



The Economic Impact of the Westlands Water District on the Local and Regional Economy: 2025 Update

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Westlands Water District

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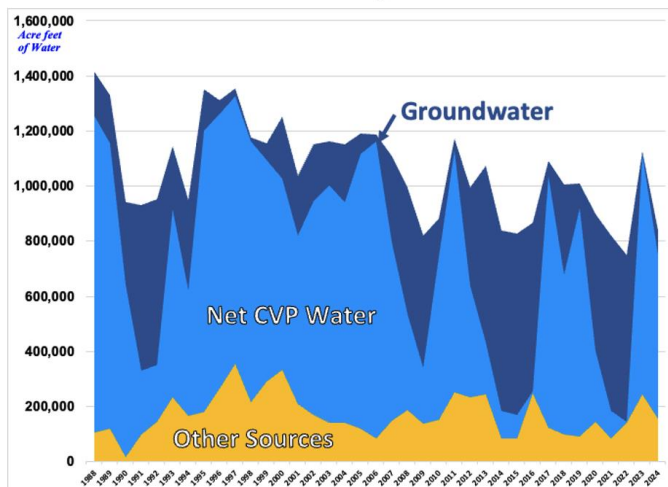
EXECUTIVE SUMMARY

TOPLINE TAKEAWAYS

- *Decreased water availability reduces the number of jobs and level of economic activity within Westlands Water District*
- *Westlands Water District operations are responsible for \$3.6 billion of economic activity and almost 28,000 jobs*
- *Reduced water availability has led to a 24.7 percent decline in economic activity and a decrease of almost \$25 million in local government revenues since 2019*
- *Decreased water availability has led to a loss of almost 7,500 jobs in two of the poorest counties in the state*
- *Reduced water availability contributes to the spread and growth of “Valley Fever” infections across the state and within the District*
- *Reduced water availability increases the risk of bird strikes for the neighboring Naval Air Station Lemoore—increasing risks to aircraft and their pilots*

Water availability has a tremendous impact on the security, prosperity and economy of the United States. In this fourth installment of our period series on the economic impact of the

Figure ES.1—History of Water Supply in Westlands Water District, Water Years Ending 1988-2024



SOURCE: Westlands Water District data. NOTE: “Net CVP Water” represents the CVP allocation adjusted for carryover and rescheduled losses. “Other Sources” include private landowner water transfers and additional supplies acquired by Westlands.

Westlands Water District (WWD), the analysis sees the first contraction in the scale and scope of that impact—driven primarily by limited water availability and the initial implementation of the California Sustainable Groundwater Management Act (SGMA). Figure

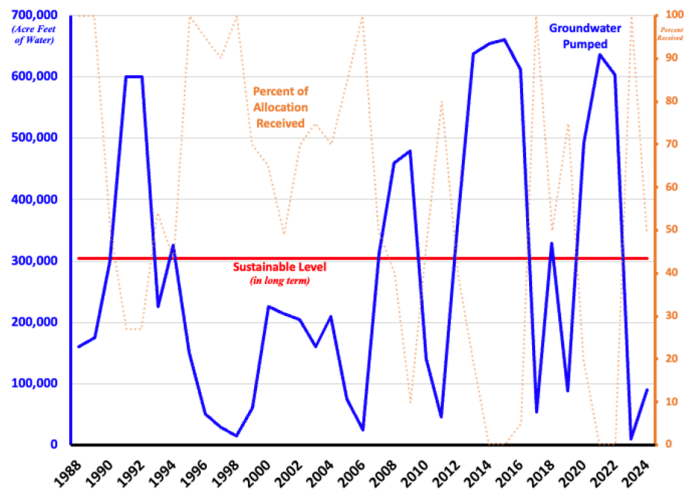
ES.1 shows the overall availability of water within WWD over the past nearly 40 years. The surface water supply from the CVP, driven largely by federal and state regulatory choices (shown in light blue), fluctuates up and down while the groundwater supply, shown in dark blue,

historically serves to level out the overall level of water available as growers in the district access groundwater to offset the reduced availability of surface water. Beginning in 2023, SGMA’s groundwater restrictions begin to shape the choices and behaviors of growers and water users within the region. Figure ES.2 provides insight into this dynamic in 2024 when, as the surface water allocation is reduced from 100 to 50 percent, groundwater pumping increases only slightly, reflecting growers’ desire to preserve their pumping rights for future years. In prior water cycles

where surface allocation dramatically declined (e.g. 1988-1992, 2005-2008, 2017-2018), there was a marked and immediate surge in groundwater usage. SGMA’s impact is not only felt in the immediate decline in economic activity in the current year, but growers are also modifying their commitments to future years, especially when it comes to “permanent crops” which often require a commitment of years to fully recapture their value. These often tend to be higher-value crops and thus reduce the economic value of the region’s products even more strongly.

This water context is important in understanding the economic structure and impact of the Westlands Water District because water supply and the cost of water, quite literally, drive the scale and character of the economic activity within Westlands. **Water supply and water costs have also driven Westlands to invest heavily in technology, infrastructure and innovative farming practices that squeeze the last ounce of value out of each drop of water.**

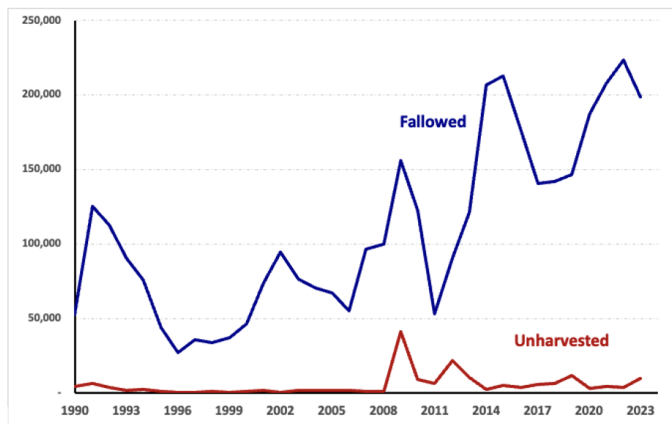
Figure ES.2—Groundwater Usage in Westlands Water District, 1988-2024



SOURCE: Westlands Water District data, including the Westlands Water District GSA’s Westside Subbasin Groundwater Sustainability Plan and its associated regulations as revised May 21, 2024.

**THE OVERALL ECONOMIC IMPACT OF THE WESTLANDS WATER DISTRICT:
DECREASED WATER REDUCES ECONOMIC ACTIVITY AND PUBLIC REVENUES**

Figure ES.3—Westlands Water District Estimated Acres Fallowed or Left Unharvested, 1990-2023 Growing Seasons



SOURCE: Westlands Water District data.

Over the past 35 years, the overall trend line has been an increase in the fallowing of agricultural acreage within the Westlands Water District as shown in Figure ES.3. These fallowed acres no longer produce the vegetables, fruit and nuts that feed America and are a lost opportunity to decrease U.S. dependence on foreign sources for healthy foods. It also has a detrimental impact on the overall economic impact of the activities of the Westlands Water District.

Figure ES.4 provides the estimate of the economic impact of the activities fueled by the water provided by the Westlands Water District. It shows that the overall impact of WWD is still very significant, totaling \$3.6 billion and accounting almost 28,000 jobs in the local economy. In this figure, direct effects account for the direct economic value of WWD activities (e.g. salaries, value of crops, etc.), indirect effects account for the economic value of the inputs and transactions necessary to produce that direct value, and induced effects reflect the increased

local economic value that is created as those who participate in this economy spend the profits, wages and savings on other goods and services across the economy.

Figure ES.4—Overall Economic and Employment Impact of the Westlands Water District, 2022

Description	Economic Impact	Share of Economic Impact	Jobs Created	Share of Jobs Created
Direct effects of agricultural production	\$2,414,859,762	68.0%	20,456.4	74.0%
Economic impact due to inputs to agricultural production <i>(indirect effects)</i>	374,217,057	10.5%	2,779.2	10.0%
Impacts due to increased employee income and consumption <i>(induced effects)</i>	761,828,327	21.5%	4,422.1	16.0%
Total Employment Impact	\$3,550,905,146	100.0%	27,657.7	100.0%

SOURCE: IMPLAN Pro and this analysis.

The overall economic impact, however, represents a marked decline from the economic impact identified in the last analysis, driven in large part by the combination of reduced access to available surface water and the restrictions of SGMA. Figure ES.5 shows that the overall economic impact of the District’s operations and activities declined by 24.7 percent since 2019. Even controlling for shifting market values for agricultural products, the economic impact of the District’s output value has returned to the same level as it was seven years earlier, driven in large part by the increase in fallowed land documented in Figure ES.3. The estimated overall employment footprint of the district fell 21.2 percent from 2019 to 2022, further exacerbating the availability of agricultural-related jobs in the region.

Figure ES.5—Overall Economic Impact of the Westlands Water District, for Years 2015, 2019 and 2022

Crop Year	Direct Effects	Total Effect	Employment
2015	2,611,525,840	3,595,969,575	28,851.6
2019	3,172,012,510	4,714,991,715	35,114.5
2022	2,280,473,415	3,550,905,146	27,657.7

SOURCE: IMPLAN Pro and this analysis and two prior economic impact studies from 2016 and 2022.

Decreases in economic activity and employment mean declines in the associated income, sales and property tax bases. Figure ES.6 shows how these declines have impacted local governments in the region. Local governments (the counties, cities and special districts) realized a 30.2 percent decline in public tax revenues from this lost economic activity (note the increase in state revenues reflects changes the interaction between state tax policies and the local economy). These decreases represent almost \$25 million in public revenues lost for these government agencies. Federally, the lost income accounted for a decline of almost \$75 million. **When economic activity in Westlands decreases, so do revenues on which that local county, city and special districts.**

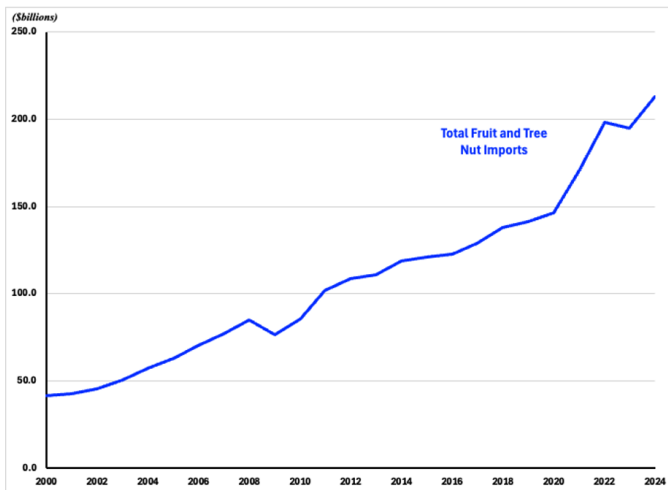
Figure ES.6—Overall Economic Impact of the WWD on Public Tax Revenues, By Type of Government, Change from 2019 to 2022

Type of Taxing Entity	2019	2022	Change 2019 to 2022	Percent Change
Federal Government	451,342,805	376,534,435	-74,808,370	-16.6%
State Government	170,969,663	174,559,177	+3,589,514	+2.1%
County Government	19,985,129	15,049,973	-4,935,156	-24.7%
City Governments	27,442,805	19,474,657	-7,968,149	-29.0%
Special Districts	35,762,986	23,582,814	-12,180,172	-34.1%
Total Tax Revenues	\$705,503,389	\$609,201,056	-\$96,302,333	-13.7%

SOURCE: IMPLAN Pro and this analysis.

**THE EFFECT ON U.S. FOOD SUPPLIES:
DECREASED PRODUCTION INCREASES FOREIGN DEPENDENCE**

Figure ES.7—Total Imports of Fruit and Tree Nuts, United States



SOURCE: Economic Research Service, U.S. Department of Agriculture, *Foreign Agricultural Trade of the U.S.*, May 8, 2025. Accessed June 20, 2025.

The U.S. farm sector has been facing increasing international competitive pressure for some time, as documented in the prior economic impact studies of the Westlands Water District.

Historically, a significant part of that shift has been due to decreased U.S. production, especially of fresh fruit and vegetables, in response to disruptions in available water—especially in the Central Valley of California. The U.S. has grown fewer crops, and domestic demand has remained strong—thus necessitating increased reliance on foreign food production. Overall, agricultural imports have surged in the

United States. For example, Figure ES.7 shows the volume of imports of fruit and tree nuts over the past 25 years—rising from \$41.9 million in 2000 to \$213.0 million in 2024—a more than five-fold increase. If the acreage fallowed since 2019 had been put back into production proportionally, Westlands growers alone would have added an additional \$202.2 million in fruit and tree nut production in 2024, almost completely offsetting the volume of imports that occurred. Other categories of produce, vegetables and agricultural products show similar patterns. International competition has grown to fill in the gaps that have been created by suppressed domestic production in this important component of the American food supply. This creates an additional risk to our national food security in the event of future disruptions such as we saw during COVID-19.

Nationally, farms in Westlands provide 3.3 percent of the national production of fresh fruit and nuts and 2.8 percent of the national production of vegetables and melons—an impressive total given the small scale of the District relative to the total arable land in the United States. This 2.8 percent share of vegetable and melon production is down from 5.4 percent in the 2019 study, reflecting the amplified impact of low water availability on growers in

the District in response to multiple years of low surface water availability, and highlighting the relative importance of the production within the District to the national food supply.

Figure ES.8—Westlands Water District Overall Share of Fresh Fruit and Vegetable Crops, Estimated Crop Values by Category, 2022

	Westlands Water District Production (\$000)	Share of Fresno & Kings Counties Production	Share of California Production	Share of U.S. Production
Fruit and Nut Crops	881,743	17.2%	4.7%	3.3%
Vegetables and Melons	551,687	37.9%	5.5%	2.8%
All other	192,015	30.3%	2.1%	
Total	\$1,625,445	22.5%	4.3%	

SOURCE: Westlands Water District data; Fresno County Department of Agriculture, *2022 Fresno County Annual Crop & Livestock Report*; Kings County Department of Agriculture/Measurement Standards, *Kings County Agricultural Crop Report 2022*; California Department of Food and Agriculture, *California Agricultural Statistics Review 2022-23*; United States Department of Agriculture, *Agricultural Statistics 2022, Fruit and Tree Nut Yearbook*.

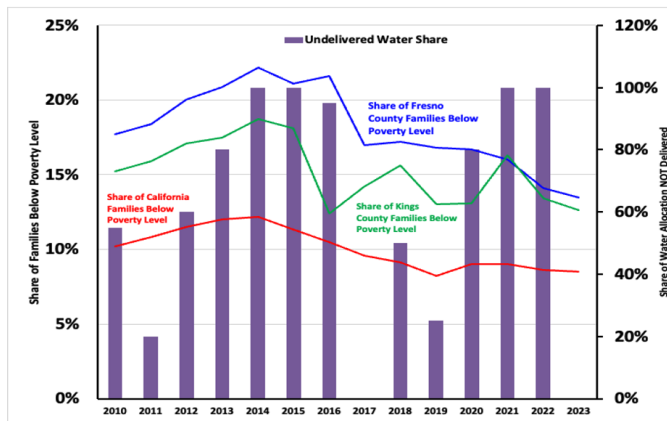
THE EFFECT ON REGIONAL LABOR MARKETS: DECREASED WATER SUPPLIES INCREASE POVERTY

The roughly 7,500 jobs lost due to decreased agricultural activity exacerbate the poverty issues in Fresno and Kings Counties. Employment in Fresno County is heavily reliant on agriculture and jobs; **direct jobs on farms accounted for 9.5 percent of all jobs in Fresno County and 15.3 percent of all jobs in Kings County.**

The divergence between the state and Fresno and Kings Counties’ poverty rates is persistent over time. Figure ES.9 shows how household poverty rates in these two counties rise in the years when water allocations fall short of contracted amounts. Continuing a trend documented in the 2022 update of the economic impact study.

