winter rain and snow to irrigate crops. Some flooded fallow fields so that winter rain can replenish the aquifers that can hold 10 times more water than all of the state's dams and reservoirs. The aquifers in the San Joaquin Valley have been depleted by pumping during dry years, with water levels dropping hundreds of feet in some areas due to overpumping.

Can more winter rainwater be captured in northern California? A \$16 billion, 45-mile tunnel could take Sacramento River water under the Delta where the Sacramento and

San Joaquin rivers meet and flow into the San Francisco Bay, thus moving water south of the Delta without disturbing the fragile Delta ecosystem where fresh and salt water merge. The long-delayed \$4 billion Sites Reservoir in northern California is scheduled to begin construction of two dams in 2024 and be completed by 2030, with a capacity to store 1.5 million acre feet of water, a third as much as Shasta Dam, the state's largest reservoir.

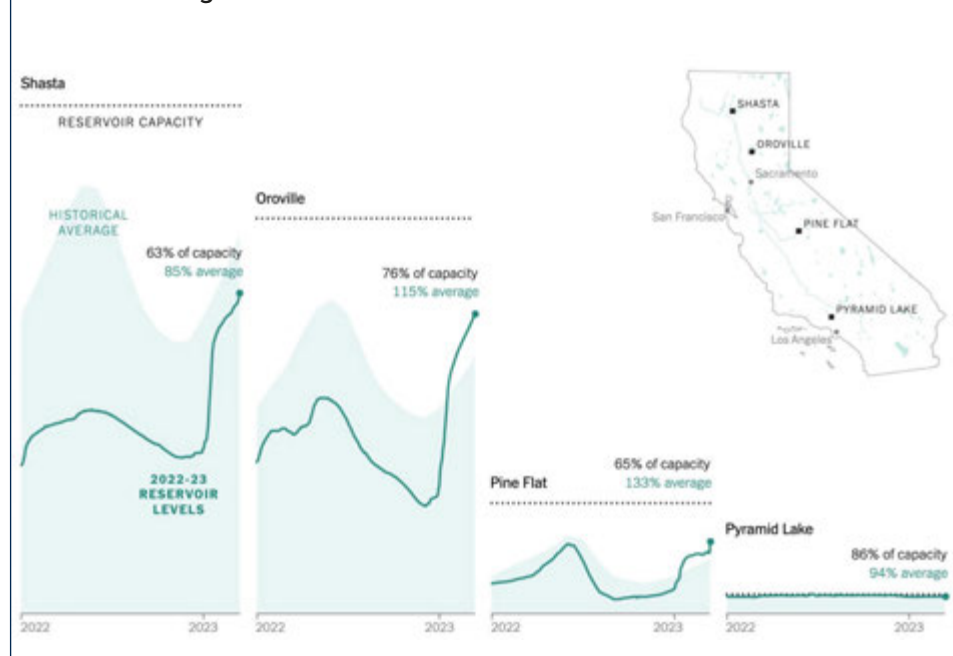
SJV

Over half of California's farm sales are from the southern San Joaquin Valley, where crops depend on water that arrives via aqueducts and canals from northern California or is groundwater pumped from aquifers.

The eight-county San Joaquin Valley accounts for half of California's farm revenue and employment. The SJV's 4.5 million acres of crop land were irrigated with about 16 million acre feet of applied water in 2018, an average 3.6 acre feet, and generated about \$24 billion in farm revenue. Tree and vine crops generate 80 percent of the SJV's farm receipts, and 70 percent of the applied water goes to trees and vines, led by 1.2 million acres of almonds.

Some SJV crops, including 350,000 acres of alfalfa and a million acres of corn and field crops, use a much larger share of the water, about a quarter, than their share of farm revenue, less than 10 percent. Over the past four decades, the SJV crop mix has shifted from annual field

California's Largest Reservoirs Held Much More Water in 2023 than in 2022



crops such as cotton to perennial tree nuts such as almonds.

Average employment in SJV crop agriculture (including crop support) is 234,000, in SJV animal agriculture (including animal support) 36,000, and in nonfarm food processing 68,000, a total of about 338,000.

SGMA

The Sustainable Groundwater Management Act of 2014 aims to slow the depletion of ground water by requiring water districts to bring water pumping and replenishment into balance by 2040. The SJV has been overdrafting ground water, meaning that 1.8 million acre feet a year more was extracted by drilling wells and pumping water to irrigate crops than was replenished by winter rains and run off from irrigation.