These profiles are almost identical to those of five years ago. The bottom line is that both Fresno and Kings Counties continue to be heavily dependent on agriculture to fuel their local economies. Continued degradations in this sector will continue to grow the counties’ already-outsized poor populations and put increasing pressure on the social safety net and infrastructure of the region. While the thrust of assessing the potential risks of this dependence is left for others, they serve as a sobering context for the near future as this study delves deeper into the implications of fewer agricultural jobs.

Figure ES.9—Percentage of Families with Incomes Below the Poverty Level, California, Kings and Fresno Counties, 2010-2023



SOURCE: US Bureau of the Census, American Communities Survey, Westlands Water District data. California Employment Development Department data.

THE EFFECT ON PUBLIC HEALTH:

DECREASED AGRICULTURAL PRODUCTION CORRELATES WITH VALLEY FEVER CASES

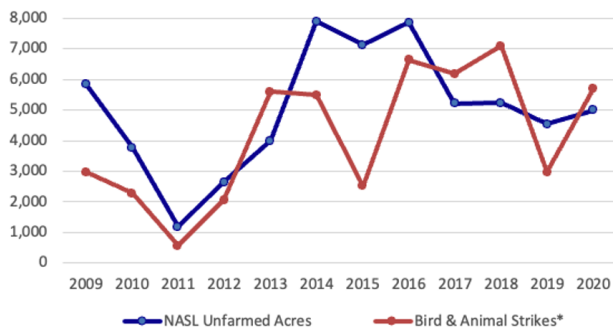
Drought impacts the number of new Valley fever cases in California because drought, or lack of irrigation, affects how the Valley fever fungus lives and grows in the soil. During dry conditions and drought, the Valley fever fungus can survive in the soil; when rain or irrigation returns, the Valley fever fungus grows again, spreading spores in dirt and outdoor dust that people can breathe in, making them sick. Overall, drought increases the number of Valley fever cases in California in the years following a drought and may allow for the Valley fever fungus to spread to more areas of California. More droughts in California seem to lead to an increase in Valley fever in more areas of the state. **Historically, cases of Valley fever in California have been lowest during years of drought and highest during years immediately after a drought.**

THE EFFECT ON PUBLIC SAFETY:

DECREASED WATER AVAILABILITY LEADS TO MORE BIRD STRIKE EVENTS

Naval Air Station Lemoore (NASL) is an important presence in the region (Westlands Water District provides the conveyance infrastructure for supplying their water needs) and a major contributor to the local economy. Because of the rural nature of NASL's location has been the frequency of instances of birds striking operating aircraft ("bird strikes"). When flight operations

Figure ES.10—Bird/Animal Strikes and Unfarmed Acreage, Lemoore Naval Air Station, 2009 to 2020



SOURCE: Unofficial totals reported by Lemoore Naval Air Station and Westlands Water District Data.

are located near agricultural lands, the probability of animal/aircraft collisions rises significantly. These probabilities rise dramatically when droughts lead to increased fallowed lands allowing rodent populations to surge, resulting in significant increases in the population of predatory birds. The U.S. Navy has taken actions to mitigate these impacts by increasing efforts to keep lands surrounding NASL cultivated. Even so, the cycles in the frequency of bird strikes does move closely with the amount of nearby farmland not under

cultivation as shown in Figure ES.10. The amount of acreage unfarmed in this diagram is influenced heavily by how much water (both surface and groundwater) is available to the growers who lease this land. Given the significant cost of the predominantly military aircraft flying out of NASL (a single F-35C costs more than \$117 million), the **policy choices that limit the availability of surface water to these growers can create significant unintended costs to both aviators and taxpayers.**

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UNDERSTANDING WESTLANDS WATER DISTRICT’S ECONOMIC IMPACT AND THE IMPORTANCE OF A RELIABLE WATER SUPPLY

This report is part of a series of estimates of the economic impact of the nation’s largest agricultural water district, the Westlands Water District (also referenced throughout this report as “Westlands” or the “District”). This series has mapped the importance of the District to the regional, state and national economies and the ways that key events and policies have shaped those contributions. In each study, the importance of the District in providing economic opportunity for the region’s households have interacted with national security, labor policies, public health, COVID-19, international trade and the need for a clean, safe and stable food supply to provide insights into the key role that the crops and activities supported by water provided through Westlands plays in the lives of the region’s residents. The prior reports in this series include the following titles:

- [*The Economic Impact of the Westlands Water District on the Local and Regional Economy*](#) (October 2016);
- [*The Implications of Agricultural Water for the Central Valley*](#) (September 2017); and
- [*The Economic Impact of the Westlands Water District on the Local and Regional Economy*](#) (March 2022).

Additional information was collected by the research team in collaboration with other research in local communities being conducted as part of ongoing research at California State University Fresno. This information was found by supplementing surveys of the local communities within the District’s immediate region with additional questions. The survey information incorporated throughout illuminates the concerns, perspectives and experiences of residents on the life issues impacted by the consequences of water policies and actions. To protect their privacy and encourage a frank discussion, pseudonyms are used to identify quoted individuals.

The Westlands Water District sits largely on the eastern side of Interstate 5 in western Fresno County. Its eastern border generally follows the path from Firebaugh to Lemoore, while its western border reaches south to Kettleman City in Kings County. Its 1,000 square miles contains some of the richest farmland in the nation, producing approximately \$1.6 billion in crops in 2022, with an overall economic impact of more than \$3.6 billion. The land within the District itself is sparsely populated, with only one incorporated city within its borders—the City of Huron whose estimated population is estimated to be 6,932 as of January 1, 2025. As seen in Figure 1, it is surrounded on its edges by larger cities like Firebaugh (pop. 8,714), Mendota (pop. 12,710), Lemoore (pop. 27,692), Avenal (pop. 13,315) and Coalinga (pop. 17,608). Fresno (pop. 557,032) is nearby and home to the District’s administrative headquarters.¹

¹ All population estimates provided are as of January 1, 2025 and are from the [*E-1 Cities, Counties and the State Population Estimates with Annual Percentage Change*](#) from the [California Department of Finance](#).

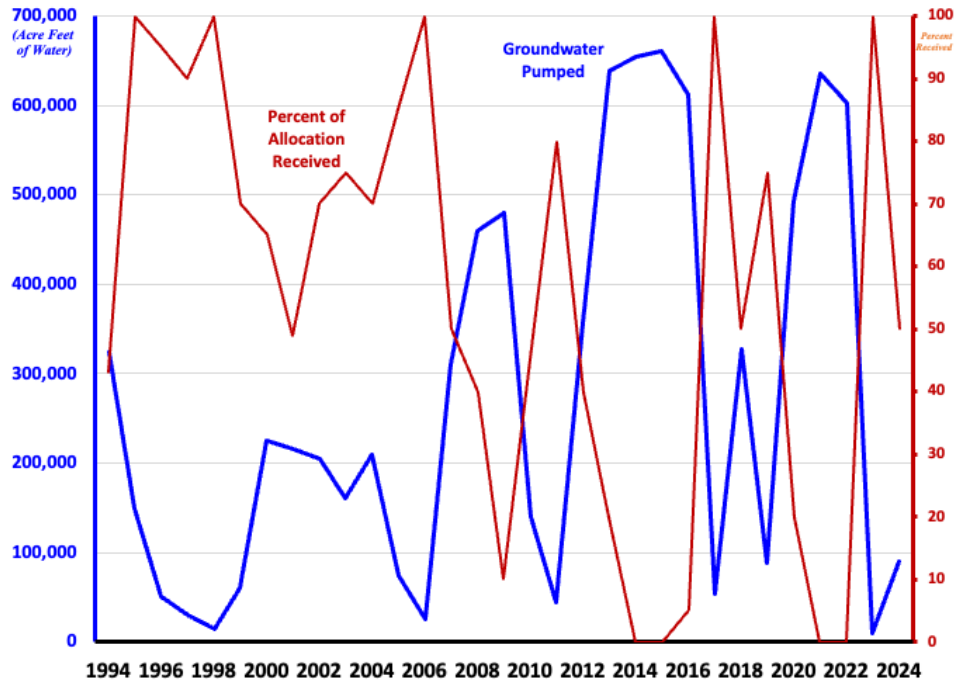
Figure 1—Map of the Westlands Water District



SOURCE: Caliper Data Systems, Maptitude 2016.

The Westlands Water District, forged into its current scale in March of 2007 through the acquisition of neighboring Broadview Water District, is the largest agricultural water district in the United States by irrigable acres. As such, it has a primary water contract with the federal government to deliver up to 1.195 million acre-feet of water annually and additional contracts to transport water through its networks to the Lemoore Naval Air Station and the cities of Coalinga and Huron. In years when the federal government provides less than its contracted amounts, the District must provide less water to its customers and find additional water elsewhere. This is typically done through expensive purchases from other users, such as other public water agencies. Individual growers also supplement their supplies through purchasing surface water or by the costly use of groundwater pumped from the aquifers that undergird the District and its environs.

Figure 2—CVP Water Allocation Received and Groundwater Pumped, Westlands Water District, 1988-2024



SOURCE: Westlands Water District data.

As can be seen in Figure 2, groundwater is the mirror image of the level of surface water available over the past several decades. It is easy to see that in each year that the federal government reduces the surface water available to Westlands, groundwater use has historically surged and, when more surface water is made available, groundwater use declines. Water year 2024 breaks this pattern, with groundwater use only rising slightly in response to reduced surface water availability. This reflects, in part, the implementation of the Sustainable Groundwater Management Act (SGMA), a law signed by Governor Jerry Brown in 2014.

SGMA REDEFINES THE AGRICULTURAL PLANNING LANDSCAPE

This legislation contains detailed provisions and guidelines for the use of the water in these aquifers, providing an additional layer of regulation with a view to limit the amount of water removed from them. Westlands Water District GSA is the designated Groundwater Sustainability Agency (GSA) for the Westside Subbasin and is in the process of implementing the Groundwater Sustainability Plan (GSP) for the region.

In that role, Westlands manages the groundwater allocations for water users in the region, manages surface water flows and purchases, manages aquifer storage and recovery and oversees the creation of percolation basins to replenish the aquifer. Pumped groundwater is typically more expensive than the originally contracted surface water because of the investment necessary to install pumps and the electricity necessary to bring it to the surface and move it to the desired use. The effects of these restrictions are being felt at this time as Westlands began a phased-in implementation on the limits for groundwater pumping in response to the limitations imposed by the GSP under SGMA. The full impacts of these limitations will be felt in 2030 when a cap of

305,000 acre-feet of groundwater will be in place, 10 years ahead of SGMA's deadline. While the full impacts of the GSP have been mitigated in some part by the temporary expanded availability of surface water, it is invariably affecting crop and planning decisions today.²

Surface water is preferred in most applications to groundwater when it is available. The use of groundwater for agricultural irrigation is not preferred as it can also create salinity issues for crops leading to lower crop yields and possible long-term damage to permanent crops. However, with prospective environmental and statutory limitations on the future availability of groundwater, groundwater supplies will not be as available in the future to meet water needs when surface water supplies are wane.

The District received its full allocation from the Central Valley Project (CVP) only four times in the past quarter-century—in 1998, 2006, 2017 and 2023, as seen in Figure 2. In the last ten years, the District has only averaged 40 percent of its contracted allocation of surface water from the CVP, but it has only received more than half of its contracted allocation five times in the past 20 years. In 2023, the abnormally wet weather cycle resulted in the District receiving its full allocation. Last year the District received 50 percent of its allocation and in 2025 the allocation currently sits at 55 percent of the overall contracted amount.

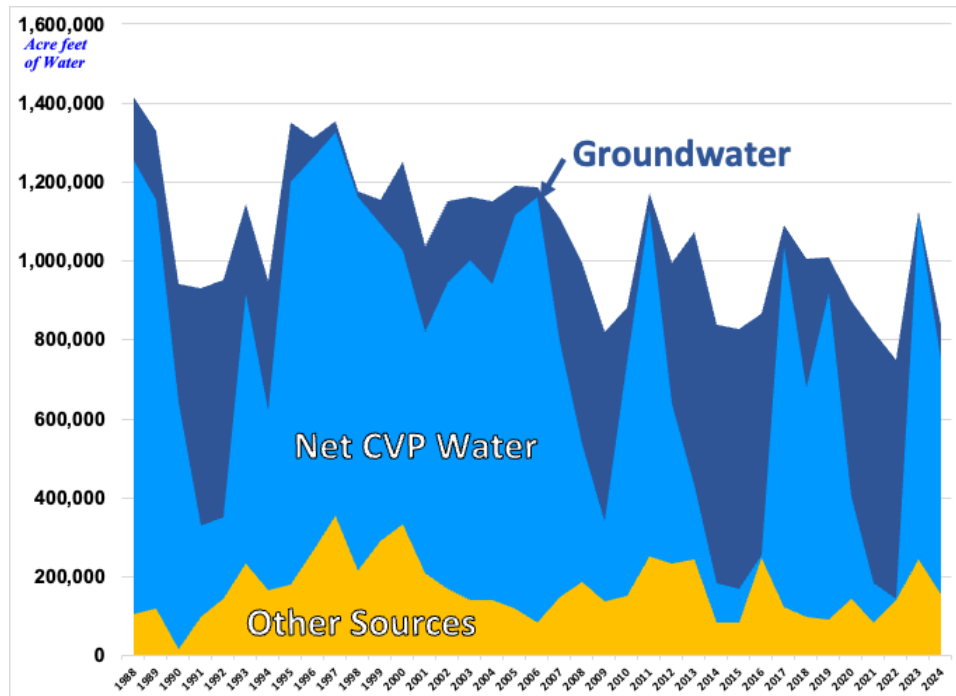
The history of Westlands Water District's water supply over the past several decades is shown in Figure 3. The surface water supply from the CVP, shown in light blue, fluctuates up and down while the groundwater supply, shown in dark blue, fills in some of the gaps in years with low allocations. The drought in recent years has led to a significant increase in pumped groundwater to replace the lost surface water as shown by the surge in the dark blue Groundwater area in years when light blue CVP water supply shrinks. Take note, however, of the larger downward trend in the total water supply over time. The peaks get lower, even as the valleys remain the same. This reflects a general decrease in overall water supply for the District. However, despite the downward supply trend, the economic value of agricultural production has risen over this time, due to increasingly effective use of available water supplies.

Furthermore, with the onset of the implementation of the SGMA in 2023, the use of groundwater is and will be increasingly constrained by the SGMA. The GSP adopted by the Westlands Water District GSA has determined through detailed study that the maximum sustainable average level of groundwater use is 0.6 acre-feet of groundwater per gross acre³ in Westlands, or a total of

² Even as the reductions in groundwater caps are phased into implementation, Westlands and its customers (mostly farmers) must strategically plan for the limits to be in place, even when the availability of surface water temporarily reduces the anticipates need. Farmers cannot act as if these limits will not impact them if the weather turns dry for the rest of this year and the next.

³ A gross acre is an acre within the Westside Subbasin assessed by Fresno or Kings County, that has been irrigated prior to December 31, 2015, or is suitable for reasonable and beneficial use of groundwater. Land that does not meet this definition may be deemed to meet the definition pursuant to an approved request for variance. Gross Acre includes land designated as Eligible Cropland pursuant to the Westlands Water District Rules and Regulations. (Definition from [Article 1, Section 2 of the Regulations for the Groundwater Allocation Program and Use of Groundwater within the Westside Subbasin.](#))

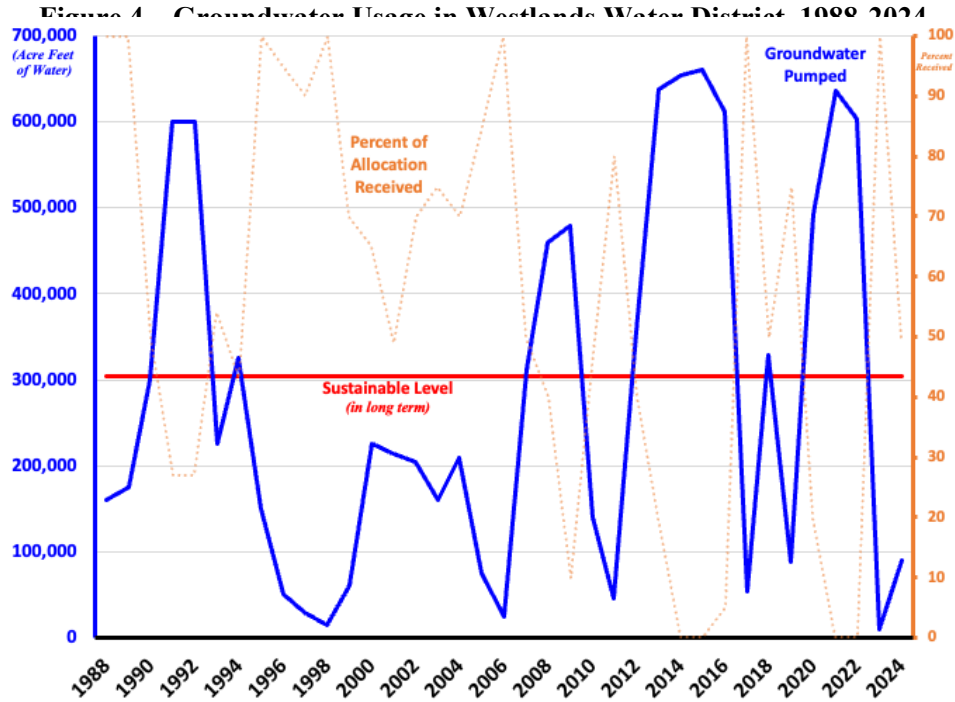
Figure 3—History of Water Supply in Westlands Water District, Water Years Ending 1988-2024



SOURCE: Westlands Water District data. NOTE: “Net CVP Water” represents the CVP allocation adjusted for carryover and rescheduled losses. “Other Sources” include private landowner water transfers and additional supplies acquired by Westlands.

about 305,000 acre-feet of groundwater use across the district. Figure 4 replicates the history in Figure 2 but adds this reference line to the diagram to provide insight into what the future may hold.⁴ Imagine the economic implications on regional production if none of the groundwater in blue above the red line Figure 4 was available to offset lost access to surface water.

⁴ The GSP gradually phases the full limits of the caps in over 8 years between 2023 and 2030. Starting at a limit of 1.3 acre-feet of groundwater allowed per gross acre (WWD has approximately 525,000 gross acres), it declines 0.1 acre-feet per gross acre each year until it reaches the sustainable target cap of 0.6 acre-feet of groundwater pumped per gross acre. At this sustainable level, users could pump as much as 305,000 acre-feet of water on average per year from the aquifer. These amounts will vary as water users do get use for banking water during years when usage is less than that that cap.



SOURCE: Westlands Water District data, including the Westlands Water District GSA’s Westside Subbasin Groundwater Sustainability Plan and its [associated regulations](#) as revised May 21, 2024.

This water context is important in understanding the economic structure and impact of the Westlands Water District because water supply and the cost of water, quite literally, drive the scale and character of the economic activity within Westlands. **Water supply and water costs have also driven Westlands to invest heavily in technology, infrastructure and innovative farming practices that squeeze the last ounce of value out of each drop of water.**

FARMING SERVES AS THE REGION’S ECONOMIC ENGINE

Farming, as an economic process, is like any natural resource-driven industries. It requires a location that has the critical resources available to produce the product in question. For mining, as an example, it is the presence of the requisite ores in enough concentrations to be commercially feasible to harvest. In the case of farming, it requires the right types of soils, farmable geography (mostly flat), appropriate growing seasons, consistently mild (or predictable) weather patterns, and water. The Central Valley is richly endowed with all but the last of these—water.

California and the U.S. government, with unusual foresight and planning, addressed the need for water by investing, in partnership with local landowners, in the infrastructure to provide water in commercially viable quantities and, as a result, California produces a significant share of the fresh produce, nuts and vegetables consumed in the United States and, for some types of products, the world. In Westlands’ case it was the foresight of the federal government that led to the Central Valley Project and its resulting production.

While the combination of state and federal regulatory actions has distorted the effective functioning of the local economy, farmers in the state’s Central Valley have adapted to this

changing environment using innovative technologies and modified planting strategies. Simultaneously, foreign producers and governments have acted to increase the competition and pressure on U.S. agricultural production and producers. The current conversations around immigration, tariffs and shifting national security priorities are also serving to drive decisions and actions by Central Valley farmers in response to this shifting landscape. This will likely redefine the mix, price and origins of the fresh fruit and produce to which Americans have access.

HOW AGRICULTURE RIPPLES THROUGH THE ENTIRE LOCAL ECONOMY

Agriculture plays a central role in the economy of the Central Valley. Farmers hire employees; buy seed, fertilizers, farm equipment, fuel, water, irrigation equipment and supplies, fuel, and

“Within the AG industry, different tiers of employment exist: Administration, HR, safety, tractor drivers, water delivery, forklift drivers, and field laborers, and some of that is seasonal, and the drought hasn’t helped, increasing the amount of fallowed land.”

DAVID, Mendota resident since 1991

other supplies; hire attorneys, accountants, consultants, and other experts; build facilities, homes, and roads; and, in today’s tech-savvy farming, develop computer and electronic monitoring infrastructure to track the status of their crops in real time.

These direct agricultural production-related activities represent the foundational aspects of an economic cycle that spreads across the local economy as shown in Figure 5. Once crops have been grown, they are then transported to other locations for packing

and processing for eventual distribution to consumers, food product manufacturing, animal feeding, and other uses—locally, domestically, and internationally. Within each of these steps in the food production process, additional inputs are required including labor (workers), infrastructure, production inputs (e.g., containers, electricity, other food products, etc.), and utilities like vehicle fuel, electricity, and gas).

Figure 5—Diagram of the Mechanisms of Farming's Economic Impact



Each of the steps in the production process is dependent on the preceding steps and factors— affecting one step in the process will affect the prices, will restrict supplies, or will result in fewer crops, which will in turn result in less produce available for packaging or processing, and eventually less produce available to food manufacturers and consumers. This ripple effect is important in estimating the economic impact that farming has because it goes beyond the traditional “multipliers” people think of in economic processing to affect other entire sectors of the economy.

The methodology used to estimate the economic impacts of the activities supported by the water provided by Westlands Water District are described in more detail in Appendix A. The next section of this report will provide the results of that analysis.

“I eventually made it to the community college, attending West Hills, and that associate’s degree opened up managerial and supervisory opportunities at the food processing plants. Once I got started in the asparagus food processing plant, I got to know the foreman, and that led to other opportunities, as the seasons changed.”

PEDRO, Firebaugh

WESTLANDS WATER DISTRICT CONTINUES TO HAVE A MAJOR ECONOMIC IMPACT

Westlands Water District, in aggregate, is directly and indirectly responsible for some \$3.6 billion dollars of economic activity in 2022 and nearly 28,000 jobs across the economy. The detailed results of the economic modeling analysis are presented in Figure 6 presenting the direct, indirect and induced estimated by the IMPLAN modeling system. It is important to consider these impacts in the context of the broader emerging economic context. According to the Bureau of Economic Analysis, the U.S. economy during the 2022 growing season was coming off a quarter of negative growth and hovering between 2.7 percent and 3.4 percent growth. Government subsidies related to COVID were winding down and consumers were just starting to return to more normal lifestyles in most states. Across the globe, governments and households were transitioning from the extraordinary restrictions imposed during the pandemic and returning more toward normalcy. The most direct impacts on agriculture were around supply chain backlogs in supplies and chemicals. This was coupled with transportation issues that framed the opening of the year’s growing cycle, but which had normalized by the middle and end of the cycle. Locally, South-of-Delta agricultural water CVP water contractors were experiencing back-to-back 0 percent allocation years.

THE ESTIMATED ECONOMIC IMPACT OF THE WESTLANDS WATER DISTRICT

Most of these impacts are through what the model calls “direct effects”—specifically through the growing of agricultural products and the value added associated with the processing and handling of those products—representing some \$2.4 billion of the economic impact and more than 20,000 jobs.

“Indirect effect” impacts, which account for another \$374 million in economic impacts, are the economic activity associated with the activities necessary to accomplish the main production process but are not actually part of it. For example, when a farmer buys a truck to haul produce

as part of their operation, this will create jobs in the truck manufacturing sector as the demand for trucks goes up by one. In this case it generally represents the economic activity fueled by the non-labor inputs necessary to farm—including things like chemicals, planting and harvesting equipment, irrigation equipment and supplies, electricity, seed, spare parts, etc. It is worth noting that while these indirect impacts are proportionately smaller than the direct effects, this difference is NOT a measure of profitability. This model looks directly at the value added of the activities, not their relative profitability.

Figure 6—Overall Economic Impact of the Westlands Water District, 2022

EMPLOYMENT	Jobs Created	Share
Direct effects of agricultural production	20,456.4	74.0%
Economic impact due to inputs to agricultural production <i>(indirect effects)</i>	2,779.2	10.0%
Impacts due to increased employee income and consumption <i>(induced effects)</i>	4,422.1	16.0%
Total Employment Impact	27,657.7	100.0%

ECONOMIC IMPACT	Total Impact	Share
Direct effects of agricultural production	\$2,414,859,762	68.0%
Economic impact due to inputs to agricultural production <i>(indirect effects)</i>	374,217,057	10.5%
Impacts due to increased employee income and consumption <i>(induced effects)</i>	761,828,327	21.5%
Total Economic Impact	\$3,550,905,146	100.0%

SOURCE: IMPLAN Pro and this analysis.

“Induced effect” economic activity is associated with the new spending power that individuals and firms have as a result of their participation in the production of the crops and its successor activities. It reflects the things that individuals and firms buy in the economy as the result of their wages and earnings. As people work in the sector and earn wages, they go out and buy food, clothes, cars, etc. These purchases then create economic demand for these products which in turn creates more jobs and economic activity in other sectors. As a result of the jobs created directly and indirectly through the Westlands Water District and its customers, almost \$800 million in new economic activity and more than 4,400 additional jobs are created.

Figure 7 shows how these impacts break out across the three primary categories of economic activities enabled by the District’s water: growing crops, subsequent (secondary) agricultural processing⁵ and Westlands Water District’s operational spending as a governmental enterprise.

⁵ Subsequent food production (also called “Secondary Agricultural Production”) was difficult to model due to the large variety of crops produced in Westlands and the limited literature on value added in each. Our literature review focused on two of the largest contributors to the agricultural output of the region—almonds and processed

As this and the prior analyses show, while the primary economic impact on total output of the Westlands Water District is through the direct production of crops, many of its employment impacts are concentrated in the secondary agricultural production dimension—in the packing, handling, processing, and subsequent manufacturing of food products derived from the agricultural products of farms in the District.

There are two important implications of this result. First, as Figure 7 shows, none of these jobs will exist if the crop production does not happen—there must be tomatoes to process if you are a tomato processor. Second, many of these jobs may occur well beyond the physical boundaries of the Westlands Water District. One of the challenges of modeling a relatively small and sparsely populated geographic area like Westlands is that much of the subsequent economic activity, especially the Secondary Agricultural Production, will likely occur at regional processing facilities that may be located in nearby towns, or perhaps even in distant locations. For example, tomatoes and garlic grown in the region are often processed outside the boundaries of Fresno County.

Figure 7—Overall Economic Impact of the Westlands Water District, by Source of Original Activity, 2022

EMPLOYMENT	Jobs Created	Share
Crop Production	12,924.3	46.7%
Secondary Agricultural Production	14,099.8	51.0%
Westlands Operational Activity	633.5	2.3%
Total Employment Impact	27,657.7	100.0%

ECONOMIC IMPACT	Total Impact	Share
Crop Production	2,280,473,415	64.2%
Secondary Agricultural Production	1,136,955,814	32.0%
Westlands Operational Activity	133,475,918	3.8%
Total Economic Impact	3,550,905,146	100.0%

SOURCE: IMPLAN Pro and this analysis.

The overall “Total Economic Impact,” however, represents a marked decline from the economic impact identified in the last analysis which used 2019 (pre-COVID) crop data. As can be seen in Figure 8, the overall economic impact of the District’s operations and activities declined by 25 percent since 2019. COVID played havoc with production and market values for agriculture in the two intervening years, and the District’s output value has almost returned to its impact from 2015, some seven years earlier. It is important to note that 2015 and 2022 were both 0 percent allocation years that were preceded by 0 percent allocation years, while 2019 was a 75 percent allocation year preceded by a 50 percent allocation year. The implementation of SGMA has also had a suppressive effect on economic growth. Estimated overall employment fell 21.2 percent

tomatoes—for which there is some detailed literature available. Sensitivity analyses were performed that showed the results presented here to be robust under a range of assumptions.

from 2019 to 2022 as well. These values are also impacted by immigration issues, shifting international production and changing environmental policies.

Figure 8—Overall Economic Impact of the Westlands Water District, for Years 2015, 2019 and 2022

Crop Year	Direct Effects	Total Effect	Employment
2015	2,611,525,840	3,595,969,575	28,851.6
2019	3,172,012,510	4,714,991,715	35,114.5
2022	2,280,473,415	3,550,905,146	27,657.7

SOURCE: IMPLAN Pro and this analysis and two prior economic impact studies from 2016 and 2022.

Figure 9 provides a snapshot of the changes across the three activity areas described above in Figure 7 and shows that there are across-the-board decreases in the employment impacts for each category with about one in five jobs disappearing on the agricultural side and more than one in three jobs on the government operations piece. On the economic impact side of the analysis, the loss of crops is more significant, resulting in a decline of 28 percent in crop production and 20 percent in secondary agricultural production.