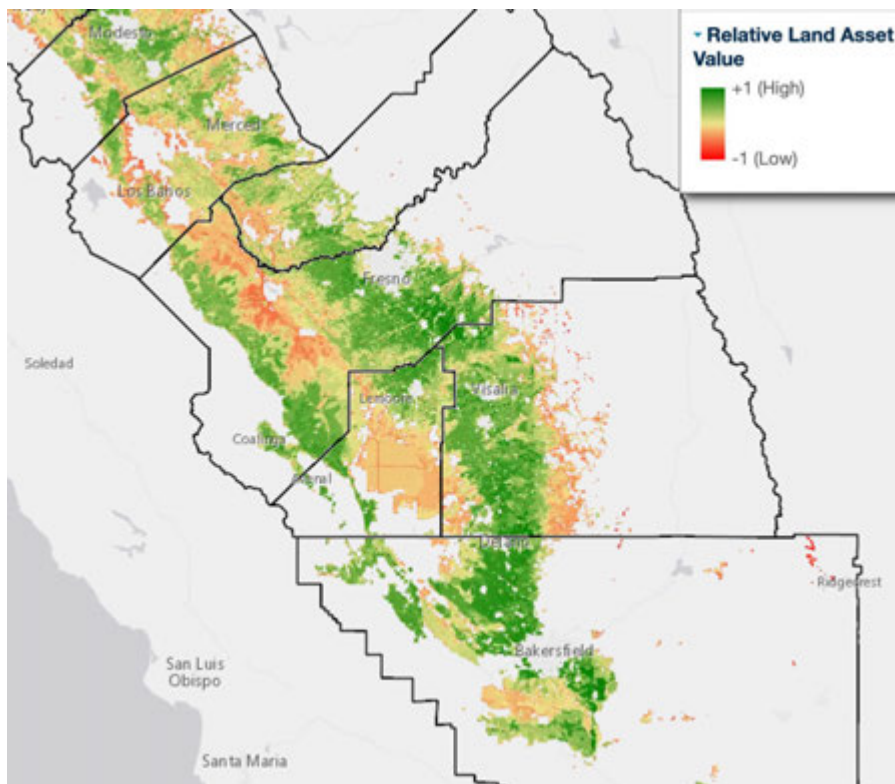
Water districts estimate how much more water has been extracted than replenished in the aquifers they manage using a variety of methodologies. One review of water district estimates found that some overestimate and others underestimate what researchers believe to be actual ground water levels. Southern SJV agriculture is most dependent on groundwater.

The net effects of SGMA's restrictions on overdrafting groundwater combined with less precipitation due to climate change and more water allowed to flow into the Pacific Ocean for environmental reasons may mean less water to irrigate crops. The anticipated reductions in water availability vary within the SJV.

Colorado

The Colorado River supplies water to farmers and 40 million Americans in seven states. A prolonged

High-Value SJV Farm Land Depends on Northern California Water



Source: <https://databasin.org/maps/e316a5c7294b477fbabeb34d6faa44fc/active/>

Trees and Vines use 70% of Applied Water in the SJV and Generate 80% of Farm Revenue

TABLE A1
Irrigated acreage, water use, and revenues by commodity group in the San Joaquin Valley in 2018

Crop Commodity Group	Irrigated Cropland (thousands of acres)	Applied Water (thousands of acre-feet per year)	Revenues (2019 \$ millions)
Alfalfa and pasture	347 (8%)	1,724 (11%)	454 (2%)
Corn and other silage	493 (11%)	1,143 (7%)	604 (3%)
Other field and grain	547 (12%)	1,219 (8%)	714 (3%)
Trees and vines	2,736 (61%)	11,145 (69%)	19,519 (81%)
Vegetables and non-tree fruits	368 (8%)	858 (5%)	2,733 (11%)
Total San Joaquin Valley	4,491	16,090	24,025

SOURCES: Irrigated cropland is from the California Department of Water Resources (LandIQ). Applied water use and revenues are derived from the openAG model (see text).

drought has reduced water levels in Lakes Mead and Powell, which can collectively hold 50 million acre feet, ten times more than Lake Shasta in California.