Figure 9—Overall Economic Impact of the Westlands Water District, By Activity Category, Change from 2019 to 2022

EMPLOYMENT	2019	2022	Decline	Percent Change
Crop Production	16,424.1	12,924.3	3,499.8	-21.3%
Secondary Agricultural Production	17,711.3	14,099.8	3,611.5	-20.4%
Westlands Operational Activity	979.2	633.5	345.7	-35.3%
Total Employment Impact	35,114.5	27,657.7	7,456.8	-21.2%

ECONOMIC IMPACT	2019 <i>(millions of \$)</i>	2022 <i>(millions of \$)</i>	Decline <i>(millions of \$)</i>	Percent Change
Crop Production	\$3,172.0	2,280.5	-891.5	-28.1%
Secondary Agricultural Production	1,416.2	1,137.0	-279.3	-19.7%
Westlands Operational Activity	126.8	133.4	+6.7	+5.3%
Total Economic Impact	\$4,715.0	3,550.9	-1,164.1	-24.7%

SOURCE: IMPLAN Pro and this analysis.

“The amount of land being fallowed due to decreased water supply has increased. And, while the time unemployed does provide some relief from the physical demands of the manual labor they do, fewer dollars are coming into the household, so some field workers grow their own food and sell that for extra money and some women offer childcare services to earn extra money.”

ADRIANA, Huron

This decline—especially the almost 7,500 jobs—represents a significant hit to the local communities in which they are set. In the next chapter of this report, the full impacts and implications of this decline will be explored in the context of the detailed economy, the communities involved and the lives impacted.

THE IMPACT OF WESTLANDS WATER DISTRICT ON PUBLIC REVENUES

The economic impacts identified in Figure 7 through Figure 9 also generate tax and fee revenues for the governments which encompass the Westlands Water District. The IMPLAN modeling engine can estimate these impacts and the revenues associated with the District’s economic activity are presented in Figure 10.

Figure 10—Overall Impact of the WWD on Public Revenues and Tax Receipts, 2022

	Cities	Special Districts	County	State	Federal	Total
Crop Production	9,228,971	11,171,502	7,130,193	98,546,271	182,571,572	308,648,509
Secondary Agricultural Production	8,858,387	10,738,332	6,850,810	68,247,236	181,200,304	275,895,068
Westlands Operational Activity	1,387,299	1,672,979	1,068,971	7,765,670	12,762,560	24,657,480
TOTAL	19,474,657	23,582,814	15,049,973	174,559,177	376,534,435	609,201,056

SOURCE: IMPLAN Pro and this analysis.

As seen here, economic activity related to Westlands in 2022 generated \$15.0 million in tax revenues for the two counties, \$19.5 million in tax revenues for local cities and \$23.6 million in tax revenues for local special districts (including local school districts)—for a local total of \$58.1 million. It provided an additional \$174.6 million to state coffers and \$376.5 million to federal accounts for a total tax stream of \$609.2 million dollars across all levels of government.

As seen in Figure 9, the recent regulatory and market conditions have led to a decline in the overall economic activity in the region. There is a corresponding decline in the public revenues received by local governments and Figure 11 provides a comparison of the public revenue portions from this analysis and the study previously published in 2023.

Figure 11—Overall Economic Impact of the WWD on Public Tax Revenues, By Type of Government, Change from 2019 to 2022

Type of Taxing Entity	2019	2022	Change 2019 to 2022	Percent Change
Federal Government	451,342,805	376,534,435	-74,808,370	-16.6%
State Government	170,969,663	174,559,177	+3,589,514	+2.1%
County Government	19,985,129	15,049,973	-4,935,156	-24.7%
City Governments	27,442,805	19,474,657	-7,968,149	-29.0%
Special Districts	35,762,986	23,582,814	-12,180,172	-34.1%
Total Tax Revenues	\$705,503,389	\$609,201,056	-\$96,302,333	-13.7%

SOURCE: IMPLAN Pro and this analysis.

At the highest level, governments have seen a 13.7 percent decrease over the last three years in the revenues they have received because of the decline in economic activities of the Westlands Water District. This totals \$96.3 million less in tax receipts to governments overall and a decline in \$24.5 million dollars to local governments. Local governments bore the largest proportional share of these declines. Special districts bear the brunt of this decline losing about half of it or \$12.2 million. Cities and counties lost roughly \$8 million and \$5 million, respectively. **When economic activity in Westlands decreases, so do revenues that local county, city and special districts rely on.**

The next section of this report explores some of the forces that underly the changes delineated in Figure 9. It is important to understand the mechanisms at work as the interaction between COVID (a focus of the 2023 report), SGMA and global trade play out in the context of this economic impact analysis.

DRIVERS THAT FUEL CHANGES IN WESTLANDS WATER DISTRICT’S ECONOMIC IMPACT

The decreased employment and economic impacts documented in Figure 9 result from the convergence of several trends and issues: (1) the surface water supply of that given year and the ongoing and prospective changes brought about by the implementation of the Sustainable Groundwater Management Act, (2) shifting prices for agricultural products that are shaped by changes in trade and competition; and (3) shifting patterns of planting by growers operating within the District’s boundaries.

The types of changes in overall economic impacts identified in this analysis can be driven by changes in both the volume of economic activity in the given geographic region and changes in the economic value the economy has assigned to these activities. In this case, Westlands has been affected by both dimensions of this equation. Farmers are now facing a regulatory framework that further limits their access to water sources and market prices that severely undercut their profitability.

HOW SGMA AFFECTS WATER AVAILABILITY AND CROP PLANNING

In the first instance, farmers are struggling with a decreasingly reliable water supply. With the implementation of SGMA, growers can no longer count on tapping groundwater to offset periods

when the allocations of surface water from the Central Valley Project go from 100 percent (over 1 million acre-feet of water) to 0 percent (no water). As demonstrated in Figure 2 above, groundwater use has been the mirror image of the surface water allocations from the USBR under the CVP contracts—rising to offset lost surface water in years when USBR allocations are low and declining dramatically when they are high. SGMA will place a one-sided cap on these fluctuations—creating caps on what can be pumped. Figure 12 shows the allocation mechanism adopted by the GSA to implement SGMA in the Westside Subbasin as filed with the California Department of Water Resources.

Figure 12—Groundwater Allocations under Westside Basin GSA, 2023-2035

Year	Acre-feet / Gross Acre	Overall Groundwater Allocation	Year	Acre-feet / Gross Acre	Overall Groundwater Allocation
2023	1.3	682,500	2030	0.6	305,000
2024	1.2	630,000	2031	0.6	305,000
2025	1.1	577,500	2032	0.6	305,000
2026	1	525,000	2033	0.6	305,000
2027	0.9	472,500	2034	0.6	305,000
2028	0.8	420,000	2035	0.6	305,000
2029	0.7	367,500			

SOURCE: Westlands Water District GSA Groundwater Sustainability Plan, [Regulations for the Groundwater Allocation Program and Use of Groundwater within the Westside Subbasin](#), revised May 21, 2024.

These totals start with 1.3 acre-feet per gross acre and phases in a 0.1 acre-feet per gross acre per year reduction each year until the targeted allocation is achieved in 2030. With approximately 525,000 gross acres in operations within the District, the GSP specifies an average annual groundwater usage level of 305,000 acre-feet by 2030, significantly less than the 603,000 acre-feet of groundwater used in 2022. This target usage is lower than the amount of groundwater used by growers in 12 of the last 18 years. In six of these years, the target level of sustainable groundwater usage would have represented less than half of the groundwater used.

While the GSP contains a mechanism for the limited carryover of unused allocations in one year to the next year, the net effect over time, if surface water access is limited for regulatory or environmental reasons, is that SGMA will represent a real constraint on groundwater access and the growers who rely on it will be more susceptible⁶ to the volatility of the rain and drought cycles in California. Even in years where surface water is moderately scarce, Westlands growers are likely to realign their crop portfolios and share of planted acreage to retain carryover balances for years when surface water allocations are severely curtailed.

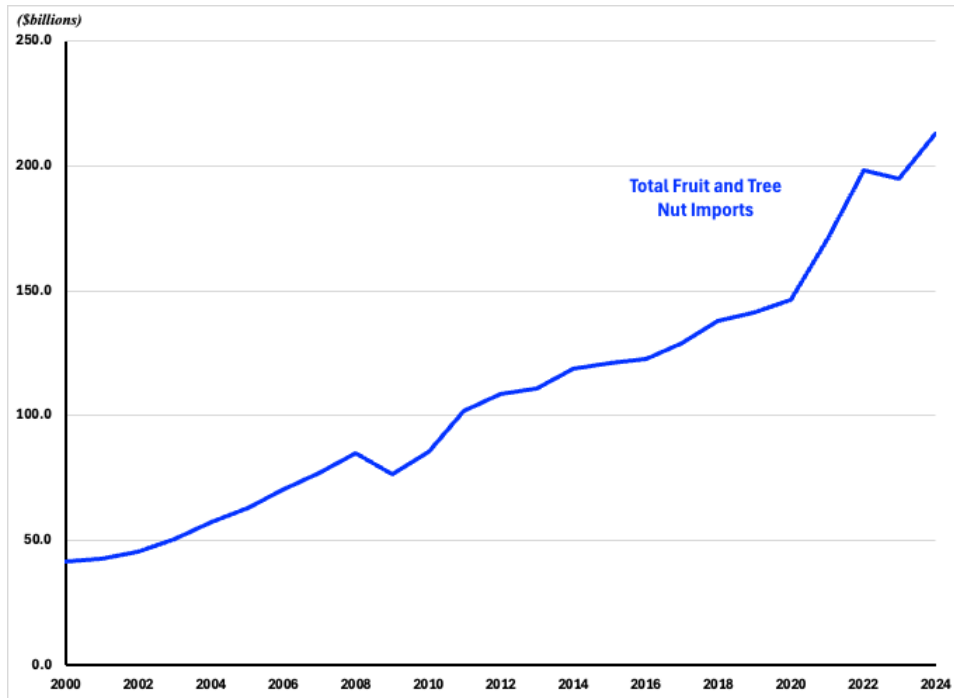
INTERNATIONAL COMPETITION HAS UNDERMINED AGRICULTURAL PRICES

The U.S. farm sector has been facing increasing international pressure for some time, as documented in the prior economic impact studies of the Westlands Water District. Historically, a

⁶ Since SGMA is being phased in within the Westlands Water District GSA through 2030, this exposure will grow each year.

significant part of that shift has been due to decreased U.S. production, especially of fresh fruit and vegetables, in response to disruptions in available water—especially in the Central Valley of California. The U.S. has grown fewer crops, and domestic demand has remained strong—thus necessitating increased reliance on foreign food production. Overall, agricultural imports have surged in the United States. Figure 13 shows the trend over the past 25 years for one category of crops critical to the Central Valley—fruit and tree nuts.

Figure 13—Total Imports of Fruit and Tree Nuts, United States



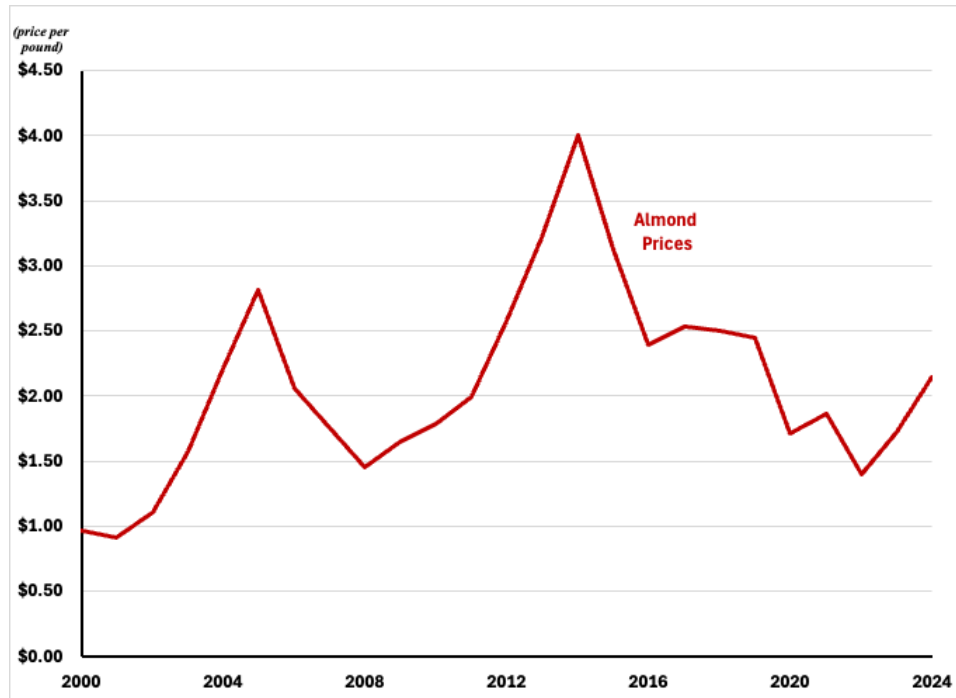
SOURCE: Economic Research Service, U.S. Department of Agriculture, [Foreign Agricultural Trade of the U.S.](#), May 8, 2025. Accessed June 20, 2025.

The total (nominal) value of fruit and tree nuts imported rose from \$41.9 million in 2000 to \$213.0 million in 2024—a more than five-fold increase. If the acreage fallowed since 2019 had been put back into production proportionally, Westlands growers alone would have added an additional \$202.2 million in fruit and tree nut production, almost completely offsetting the volume of imports that occurred. Other categories of produce, vegetables and agricultural products show similar patterns. International competition has grown to fill in the gaps that have been created by suppressed domestic production in this important component of the American food supply. This creates an additional risk to our national food security in the event of future disruptions such as we saw during COVID.

This surge in imports, combined with other economic factors, has led to significant decreases in the market price of some key agricultural products that comprise important shares of the agricultural production within the District’s boundaries.

Figure 14 shows the changes in the price of almonds, for example. As seen here, these prices peaked in 2014 and have shown a relatively consistent decline, accelerated in part during the COVID era. 2024 shows a slight recovery in these prices, but they are still significantly below the roughly \$2.50 per pound in effect at the time of the last economic impact analysis.

Figure 14—Price per Pound of Almonds, California, 2000-2024



SOURCE: 2024 California Almond Nursery Sales Report, National Agricultural Statistics Service, U.S. Department of Agriculture, April 24, 2025, accessed June 20, 2025.

The impact of this price volatility plays out in the overall level of economic output. Total crop values are influenced not only by the market prices, but also the yields on these parcels (units of crops produced per acre), and number of acres planted. Figure 15 compares the acreage between the 2019 and 2022 crop years. The 2022 growing season saw a 12.4 percent decline in the number of acres planted relative to the 2019 growing season, while the overall economic value of the output from those acres declined 16.5 percent.

“Due to the lack of water, the primary crops left in Firebaugh are almonds and pistachios; however, the tasks associated with these crops are mostly automated.

The spice plant and warehouse in Firebaugh (owned by Olam) shut down in December 2024, eliminating 275 jobs.”

PEDRO, Firebaugh

Figure 15—Estimated Crop Acreage and Value with the Westlands Water District, 2019 and 2022 Growing Seasons

Sector	2019		2022	
	Acres	Estimated Value	Acres	Estimated Value
Grain farming	18,013	11,950,542	30,574	12,126,326
Vegetable and melon farming	118,540	768,193,284	88,927	551,687,011
Fruit farming	27,704	168,452,354	22,846	188,946,778
Tree Nut farming	176,803	841,075,935	177,746	692,795,773
All other crop farming	68,447	157,220,952	38,782	179,889,084
Total Farming	409,507	\$1,946,893,067	358,875	1,625,444,971

SOURCE: District data and Fresno Farm Bureau Annual Crop Report, 2019, Annual Crop Report 2022.

There was some variation between categories. Grains and tree nuts saw increases while vegetable and melon farming and fruit farming saw significant declines. Vegetable and melon farming saw a 25 percent decline in acreage planted and a decrease of 28 percent in estimated value while the number of acres planted in almonds increased slightly (0.5 percent) while producing 18 percent less estimated value. Grain farming saw a 70 percent increase in acres planted (granted it was a small base) that produced a 1.5 percent increase in estimated value.

WESTLANDS WATER DISTRICT’S GROWERS REMAINS IMPORTANT PRODUCERS OF FRESH NUTS, FRUIT AND VEGETABLES

Westlands irrigated agriculture is a significant contributor to both the regional and national economies. Crops produced within Westlands’ boundaries produced an estimated 22.5 percent of the crop-related agricultural production in the combined area of Fresno and Kings Counties in 2022 as shown in Figure 16. Given that Fresno County ranked second in the state in 2022 (down from first in 2019) for overall agricultural production and Kings County ranked ninth (down from eighth), this is a significant contribution. Figure 16 shows the overall shares of county, state and national crop production produced by farmers who are part of the Westlands Water District. Farms in Westlands contribute 17.2 percent of fruit and nut production in Fresno and Kings Counties and nearly 38 percent of the vegetables and melons produced in the two counties.

Nationally, farms in Westlands provide 3.3 percent of the national production of fresh fruit and nuts and 2.8 percent of the national production of vegetables and melons—an impressive total given the small scale of the District relative to the total arable land in the United States. This 2.8 percent compares to 5.4 percent in the 2019 study, reflecting changes that have been imposed on growers in the District in response to multiple years of low surface water availability.

Figure 16—Westlands Water District Overall Share of Fresh Fruit and Vegetable Crops, Estimated Crop Values by Category, 2022

<i>(thousands of dollars)</i>	Westlands Water District	Fresno & Kings Counties	California	United States
Fruit and Nut Crops	881,743	5,134,052	18,930,295	26,913,586
Vegetables and Melons	551,687	1,455,619	9,958,247	19,406,724
All other	192,015	633,920	8,984,287	
Total	\$1,625,445	\$7,223,591	\$37,872,829	

WESTLANDS WATER DISTRICT - SHARE OF OVERALL OUTPUT			
<i>(Westlands Water District Share of Region's Production)</i>	Fresno & Kings Counties	California	U.S.
Fruit and Nut Crops	17.2%	4.7%	3.3%
Vegetables & Melons	37.9%	5.5%	2.8%
All other	30.3%	2.1%	
Total	22.5%	4.3%	

SOURCE: Westlands Water District data; Fresno County Department of Agriculture, *2022 Fresno County Annual Crop & Livestock Report*; Kings County Department of Agriculture/Measurement Standards, *Kings County Agricultural Crop Report 2022*; California Department of Food and Agriculture, *California Agricultural Statistics Review 2022-23*; United States Department of Agriculture, *Agricultural Statistics 2022, Fruit and Tree Nut Yearbook*.

The overall importance of the impact that farms in Westlands Water District have on the national production of these key agricultural products is a testament to the unique character of this farming region and its ability to provide fresh fruits and vegetables to the nation year-round.

WESTLANDS WATER DISTRICT FARMERS CONTRIBUTE TO U.S. AND CALIFORNIA AGRICULTURAL EXPORTS

Agricultural exports totaled \$23.6 billion for California in 2022 (up from \$21.7 billion in 2019, and up 4.4 percent from the prior year and accounting for 12.8 percent of the U.S. total. Figure 17 shows the exports for the top 15 products for California agricultural exports for both 2019 and 2022. Almonds and pistachios alone account for almost a third of these exports.

Figure 17—Top 15 Agricultural Exports, California 2019 and 2023

Rank	Commodity	2019 Export Value (Millions)	2023 Export Value (Millions)
1	Almonds	4,901	4,363
2	Pistachios	2,010	2,732
3	Dairy and Products	1,805	2,580
4	Wine	1,253	1,056
5	Walnuts	1,250	922
6	Processed Tomatoes	623	769
7	Rice	765	741
8	Table Grapes	743	616
9	Oranges and Products	541	597
10	Strawberries	402	509
11	Beef and Products	404	496
12	Cotton	438	326
13	Lettuce	292	313
14	Seeds for Sowing	333	289
15	Hay	292	279

SOURCE: California Department of Food and Agriculture, California Agricultural Exports, 2019-2020 and California Agricultural Exports, 2023-2024.

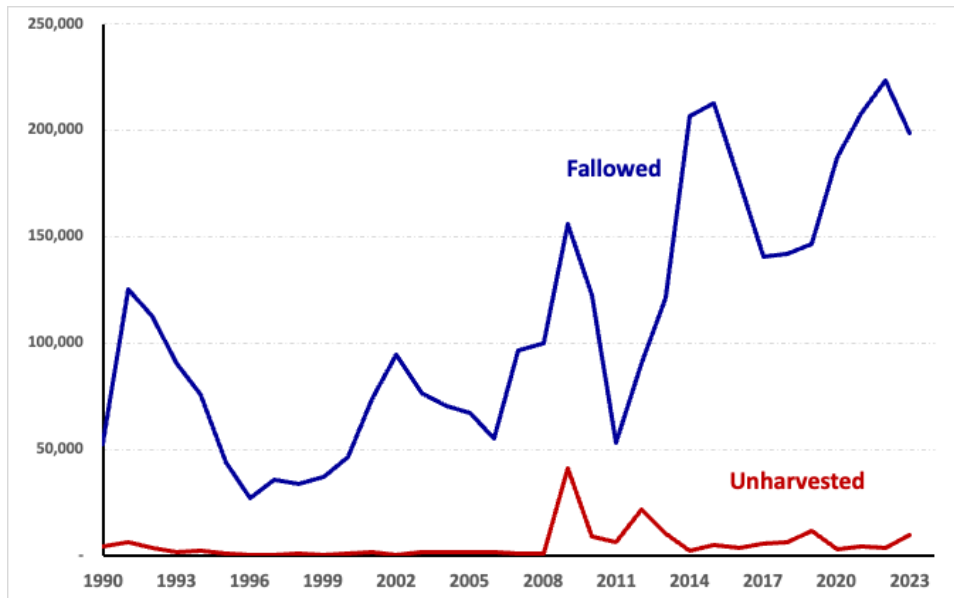
Of these fifteen commodities, growers in the Westlands Water District contribute significantly to the state’s supply of nine of these commodities, including almonds, wine (by providing wine grapes), pistachios, table grapes, processed tomatoes, raisins, cotton, lettuce, and seeds for sowing. Additionally, hay, grain, and feed production from farms within the District contribute to two others—dairy and beef products.

FOLLOWING POST-SGMA

In years of restricted deliveries of surface water through the CVP, the reduced supply not only affects the volume of water available to the District’s customers but also impacts the availability of water in the region overall making it more difficult to secure additional water from other sources. With the implementation of SGMA, this unavailability of surface water becomes a real constraint on production and a real risk for growers—they no longer have the backstop of groundwater to sustain production (especially for permanent crops) as rainfall levels vary.

Given the recent “wet” years, one would expect to see fallowed acreage drop dramatically with just a few years of higher water levels. And yet, as seen in Figure 18, fallowed acreage has seen only a small decline in response to increased surface water availability. The smaller magnitude of this shift is at least partially explained by the uncertainty in future water availability introduced by the increased constraints of SGMA. Growers must adapt their farming strategies to plan for greater volatility in the overall levels of water available for their production. In the face of weak prices, competition from imports and greater water supply uncertainty, growers will begin to re-engineer their overall crop strategies to respond.

Figure 18—Westlands Water District Estimated Acres Fallowed or Left Unharvested, 1990-2023 Growing Seasons



SOURCE: Westlands Water District data.

AGRICULTURAL UNEMPLOYMENT EXACERBATES POVERTY IN THE REGION

“It’s primarily agricultural options (...) When I was a teenager, a lot of high school students would work in the fields during the summer. I had to drive 20 miles away to work at a McDonald’s on [Interstate] 5.”

David, Mendota

Employment in Fresno County is heavily reliant on agriculture. Figure 19 shows the breakdown in employment for the years 2018 through 2023 for Fresno County. Figure 20 provides the same detail for Kings County. **Direct jobs on farms accounted for 9.5 percent of all jobs in Fresno County and 15.3 percent of all jobs in Kings County.**

In Fresno County, farming has been trending slightly down over time as a share of overall employment even as the total number of jobs has remained relatively flat. The share is impacted in part by slight growth in the services sector. In Kings County, the specific number of jobs has increased slightly while farming has remained as a relatively consistent share of overall employment.

Figure 19—Employment by Census-defined Industry Category, Fresno County, 2018-2023

Jobs by Industry	2018	2019	2020	2021	2022	2023
Farming	44,200	44,100	40,300	40,500	40,600	40,700
Mining, Logging & Construction	19,000	19,300	19,000	20,500	22,500	22,900
Manufacturing	25,900	26,200	25,800	26,100	27,000	26,700
Trade, Transportation & Utilities	68,800	70,000	69,600	73,500	76,600	76,400
Services	165,900	172,600	160,200	168,000	178,400	183,900
Government	74,500	75,200	72,500	70,900	73,600	76,100
Total Employment	398,300	407,400	387,400	399,500	418,700	426,700
Percent Employment by Industry	2018	2019	2020	2021	2022	2023
Farming	11.1%	10.8%	10.4%	10.1%	9.7%	9.5%
Mining, Logging & Construction	4.8%	4.7%	4.9%	5.1%	5.4%	5.4%
Manufacturing	6.5%	6.4%	6.7%	6.5%	6.4%	6.3%
Trade, Transportation & Utilities	17.3%	17.2%	18.0%	18.4%	18.3%	17.9%
Services	41.7%	42.4%	41.4%	42.1%	42.6%	43.1%
Government	18.7%	18.5%	18.7%	17.7%	17.6%	17.8%
Total Employment	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
California – Pct of Jobs in Farming	2.4%	2.4%	2.5%	2.4%	2.3%	2.2%
California – Pct of Jobs in Food Mfg	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%
California – Pct of Jobs in Manufacturing	7.5%	7.4%	7.6%	7.5%	7.4%	7.3%
Fresno County Share of State Farm Jobs	10.5%	10.4%	9.9%	9.9%	9.7%	10.0%

SOURCE: California Employment Development Department data.

Nearly one in eight farm jobs in the state of California is in Fresno and Kings Counties. Since 2019, however, these employment numbers reported by the California Employment

Development Department amount to almost the losses generated in our separate input-output model, declining a net total of 3,600 jobs. This directly corresponds to the 3,499 jobs (within the rounding error) estimated to be lost in direct crop production in Figure 9. If one were to rely only on the EDD analysis, the estimate would fail to capture the nearly 4,000 additional jobs lost because of this lost primary production. While these numbers may not appear large in the statewide economy, they have a dramatic consequence for the lives of the individuals directly impacted by their disappearance.

Figure 20—Employment by Census-defined Industry Category, Kings County, 2018-2023

Jobs by Industry	2018	2019	2020	2021	2022	2023
Farming	7,600	7,500	7,300	7,300	7,400	7,700
Mining, Logging & Construction	1000	1000	1000	1000	1200	1200
Manufacturing	4,900	4,900	4,600	4,500	4,700	4,700
Trade, Transportation & Utilities	7,000	6,900	6,400	6,500	6,700	6,500
Services	13,000	13,300	12,800	13,500	14,600	15,300
Government	14,900	15,100	14,300	14,000	14,500	15,000
Total Employment	48,400	48,700	46,400	46,800	49,100	50,400
Percent Employment by Industry	2018	2019	2020	2021	2022	2023
Farming	15.7%	15.4%	15.7%	15.6%	15.1%	15.3%
Mining, Logging & Construction	2.1%	2.1%	2.2%	2.1%	2.4%	2.4%
Manufacturing	10.1%	10.1%	9.9%	9.6%	9.6%	9.3%
Trade, Transportation & Utilities	14.5%	14.2%	13.8%	13.9%	13.6%	12.9%
Services	26.9%	27.3%	27.6%	28.8%	29.7%	30.4%
Government	30.8%	31.0%	30.8%	29.9%	29.5%	29.8%
Total Employment	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
California – Pct of Jobs in Farming	2.4%	2.4%	2.5%	2.4%	2.3%	2.2%
California – Pct of Jobs in Food Mfg	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%
California – Pct of Jobs in Manufacturing	7.5%	7.4%	7.6%	7.5%	7.4%	7.3%
Kings County Share of State Farm Jobs	1.8%	1.8%	1.8%	1.8%	1.8%	1.9%

SOURCE: California Employment Development Department data.

THE DEMOGRAPHIC AND ECONOMIC CONTEXT OF THE REGION

As a major agricultural production area, Westlands Water District has an economic impact not only on local markets, but also on regional and global markets. The District’s almond production, for example, is historically part of one of the U.S.’s major export successes. But there are two stories involved in understanding the economic impact that Westlands Water District has on surrounding economies. The first is rooted in the reality of the towns and communities that are found in and around the District. It is critical to understand that, absent a vibrant agricultural industry, these communities would have no economic base or activity from

““Coming out of high school, four options exist”: 1) “become a seasonal farmworker like I did” (most likely) or, if you know someone, get a seasonal job in a food processing plant or packing house”; 2) “enter the U.S. military like many of my peers did (mostly the Marines or the Navy) because recruiters were constantly on our high school campus”; 3) “take vocational electives in high school—like autoshop, welding, and ag mechanics to either start up your own business or, if you know someone, get a year-round maintenance or warehouse job at a food processing plant”; or 4) “go to college, if you can afford it.”

PEDRO, Firebaugh

DEMOGRAPHICS OF THE REGION

Westlands Water District provides critical core infrastructure to the economies of two Central Valley counties—Fresno County and Kings County. While most of its operations lie within Fresno County, significant acreage is located within Kings County. While Westlands Water District does not directly supply water to the communities of Avenal, Lemoore, and Kettleman City, the District’s agricultural footprint does directly impact the lives and economies of each. It also similarly supports the operations of the Lemoore Naval Air Station. The agricultural sector within both counties is a major driver of employment and economic activity, and in some instances, such as for the City of Huron, the existence of agriculture provides the economic base upon which the entire community’s existence is predicated.

“About the only professional employment available in Huron is for elementary and middle school teachers.”

ADRIANA, Huron

The two counties served by the Westlands Water District are expected to grow by a modest 126,000 people in the period from 2020 to 2050, with an average increase in population of 3.8 percent per decade for Fresno County and 1.7 percent per decade for Kings County, as shown in Figure 21. The region of the state serviced by Westlands is expected to see a growth rate that outstrips the state of California, which is projected to increase only 1.8 percent per decade for this same period. To sustain a consistent quality of life and a stable economy, the region will need to grow the employment base significantly over this period.

After 2050, however, the state’s models show population contractions for both counties, reflecting assumptions about the availability and depth of the regional agricultural economy.