Under a 1922 agreement and subsequent amendments, the upper-basin states of Colorado, New Mexico, Utah, and Wyoming get 7.5 million acre feet a year, the lower-basin states of Arizona, California, and NM get 8.5 million acre feet, and Mexico gets 1.5 million

acre feet of Colorado River water each year. However, instead of generating the expected 15 million acre feet a year, the Colorado River has generated only 12 million acre feet a year since 2020, so water extractions have depleted Lakes Mead and Powell.

The Imperial Irrigation District is the largest single Colorado River water user, with rights to a quarter of the flow or 3.1 million acre-feet of water that is delivered via an 80-mile long

canal; IID water is used primarily to grow forage crops such as alfalfa. Arizona in 1968 agreed that the IID's water rights were senior, but nonetheless relied on Colorado River water delivered via the Central Arizona Project to provide water to the suburbs of Phoenix and Tucson.

Runoff from irrigating IID fields in the Imperial Valley created the Salton Sea, California's largest lake 200 feet below sea level. As farmers irrigate more efficiently, the Salton Sea is shrinking and getting saltier, with salt levels twice that of sea water.

Six of the seven states that share Colorado River water agreed to reduce water usage by over two million acre feet, but California refused to give up the one million acre feet the other states requested. Agriculture uses 80 percent of Colorado River water and has the most senior water rights. Arizona wants allocations to the IID and other agricultural districts reduced, which the agricultural districts resist unless they receive full compensation.

Outlook

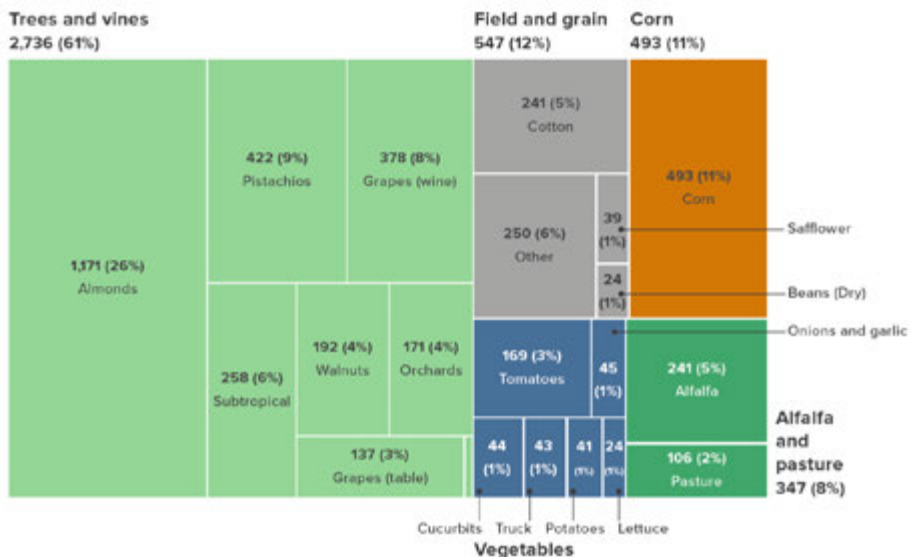
Less water will increase its value, encouraging farmers to plant crops that require less water and to use water-saving technologies such as drip irrigation to stretch available water supplies.

California and other western states have a first-in-time, first-in-right approach to water rights that gives senior rights to those who were first to put water to beneficial uses. Owners of senior water rights could elect to sell their water, and about 1.5 million acre feet are sold each year, mostly surface water such as that stored behind dams and sent to the SJV via canals.

Almonds are the Largest Acreage SJV Crop, Followed by Corn, Pistachios, and Grapes

FIGURE A2

The San Joaquin Valley has a diverse crop mix, but perennials constitute more than 60 percent of acreage



Crops Account for 87% of SJV On-Farm Employment

TABLE A2

Base case revenues, value added, and employment in the San Joaquin Valley

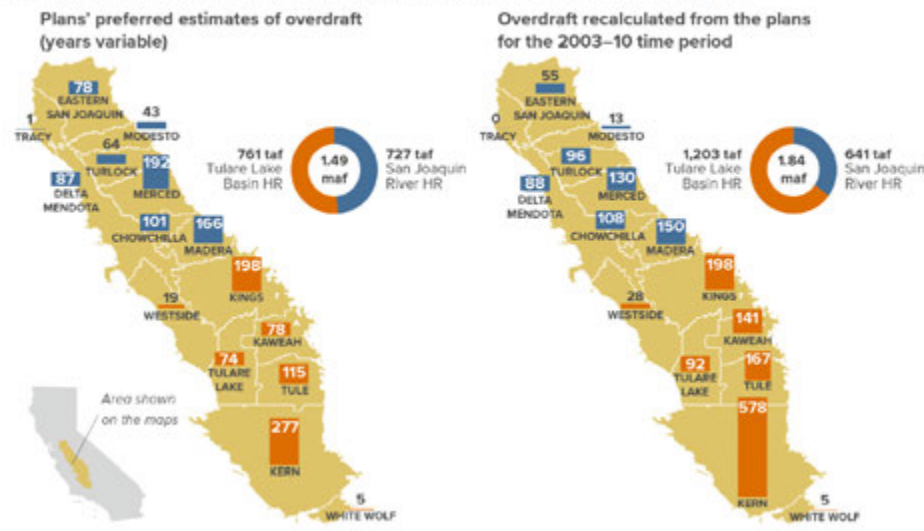
Agriculture-related sectors	Revenues (\$ millions)	Value added (\$ millions)	Employment
Crops	24,025	17,038*	233,897*
Dairy and beef	8,373	3,163*	35,860*
Food and beverage industries	34,359	7,427	67,766
Agricultural sector total	66,757	27,628	337,523
Economy-wide total	344,997	193,442	2,024,543

SOURCES: IMPLAN database for the eight-county region in 2019. Revenues for crops are from openAG (see note 29).

Water Overdrafts May be Underestimated in the Southern SJV

FIGURE A3

Estimates of groundwater overdraft by basin from the groundwater sustainability plans

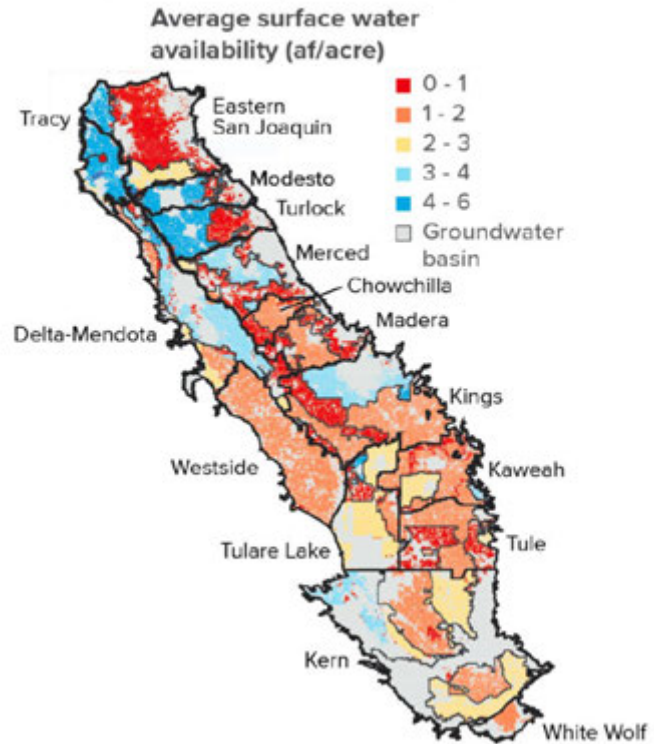


Up to a million of the 4.5 million acres now irrigated in the SJV may be fallowed as a result of less water availability. However, farm revenue and employment losses are likely to be less than 10 percent if the remaining water is shifted to its highest value use, as from cotton and forage crops to more valuable and labor-intensive fruits and vegetables.