Figure 21—Population Estimates and Projections, Fresno and Kings Counties and California, 2020-2070

Estimated and Projected Population			
Year	Fresno County	Kings County	California
2020	1,007,436	152,531	39,541,722
2030	1,041,626	160,041	39,694,960
2040	1,090,802	164,448	40,914,063
2050	1,125,478	160,329	41,655,829
2060	1,128,537	147,757	41,638,357
2070	1,104,001	130,432	41,179,366

Percent Growth by Decade			
Period	Fresno County	Kings County	California
2020 - 2030	3.4%	4.9%	0.4%
2030 - 2040	4.7%	2.8%	3.1%
2040 - 2050	3.2%	-2.5%	1.8%
2050 - 2060	0.3%	-7.8%	0.0%
2060 - 2070	-2.2%	-11.7%	-1.1%

SOURCE: California Department of Finance, Demographic Research Unit, baseline population projections by county, series P-1 and P-3, <http://www.dof.ca.gov/Forecasting/Demographics/projections/>, accessed December 30, 2024. Note that methodological changes in state projections affect projected data relating to Hispanic ethnicity and Multiracial identity. Because Kings County has such a large Hispanic population, these projections reflect data that are suppressed.

The demographic projections in Figure 22 reflect a more conservative estimate of the number of new Californians entering the state as well as decreased fertility among current populations, continuing expectation of a net exodus of Californians heading to other states or counties (as evidenced by near zero to very slightly positive net migration estimates). Note the declining rate of growth in Fresno County and the negative growth rate for Kings County, for example, in the 2050s and 2060s. This reflects expectations of less demand for migrants into the field in pursuit of an expected shrinking share of agricultural jobs.

As Figure 22, this has implications for the demography of the region. Many of the population declines are in the Hispanic segment of the population as workers migrate to other counties and states in search of opportunity. These changes roughly parallel what is anticipated statewide, although they are amplified in relative magnitude in the smaller Kings County context.

**Figure 22—Projected Population, By Race/Ethnicity,
Fresno County and California, 2020-2070**

Fresno County							
Year	African-American	Hispanic	Asian-PI	White	Other	Total	Percent Hispanic
2020	40,657	583,502	103,076	250,604	29,597	1,007,436	57.9%
2030	45,249	574,273	125,589	258,782	37,733	1,041,626	55.1%
2040	47,775	591,791	146,397	259,394	45,445	1,090,802	54.3%
2050	48,930	603,976	164,610	255,305	52,657	1,125,478	53.7%
2060	48,278	595,062	177,261	250,062	57,874	1,128,537	52.7%
2070	46,672	567,734	184,595	243,134	61,866	1,104,001	51.4%
50-year Change	14.8%	-2.7%	79.1%	-3.0%	109.0%	9.6%	

Kings County							
Year	African-American	Hispanic	Asian-PI	White	Other	Total	Percent Hispanic
2020	6,072	105,215	4,313	32,281	4,650	152,531	69.0%
2030	10,468	101,148	5,140	36,162	7,123	160,041	63.2%
2040	17,083	93,321	6,338	36,946	10,760	164,448	56.7%
2050	23,009	78,410	7,268	37,264	14,378	160,329	48.9%
2060	27,158	59,484	7,853	35,480	17,782	147,757	40.3%
2070	29,066	41,745	8,220	30,758	20,643	130,432	32.0%
50-year Change	378.7%	-60.3%	90.6%	-4.7%	343.9%	-14.5%	

California							
Year	African-American	Hispanic	Asian-PI	White	Other	Total	Percent Hispanic
2020	2,187,443	15,464,157	6,328,362	13,872,534	1,689,226	39,541,722	39.1%
2030	2,373,358	14,560,242	6,818,203	13,999,172	1,943,985	39,694,960	36.7%
2040	2,550,959	14,971,539	7,270,116	13,935,229	2,186,220	40,914,063	36.6%
2050	2,665,592	15,268,991	7,618,879	13,673,243	2,429,124	41,655,829	36.7%
2060	2,714,254	15,108,955	7,811,069	13,394,489	2,609,590	41,638,357	36.3%
2070	2,748,088	14,616,374	7,868,074	13,207,289	2,739,541	41,179,366	35.5%
50-year Change	25.6%	-5.5%	24.3%	-4.8%	62.2%	4.1%	

SOURCE: California Department of Finance, Demographic Research Unit, baseline population projections by county, series P-1 and P-3, <http://www.dof.ca.gov/Forecasting/Demographics/projections/>, accessed December 30, 2024.

THE ECONOMICS OF THE DISTRICT'S REGION—POORER AND MORE VULNERABLE

Figure 23 shows the unemployment data for Fresno County. Unemployment is already 50 percent above the statewide average at 8.1 percent. The number of unemployed in the county totals some 37,300 individuals. **The 7,500 lost jobs from the decline in production in Westlands alone could account for nearly one-fifth of the regional total.**

Figure 23—Labor Force, Employment and Unemployment in Fresno County and California, 2008-2024

Year	Fresno County				California				County Rate Exceeds State By (%)
	Civilian Labor Force (000s)	Employment (000s)	Unemployment (000s)	Unemployment Rate (%)	Civilian Labor Force (000s)	Employment (000s)	Unemployment (000s)	Unemployment Rate (%)	
2024*	462.7	425.3	37.3	8.1%	19,368.4	18,328.5	1,039.9	5.4%	49.7%
2023	461.0	426.6	34.4	7.5%	19,308.3	18,388.3	920.0	4.8%	56.3%
2022	450.1	420.9	29.2	6.5%	19,169.3	18,348.9	820.4	4.3%	51.2%
2021	443.5	403.0	40.5	9.1%	18,956.6	17,568.7	1,387.8	7.3%	24.7%
2020	445.6	393.8	51.9	11.6%	18,958.6	17,037.0	1,921.6	10.1%	14.9%
2019	450.6	417.6	32.9	7.3%	19,385.3	18,589.6	795.7	4.1%	78.0%
2018	446.2	412.4	33.8	7.6%	19,289.5	18,469.9	819.6	4.2%	81.0%
2017	444.5	406.3	38.2	8.6%	19,185.4	18,258.1	927.3	4.8%	79.2%
2016	444.7	402.4	42.4	9.5%	19,012.0	17,965.4	1,046.6	5.5%	72.7%
2015	440.3	395.2	45.1	10.3%	18,824.1	17,647.4	1,176.7	6.3%	63.5%
2014	437.6	386.4	51.3	11.7%	18,676.7	17,264.5	1,412.2	7.6%	53.9%
2013	436.6	378.0	58.6	13.4%	18,565.4	16,887.9	1,677.5	9.0%	48.9%
2012	439.5	372.0	67.5	15.4%	18,484.9	16,541.0	1,943.8	10.5%	46.7%
2011	443.3	368.8	74.5	16.8%	18,406.8	16,220.6	2,186.2	11.9%	41.2%
2010	440.6	365.3	75.3	17.1%	18,370.5	16,078.5	2,292.1	12.5%	36.8%
2009	437.0	370.3	66.7	15.3%	18,306.0	16,193.1	2,112.8	11.5%	33.0%
2008	429.9	384.4	45.5	10.6%	18,179.9	16,856.1	1,323.8	7.3%	45.2%

SOURCE: California Employment Development Department data. * - Includes data through September 2024.

Figure 24—Labor Force, Employment and Unemployment in Kings County and California, 2008-2024

Year	Kings County				California				County Exceeds State By (%)
	Civilian Labor Force (000s)	Employment (000s)	Unemployment (000s)	Unemployment Rate (%)	Civilian Labor Force (000s)	Employment (000s)	Unemployment (000s)	Unemployment Rate (%)	
2024*	59.3	54.1	5.1	8.7%	19,368.4	18,328.5	1,039.9	5.4%	61.7%
2023	58.2	53.5	4.8	8.2%	19,308.3	18,388.3	920.0	4.8%	70.8%
2022	56.2	52.2	4	7.1%	19,169.3	18,348.9	820.4	4.3%	65.1%
2021	55.3	50.0	5.4	9.7%	18,956.6	17,568.7	1,387.8	7.3%	32.9%
2020	57.0	50.3	6.8	11.8%	18,958.6	17,037.0	1,921.6	10.1%	16.8%
2019	57.8	53.2	4.6	8.0%	19,385.3	18,589.6	795.7	4.1%	95.1%
2018	57.5	53.0	4.5	7.9%	19,289.5	18,469.9	819.6	4.2%	88.1%
2017	57.3	52.1	5.1	9.0%	19,185.4	18,258.1	927.3	4.8%	87.5%
2016	57.2	51.4	5.7	10.0%	19,012.0	17,965.4	1,046.6	5.5%	81.8%
2015	57.7	51.6	6.1	10.6%	18,824.1	17,647.4	1,176.7	6.3%	68.3%
2014	57.4	50.4	6.9	12.1%	18,676.7	17,264.5	1,412.2	7.6%	59.2%
2013	58.0	50.1	7.9	13.6%	18,565.4	16,887.9	1,677.5	9.0%	51.1%
2012	58.7	49.8	8.9	15.1%	18,484.9	16,541.0	1,943.8	10.5%	43.8%
2011	59.1	49.5	9.6	16.2%	18,406.8	16,220.6	2,186.2	11.9%	36.1%
2010	59.6	49.7	9.8	16.5%	18,370.5	16,078.5	2,292.1	12.5%	32.0%
2009	60.9	51.9	9	14.8%	18,306.0	16,193.1	2,112.8	11.5%	28.7%
2008	58.8	52.5	6.2	10.6%	18,179.9	16,856.1	1,323.8	7.3%	45.2%

SOURCE: California Employment Development Department data. * - Includes data through November 2024.

Kings County is even more dependent on agriculture but lacks the diversifying impact of the large metropolis of Fresno as seen in Figure 24. From an overall labor market perspective, Kings County reflects the same disparities and trends seen in Fresno County, as seen in Figure 23. Kings County’s unemployment is high at 8.7 percent, down 26 percent from the 2020 peak but 62 percent higher than the state’s 5.4 percent rate. While the size of the labor force in Kings County is significantly smaller than Fresno County’s, the overall patterns are like those seen in Fresno County. The labor market instability has led to worker uncertainty.

“(...)most people of working age now are commuting 30 minutes to Madera or 60 minutes to Fresno or Merced for employment opportunities.”

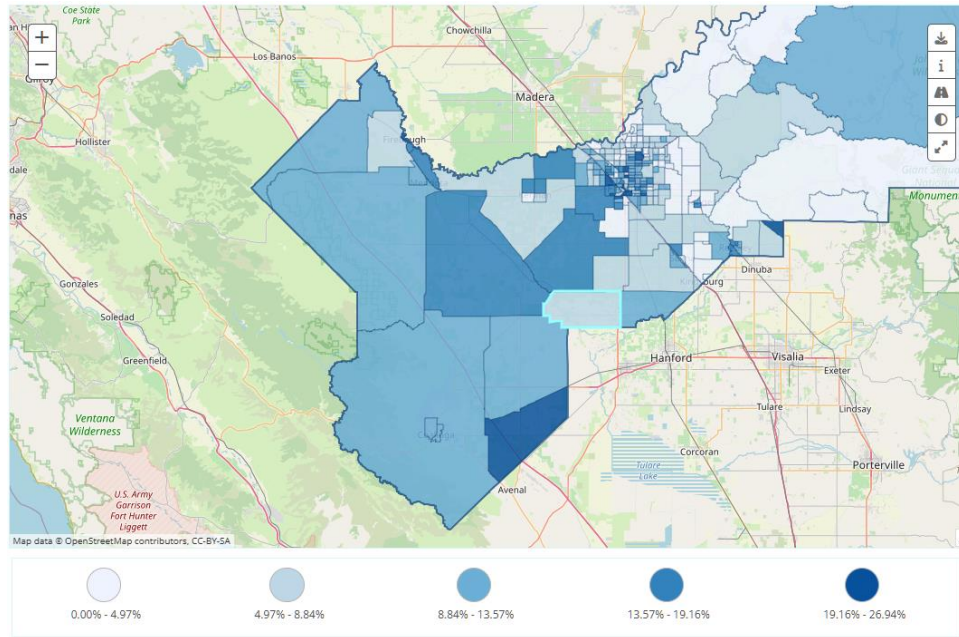
PEDRO, Firebaugh

The decreased agricultural water supply has led to an increase in the number of acres being fallowed. With that, the number of agricultural jobs available has decreased, impacting families’ employment stability and security. Residents from within and adjacent to the District’s boundaries were asked a series of questions.

- When asked, “How concerned are you about the stability of your current job?” 80.6% said “somewhat” or “very concerned.”
- When asked, “How confident are you that you will be able to find viable employment within the next 3 months?” 31.8% are “not confident at all.”

Figure 25 shows the unemployment rate of the population ages 16 and over along the Westlands Water District, ranging from 6.75% in Census Tract #77.00 in the Lanare-Riverdale Cluster to 23.11% in Census Tract #78.01 in Huron. The relatively high unemployment rate suggests an already beleaguered workforce with limited employment opportunities.

Figure 25—Population 16+ Unemployed, Fresno County, 2023

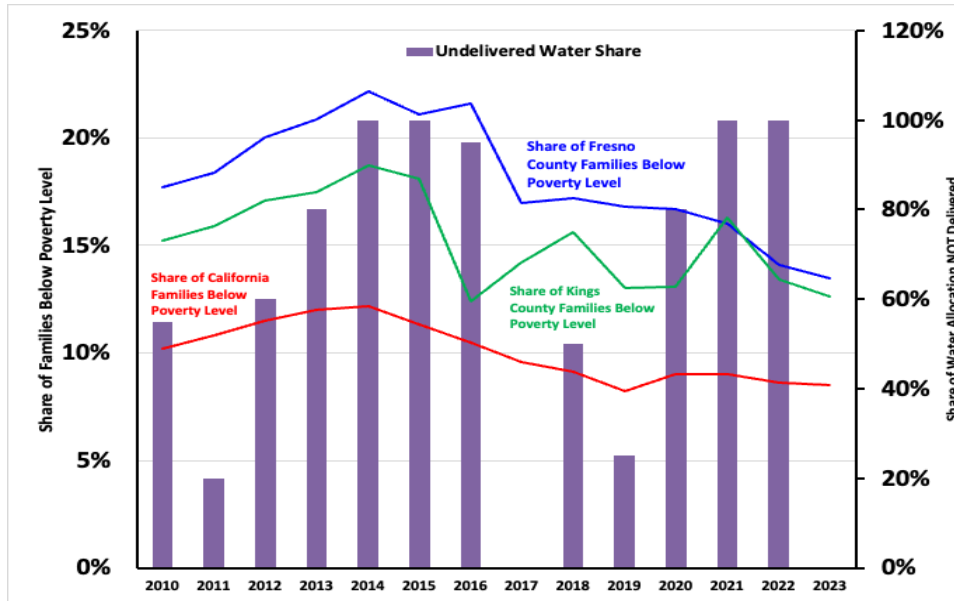


Source: [Healthy Fresno County Data](#)

Contextually, the region covered by the Westlands Water District is not wealthy, despite having a naturally welcoming endowment of resources ideally suited for agriculture. In fact, Fresno and Kings Counties are among some of the poorest in the state. Poverty and unemployment are already high. Substance abuse and domestic violence issues reflect the social pressure that communities in this area of the Central Valley navigate each day.

The divergence between the state and Fresno and Kings Counties' poverty rates is persistent over time. Figure 26 replicates and updates the diagram from the prior analysis showing the rough visual correlation between lost access to surface water and poverty rates in the two counties. The trend lines for the past few years continue the rough trend identified then wherein poverty rises in households in these two counties in the years when water allocations fall short of contracted amounts.

Figure 26—Percentage of Families with Incomes Below the Poverty Level, California, Kings and Fresno Counties, 2010-2023



SOURCE: US Bureau of the Census, American Communities Survey, Westlands Water District data. California Employment Development Department data.

These profiles are almost identical to those of five years ago. The bottom line is that both Fresno and Kings Counties continue to be heavily dependent on agriculture to fuel their local economies. Continued degradations in this sector will continue to grow the counties’ already-outsized poor populations and put increasing pressure on the social safety net and infrastructure of the region. While the thrust of assessing the potential risks of this dependence is left for others, they serve as a sobering context for the near future as this study delves deeper into the implications of fewer agricultural jobs.

WHAT ARE THE BROADER EFFECTS OF LESS WATER AVAILABILITY IN WESTLANDS WATER DISTRICT?

The clear and obvious answers are (1) less food, including fresh and healthy fruits, nuts and produce; (2) fewer work opportunities for particularly for lower income households in the region; (3) less general economic activity (including retailers, wholesalers, transportation companies, staffing companies); (4) fewer tax revenues for national and local governments; (5) fewer people living in the region; (6) fewer hospitals and schools; (6) fewer businesses and entrepreneurs; and (7) more people dependent on public support to live their lives. These are the direct, indirect and induced effects documented in the sections above.

There are many additional implications associated with the decreased availability of water within the Westlands Water District that are not as obvious in the analysis above, but which have been explored in the three prior economic studies prepared for the District. These include workforce development, economic opportunity, national security, the security of the U.S. food supply, environmental safety and worker protection. Each of these issues has been the focus of major portions of the three preceding economic impact studies prepared for the Westlands Water District. While this study will not duplicate these analyses, readers are encouraged to review these prior works—most of the issues and arguments raised within them are still actively relevant today. For this iteration of the economic impact analysis, the study team examines two additional considerations to deepen the reader’s understanding of the economic impact of the District. These include:

1. **the health consequences** of the increase in Valley Fever cases in region caused by the increasing levels of dust exposed by less watering and farming; and
2. the potential impacts of **increased bird strikes** caused by associated with crop composition changes and more concentrated (and fewer) watering opportunities for fowl.

PUBLIC HEALTH ANALYSIS: DECREASED AGRICULTURAL PRODUCTION IS CORRELATED WITH INCREASING CASES OF VALLEY FEVER

One of the most widespread public health concerns in California has been the growth of Valley Fever cases across the region. According to the Center for Disease Control (CDC), Valley Fever is:

“is a lung infection caused by *Coccidioides*, a fungus that lives in the soil. ... People can get Valley fever by breathing in the spores from *Coccidioides*. Some people breathe in the spores and never get sick. Valley fever causes typical lung infection symptoms like cough and fever. ... Valley fever does not spread from person to person or between people and animals.”⁷

Infection typically happens when individuals breathe in spores as part of wind-driven dust in dry areas, although the spores can also enter through open wounds on the skin when exposed to dust containing them.

Per the CDC, its symptoms resemble most other respiratory diseases like pneumonia. Symptoms can include fatigue, cough, fever, headache, shortness of breath, night sweats, muscle and joint pain and rashes. For most people, the symptoms will pass without major incident. For 5 to 10 percent of people, they will develop serious or long-term problems in their lungs and about 1 percent of those infected will see the infection spread from their lungs to other parts of the body, including their skin, bones, joints or brain.

For a small group of those infected by Valley Fever, the consequences can be life-threatening—for many others it can result in significant lost work, income and quality of life.

THE RELATIONSHIP BETWEEN WATER AVAILABILITY AND VALLEY FEVER

Wind-borne dust is the primary driver in the spread of Valley Fever. Its spread is predominantly airborne as the fungus spores are spread around a region by winds creating dust clouds as they pass over dry soils containing the fungal spores. Construction,⁸ recreational uses and agriculture have also been associated with this dust creation, although recent studies have found that the absence of agricultural activity is even more problematic.

Most recently, a team from the University of California at Merced showed that fallowed agricultural lands are the dominant source of human-generated dust in California.⁹ Not only was there a close correlation between dust levels and the share of agricultural land in fallow, but they found that the magnitude of the dust created increased in years of more severe drought, less

⁷ Center for Disease Control. *About Valley Fever (Coccidioidomycosis)*, April 24, 2024. Accessed June 24, 2025. <https://www.cdc.gov/valley-fever/about/index.html>

⁸ Laws, R., *et.al.*, “Coccidioidomycosis Outbreak Among Workers Constructing a Solar Power Farm — Monterey County, California, 2016–2017,” *Morbidity and Mortality Weekly Report*, August 24, 2018, Vol. 67, No. 33, pp. 931-934. accessed June 24, 2025. <https://www.cdc.gov/mmwr/volumes/67/wr/mm6733a4.htm>

⁹ Adebisi, A., *et.al.*, “Fallowed agricultural lands dominate anthropogenic dust sources in California,” *Communications Earth & Environment*, April 2025, Vol. 6:324. Accessed June 24, 2025. <https://www.nature.com/articles/s43247-025-02306-0.pdf>

irrigated land. The study used sophisticated mapping, computer and spectrographic equipment to disaggregate the various potential causes of dust in reaching their conclusion.

Given estimates by the some, including the [Public Policy Institute of California](#),¹⁰ that at least 500,000 acres across the Central Valley might have to be fallowed in response to the limitations created by the Sustainable Groundwater Management Act, there is a significant concern that this would lead to a growing number of Valley Fever infections statewide, and especially in regions like the Westlands Water District, where the fallowed acreage would be concentrated.

Another study from a team at the University of California, Berkeley¹¹ reached the conclusion that agricultural activity may reduce the presence of *Coccidioides* spores. They surveyed adjoining locations in a common area of the Central Valley and found that they could not detect spores on *any* of the farmed lands, but they found them in almost 40 percent of the undeveloped sites. While not definitive, the study pointed to the possibility that agricultural activity might have a suppressive impact on the proportion of *Coccidioides* spores found in dust during high wind months.

VALLEY FEVER IN THE WESTLANDS WATER DISTRICT REGION

Valley fever infections have been surging across the state. In 2001, there were 1,401 cases reflecting an infection rate of 4.3 cases per 100,000 people. This rose to 4,431 cases in 2010 with an infection rate of 11.9 cases per 100,000 people.¹² By 2020, this had almost doubled again to 7,252 cases reflecting an infection rate of 18.2 per 100,000 people¹³ and in 2022, the totals were 7,451 and an infection rate of 19.1 cases per 100,000 people.¹⁴ A regional analysis of infections in California from 2000 through 2018 found the condition to be most prevalent in the Central Valley, with infection rates as high as 90.6 per 100,000 people in the Southern San Joaquin Valley, and identified a 15-fold increase in the Northern San Joaquin Valley—loosely including the Westlands Water District and its environs.¹⁵

¹⁰ Ayres, A. *et.al.*, *Land transitions and Dust in the San Joaquin Valley: How Proactive Management Can Support Air Quality Improvements*, July 2022, accessed June 24, 2025. <https://www.ppica.org/publication/land-transitions-and-dust-in-the-san-joaquin-valley/>

¹¹ Wagner, R., *et.al.*, “*Coccidioides* undetected in soils from agricultural land and uncorrelated with time or the greater soil fungal community on undeveloped land,” *PLOS Pathogens*, May 25, 2023, Vol. 19, Issue 5. Accessed June 24, 2025. <https://pmc.ncbi.nlm.nih.gov/articles/PMC10246812/>

¹² California Department of Health, *Yearly Summaries of Selected General Communicable Diseases in California, 2001-2010*, p. 27.

¹³ California Department of Public Health, *Epidemiologic Summary of Valley Fever (Coccidioidomycosis) in California, 2020-2021*, p. 4.

¹⁴ California Department of Public Health, *Epidemiologic Summary of Valley Fever (Coccidioidomycosis) in California, 2022*, p. 5.

¹⁵ Sondermeyer Cooksey, G. *et.al.*, “Regional Analysis of *Coccidioidomycosis* Incidence, California, 2000-2018,” *Morbidity and Mortality Weekly Report*, December 4, 2020, Vol. 69 No. 48, pp. 1817-1821.

The infections were most common in populations who were likely to be in contact with dust and soil, and especially in windy settings. Studies have looked at infection rates among agricultural workers,¹⁶ solar power construction workers¹⁷ and wildland firefighters¹⁸ to name a few.

Figure 27—Water Allocation and Valley Fever Cases/Rate, Fresno and Kings Counties, 2001-2024

Water Year	CVP Allocation %	Fallowed Acres	Valley Fever Cases		Valley Fever Rate	
			Fresno County	Kings County	Fresno County	Kings County
2001	49%	73,802	55	37	6.7	27.9
2002	70%	94,557	73	46	8.8	34.2
2003	75%	76,654	142	51	16.8	36.8
2004	70%	70,367	130	73	15.1	51.2
2005	85%	66,804	331	128	38.0	88.5
2006	100%	54,944	665	233	78.0	158.0
2007	50%	96,409	400	138	44.5	91.8
2008	40%	99,663	323	185	35.4	121.8
2009	10%	156,239	489	204	52.9	134.4
2010	45%	131,339	724	386	77.8	252.3
2011	80%	59,514	735	375	78.0	247.5
2012	40%	112,755	483	242	50.9	161.6
2013	20%	131,848	314	108	32.9	72.2
2014	0%	220,053	164	78	17.0	52.5
2015	0%	218,112	280	104	28.8	70.0
2016	5%	179,784	614	235	62.8	159.2
2017	100%	146,275	834	273	84.6	183.3
2018	50%	148,320	645	173	64.9	114.5
2019	75%	158,103	625	220	62.4	145.0
2020	20%	190,972	449	157	44.6	103.2
2021	0%	211,920	410	169	40.6	111.5
2022	0%	227,563	448	168	44.3	111.0
2023	100%	211,678	567	269	55.8	176.6
2024~	50%	203,678	1,042	469		

SOURCE: Reported for Fresno and Kings Counties by California Public Health Department, <https://www.cdph.ca.gov/Programs/CID/DCDC/pages/Coccidioidomycosis.aspx>, accessed June 1, 2025.

¹⁶ McCurdy, Stephen. *Risk factors for Valley fever among Hispanic California farmworkers*, December 15, 2020, accessed June 24, 2025. <https://health.ucdavis.edu/news/headlines/risk-factors-for-valley-fever-among-hispanic-california-farmworkers/2020/12>

¹⁷ Wilken, J., *et al.*, “Coccidioidomycosis among Workers Constructing Solar Power Farms, California, USA, 2011-2014,” *Emerging Infections Diseases*, November 2015, Vol. 21, No. 11, pp. 1997-2005.

¹⁸ Laws, R. *et al.*, “Coccidioidomycosis outbreak among inmate wildland firefighters: California, 2017,” *American Journal of Industrial Medicine*, November 2021, Vol. 64, pp. 266-273.

Figure 27 shows the history of Valley Fever infections in Fresno and Kings Counties from 2001 through 2024. The counties reflect the broader, growing rates of infection seen statewide, with current rates far dwarfing the much lower rates seen in the early 2000s. Additionally, with the expected increases in fallowed land likely to emerge in the wake of the implementation of SGMA, these infection rates are expected to continue to grow.

Unlike the comparisons with bird strikes, there are no obvious correlations between water availability and infection rates at the lowest level. The data in Figure 27 do reflect a pattern that has been observed in other regions, specifically that infection rates do seem to pause during drought years and then surge in the years immediately following. There are multiple hypotheses for why this might happen. A paper published in *The Lancet Regional Health-Americas* proposes that dry years allow the heartier *Coccidioidomycosis* spores to outlast competing organisms and to disperse broadly and, when moisture returns, it surges in the absence of competition. Others propose that the dry years also suppress rodent populations and, because dead rodents serve as a key source of nutrients for the fungus, infections surge when these populations surge in the ensuing wetter years. Still others associate the infection rates with the prospect that people are more likely to wear masks and other protection during the dry years when dust is readily abundant and then remove those coverings when it is wetter giving the fungus access to more growing spaces in their lungs.¹⁹ Whatever the driving dimension, this pattern appears to be consistent both over time and across regions. With more land sitting idle and un-irrigated-not just during drought but due to long-term fallowing-these effects are likely to be amplified.

Research shows that drought impacts the number of new Valley fever cases in California because drought, or lack of irrigation, affects how the Valley fever fungus lives and grows in the soil. During dry conditions and drought, the Valley fever fungus can survive in the soil, even when other microbes and organisms are killed off by lack of water. During a drought, fewer people get infected by the Valley fever fungus because the fungus is believed to be inactive in the soil. But when rain or irrigation returns, the Valley fever fungus can grow again, spreading spores in dirt and outdoor dust that people can breathe in, making them sick. Overall, drought increases the number of Valley fever cases in California in the years following a drought and may allow for the Valley fever fungus to grow in the soil in more areas of California. More droughts in California may lead to an increase in Valley fever in more areas of the state.

The switch between dry conditions in the soils during a drought and rainy winters following a drought creates the right conditions for the Valley fever fungus to thrive. **Historically, cases of Valley fever in California have been lowest during years of drought and highest during years immediately after a drought.**

¹⁹ Heaney, A. *et.al.*, “Coccidioidomycosis seasonality in California: a longitudinal surveillance study of the climate determinants and spatiotemporal variability of seasonal dynamics, 2000-2021,” *The Lancet Regional Health Americas*, August 2024, Vol. 38, accessed June 24, 2025, [https://www.thelancet.com/journals/lanam/article/PIIS2667-193X\(24\)00191-1/fulltext](https://www.thelancet.com/journals/lanam/article/PIIS2667-193X(24)00191-1/fulltext).

IN-DEPTH ANALYSIS: HOW WATER POLICIES MAY EXACERBATE AN INCREASE IN BIRD STRIKE EVENTS

An emerging issue as development has overlapped with rural lands has been the frequency of instances of birds striking operating aircraft (“bird strikes”). Naval Air Station Lemoore (NASL) is an important presence in the region (Westlands Water District provides the conveyance infrastructure for supplying their water needs) and a major contributor to the local economy.²⁰ When a major center of flight operations is located in the heart of agricultural lands, the probability of animal/aircraft collisions rises significantly. However recent policy and climatological patterns have had a marked impact on their frequency.

THE SCOPE OF THE AVIATION AND AGRICULTURAL OPERATIONS AT LEMOORE NAVAL AIR STATION

NASL is a key part of the U.S. defense readiness posture. According to their official website, the base is home to:

- More than half of the U.S. Navy’s F/A-18E/F Super Hornet aircraft,
- All the U.S. Navy’s F-35C Lightning II aircraft,
- 16 operational Strike Fighter squadrons,
- 2 Fleet Replacement squadrons,
- 1 Search and Rescue squadron, and
- 4 Carrier Air Wing Commands including CVW-2 (*USS Carl Vinson*), CVW-9 (*USS Abraham Lincoln*), CVW-11 (*USS Theodore Roosevelt*) and CVW-17 (*USS Nimitz*).