The Southern SJV is Most Dependent on Groundwater

FIGURE A4

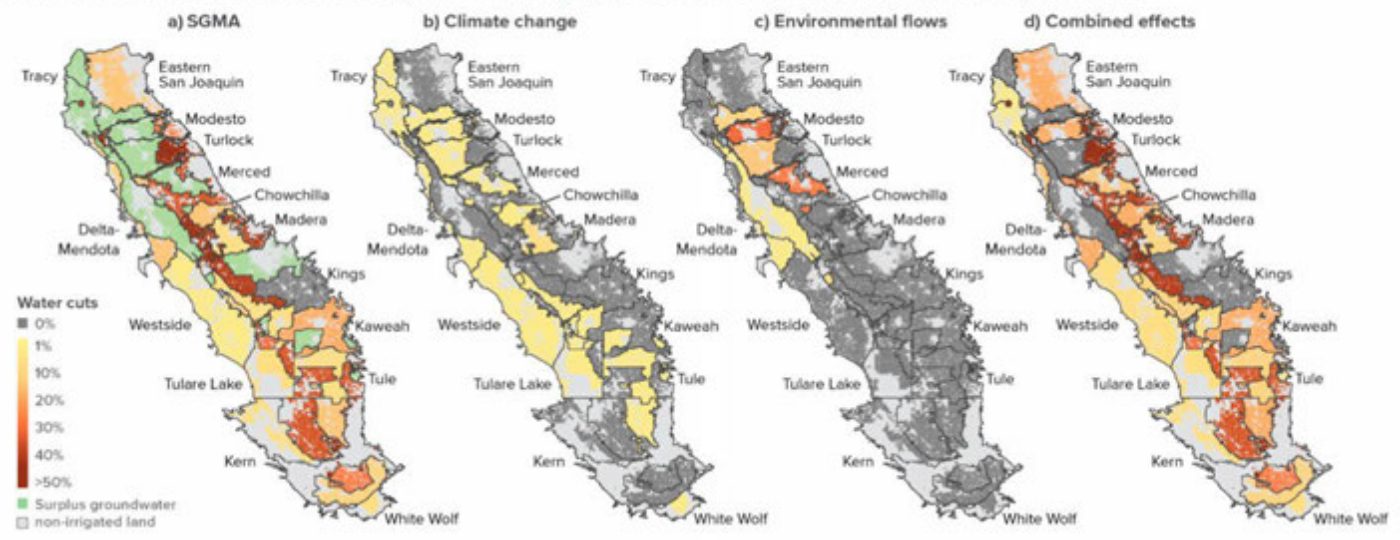
Surface water availability varies within and across basins



Changes in Water Availability Vary Within the SJV

FIGURE A6

Farm water reductions from SGMA, climate change, and proposed environmental flow requirements



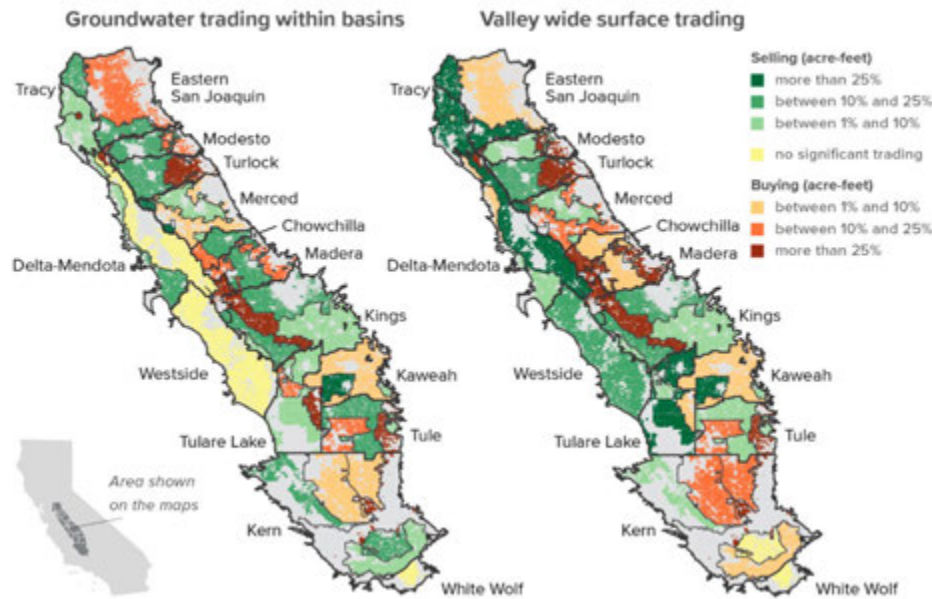
Colorado River Water is Divided Between Upper and Lower Basin States



Selling Water Would Likely Shift SJV Water from the North and West to the South and East

FIGURE A13

Different types of trading may have local consequences that need to be considered



References

Escriva-Bou, Alvar, Ellen Hanak, Spencer Cole, and Josué Medellín-Azuara. 2023. The Future of Agriculture in the San Joaquin Valley. PPIC. <https://www.ppic.org/publication/policy-brief-the-future-of-agriculture-in-the-san-joaquin-valley/>

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