NASL serves as a major training and operations hub and is one of three “master jet bases” supporting the aviation operations of the United States Navy.²¹ In this role it is a concentrated source of aviation activity with some 210,000 “flight operations” happening at the base each year as it supports the six aircraft carriers assigned to the Pacific Fleet.

Surrounding this aviation operation are approximately 20,000 acres of federally-owned land. According to the base’s [Environmental Support](#) information page, the majority of this land (11,500 acres) is leased out to local farmers for agricultural purposes on five-year leases. This program raises approximately \$1 million per year in rents.²² According to the Navy,

²⁰ Note that this analysis does not include this indirect value in its estimate of economic impact even though the District’s infrastructure enables the base’s functional presence. This reflects the presumption that other arrangements could be made to supply the base if needed but it is worth noting that Westlands plays a critical role for both this base and the neighboring city. [Per their own analysis](#), NAS Lemoore generated \$947 million of economic value and 8,500 jobs in 2019.

²¹ The other two master jet bases are Naval Air Station Oceana in Virginia Beach, Virginia and Naval Air Station Whidbey Island in Whidbey Island, Washington.

²² This is one of the largest lease-out programs under the direction of the U.S. Navy.

“Agricultural activities, natural grass and brush areas, and approximately 400 acres of wastewater treatment ponds at NAS Lemoore attract and support more than 124 species of animals including 3 reptiles, 3 amphibians, 12 mammals and 106 birds. Include in this list are several federally protected species.”

Surrounding the base more broadly, are thousands of acres of agricultural land that characterize the geography of Kings County which has attracted its own populations of animals and birds. Having nature and aircraft operations in proximity leads to occasional interactions between the two—usually fatal to the animal or bird and sometimes damaging to the aircraft.

The interaction between birds and aircraft is not a new phenomenon. Airports are often located away from residential and commercial areas of cities and communities to limit their safety, noise and pollution impacts on local communities and, when possible, are often located near bodies of water to simplify takeoff and landing approaches. The empty lands around airports are often earmarked for other operations that occur away from urban development, such as landfills, wastewater treatment and agricultural purposes. In each of these cases, these co-locating uses can affect the type and number of animals and birds present. The FAA has developed extensive rules governing wildlife hazard management in [Part 139](#) of the Federal Aviation Regulations. There are specific best practices around mitigating these risks which are observed at NASL and other airports.

HOW REDUCED WATER AVAILABILITY AMPLIFIES BIRD STRIKE RISKS

In a [2014 interview](#), Mark Stack, the U.S. Navy Airport Manager at NASL explained, “The potential for bird strikes exists and typically happens during these increased drought years.” When there is less water available, farmers plant fewer crops overall. This leads to larger parcels of land left fallowed which in turn leads to larger rodent populations. As a U.S. Navy [Request for Information](#) issued in February 2024 explained, “active cultivation of these farming operations has been critical in reducing bird air strikes, as the periodic discing and turning of soil reduces the bird population by frustrating the ground prey base.” When the fields are not planted, rodents become established in fallowed fields and attract raptors who feed on them. Furthermore, these raptors tend to be larger birds which increases their ability to inflict damage on an aircraft engine. Suppressing these rodent populations is one of the primary motivators for NASL’s agricultural land leasing program. While this leasing program is critical for the base’s overall risk management strategy, it is also important to note that fallowed land in the privately-held acreage surrounding the base also increases during low-water availability years and leads to increased bird activity overall.

To provide a sense of scale, during a dry year in 2014, approximately 80 percent of the land in the Navy’s lease program sat fallow²³ and it was a relatively high year for bird strikes at NASL. Using unofficial bird strike data obtained from NASL, Figure 28 shows the relationship between surface water availability through the CVP and reported bird strikes over the past 24 years. With a few small exceptions, there is a clear inverse relationship between water availability and the

²³ Romero, Ezra, *In Lemoore, Drought Poses a Threat to Navy Jets*, KVPR-TV broadcast news story, February 11, 2014, accessed May 31, 2025. <https://www.kvpr.org/environment/2014-02-11/in-lemoore-drought-poses-a-threat-to-navy-jets>.

number of bird strikes—the more water availability, the fewer bird strikes. Note that the “WWD Fallowed Acres” listed in the table are for all of Westlands Water District and not for the U.S. Navy leasing program. The specific acreage lying fallow under the Navy program is the “NASL Unfarmed Acres” column, for which data is unavailable for all years.

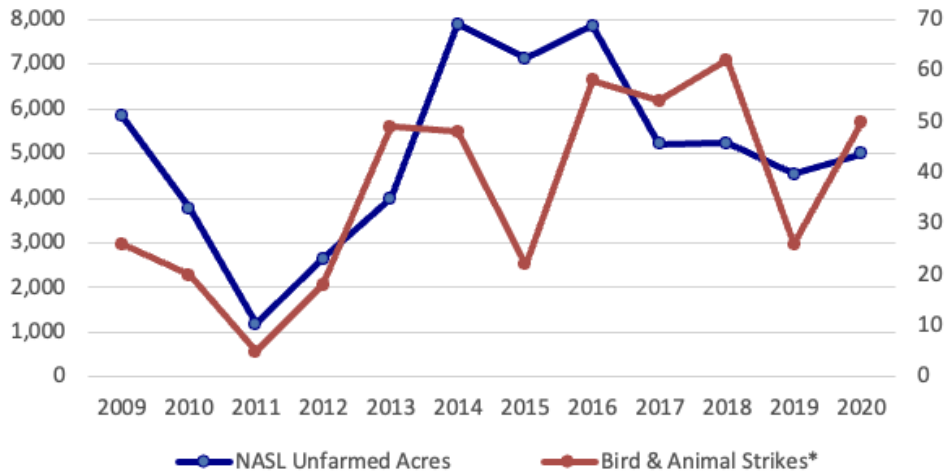
Figure 28—Water Allocation and Bird/Animal Strikes, Lemoore Naval Air Station, 2001-2020

Year	CVP Allocation %	WWD Fallowed Acres	NASL Unfarmed Acres	Bird & Animal Strikes*
2003	75%	76,654		2
2004	70%	70,367		4
2005	85%	66,804		7
2006	100%	54,944		6
2007	50%	96,409		15
2008	40%	99,663		21
2009	10%	156,239	5,861	26
2010	45%	131,339	3,768	20
2011	80%	59,514	1,190	5
2012	40%	112,755	2,654	18
2013	20%	131,848	3,990	49
2014	0%	220,053	7,897	48
2015	0%	218,112	7,128	22
2016	5%	179,784	7,860	58
2017	100%	146,275	5,219	54
2018	50%	148,320	5,234	62
2019	75%	158,103	4,543	26
2020	20%	190,972	4,998	50

SOURCE: Unofficial totals reported by Lemoore Naval Air Station and Westlands Water District Data.

Figure 29 presents the two key variables in this table over time, showing the relationship between the unfarmed (and hence untilled) land near the runways at NASL and the instances of animal/bird strikes. As can be seen here, the trends lines do move together over time, supporting the idea that the incidence of animal/bird strikes are less frequent in years when the land is in use or, alternatively, when the unavailability of water makes it harder to farm on this land, the likelihood of bird strike incidence rises significantly.

Figure 29—Bird/Animal Strikes and Unfarmed Acreage, Lemoore Naval Air Station, 2009 - to 2020



SOURCE: Unofficial totals reported by Lemoore Naval Air Station and Westlands Water District Data.

THE ECONOMIC IMPLICATIONS OF WATER AVAILABILITY ON BIRD STRIKE RISKS

The economic implications of these strikes are real. Typically fatal for the bird, a bird strike can significantly damage or, in the exceptional instances, destroy a multi-million-dollar aircraft and endanger the life of a hard-to-replace pilot into whom the Navy has invested at least \$10 million.²⁴ The actual damage of each instance is specific to the incident. On October 2, 2019, for example, a single bird damaged a single engine on a Navy E-6B Mercury communications plane and did \$2 million in damage.²⁵ The plane itself was worth \$141.7 million.

The aircraft stationed at NASL represent major investments by the American taxpayer with each F/A-18 Super Hornet costing approximately \$70 million²⁶ and each F-35C Lightning II costing more than \$117.3 million.²⁷ While most bird strikes result in less than a total loss, a *Military Times* analysis of bird strikes data from 2011 to 2017 estimated the cost to the U.S. Navy at \$64.8 million. The U.S. Air Force faced a cost of \$182 million for the same period.²⁸ A

²⁴ Prasad-Rao, J. *et al.*, “Attrition Risk and Aircraft Suitability Prediction in U.S. Navy Pilot Training Using Machine Learning,” *Aerospace*, April 2023, Volume 10, Issue 4, id:379.

²⁵ “A bird struck a Navy ‘doomsday plane.’ It caused missions in damage.” *Washington Post*, October 18, 2019. Accessed June 24, 2025. <https://www.washingtonpost.com/nation/2019/10/18/navy-doomsday-plane-bird-strike-eb-mercury/>

²⁶ According to the Naval Air Systems Command information page on the F/A-18E/F Super Hornet. Accessed June 24, 2025. <https://www.navair.navy.mil/product/FA-18EF-Super-Hornet>

²⁷ Center for Arms Control and Non-proliferation, *F-35 Joint Strike Fighter: Costs and Challenges*, July 2021. Accessed June 24, 2025. <https://armscontrolcenter.org/f-35-joint-strike-fighter-costs-challenges/>

²⁸ Insinna, V. “Wildlife strikes add to Air Force and Navy’s mishap count,” *Military Times*, April 13, 2018. Accessed June 24, 2025. <https://www.militarytimes.com/news/your-military/aviation-in-crisis/2018/04/14/wildlife-strikes-add-to-air-force-and-navys-mishap-count/>

December 2018 [Department of Defense report](#) pegged the total cost for the years 2007 to 2016 at \$251 million for the U.S. Air Force and \$119 million for the U.S. Navy.²⁹

The relative infrequency of these incidents belies the reality that when they do happen, they can be severe and consequential, possibly even resulting in the loss of human lives. As can be seen in Figure 28, when surface water is less available, there can be as much as a 30-fold increase in incident frequency. While the Navy has been proactive and creative (see [this story](#) from the U.S. Fish and Wildlife Service about relocating burrowing owls³⁰) in finding solutions to the mitigate the risks, these actions cannot overcome the risks generated by placing tens of thousands of acres into fallow when surface water is not available and groundwater access availability is limited.

CONCLUSION

The footprint of the Westlands Water District on the Fresno region, the Central Valley, the state of California, and the nation is undeniable. Farms in Westlands are a significant supplier to the nation and the world of fresh produce and agricultural products. In the production of that supply, it directly and indirectly employs and supports tens of thousands of households and creates billions of dollars of economic value. While there are a range of modern policy and economic crises that may influence the level of that production, there are no real domestic alternatives to the region for production of these critical agricultural products.

²⁹ Department of Defense Natural Resources, *Bird/Wildlife Aircraft Strike Hazard (BASH): Supporting a Safer Mission through Avian Management and Conservation*, December 2018. Accessed June 24, 2025.

https://www.denix.osd.mil/dodpif/denix-files/sites/37/2020/07/DoD-PIF-BASH-Factsheet_508.pdf

³⁰ Handron, J. *Solving the unsolvable: Wise conservation solution protects owls and aviators at NAS Lemoore*. September 7, 2019, accessed June 24, 2025. <https://www.fws.gov/story/2017-09/solving-unsolvable>

APPENDIX A. METHODOLOGY FOR ESTIMATING THE ECONOMIC IMPACT OF THE WESTLANDS WATER DISTRICT

To estimate the economic impact of the Westlands Water District, this analysis will look at three components of its role in the local economy: (1) the economic value of the crops produced by the farmers who use its water and water infrastructure; (2) the economic value associated with the secondary markets that take these crops to their ultimate market destination; and (3) the economic value of the goods and services directly purchased by the District to provide the water infrastructure and services incumbent in its mission and business model. Each of these components is analyzed and aggregated to provide an overall impact.

To estimate the economic impact of the three areas listed above, the primary economic value of each of the activities was inputted into the IMPLAN[®] economic modeling program. IMPLAN is the industry standard for providing economic impact analyses of specific activities. It is an “input-output” type simulation model that uses detailed economic data to calibrate its estimates of the subsequent impacts of various economic and policy-related activities. It breaks the economy down into approximately 400 sectors and uses detailed coefficient matrices to estimate the dynamic effects of policy choices through multiple iterations of impacts.

BUILDING THE IMPLAN MODEL

IMPLAN requires breaking the policy or impact to be analyzed into specific activities that fit its framework of sectors. With these inputs the model then provides the detailed impacts on employment, total economic output, proprietor income, labor income, and government tax revenues.

Generally, there are four steps to building these models: (1) defining the geography for the modeling; (2) breaking the policy or entity’s impact into the requisite model sectors; (3) inserting them into the model; and (4) assembling and interpreting the results from the many scenarios.

For purposes of this analysis, Fresno County-level data were used to assess the economic impacts. Similar models were constructed using census tract-delineated boundaries for the District and building separate models for both the Fresno and Kings County components of the Westlands Water District; however, those results are excluded here because adding the complexity associated with each did not materially affect the findings, presented here, using the Fresno County-based model. Crop acreage data were combined with the most recent available valuation information published in the Fresno County *2022 Annual Crop & Livestock Report*³¹ to estimate crop values. Industry-specific studies of Secondary Agricultural Production levels were reviewed in combination with geographically-generated estimates from the IMPLAN model’s

³¹ It should be noted that while the 2020 Kings County crop report was available to the author, the narrow range of crops detailed there limited its usefulness for building the models. COVID-19-related issues delayed the availability of the Fresno County Annual Crop Report, thereby limiting our ability to properly value and model the most recent acreage data available from 2020. Some sensitivity around this question will be provided later in this section.

2022 data to create the requisite estimates of Secondary Agricultural Production valuations. Finally, sensitivity analyses were prepared for each to ensure that the uncertainty around each estimate did not materially reverse any of the findings presented here.

DATA AVAILABILITY

In preparing this economic impact analysis, data from the 2022 agricultural year were used to estimate the economic impacts described in this report. Preliminary crop acreage data for the 2023 crop year were available at the time this analysis was prepared. To assess the robustness of the results, these available data were compared to the year used in this analysis. Figure A.1 shows a comparison of the data for acres grown by crop type in the Westlands Water District for the 2022 and 2023 crop years.

Figure A.1—Comparison of Acreage Planted in the Westlands Water District, 2022 and 2023

Sector	2022	2023
Oilseed farming	45	1,724
Grain farming	10,418	30,574
Vegetable and melon farming	77,157	88,927
Fruit farming	24,690	22,846
Tree Nut farming	197,572	177,746
All other crop farming	22,581	37,058
Total Acres Planted	332,463	358,875

SOURCE: Westlands Water District data.

Figure A.1 shows that there was an eight percent increase in the acreage planted between 2022 and 2023, with the increases in the planted acreage of all types of crops except Tree Nut and Fruit farming. This 8 percent increase in planted acreage is very modest given that 2023 was a particularly wet year and the District went from receiving 0 percent of its contractual allocation in 2022 to 100 percent of its contractual allocation in 2023. Even when accounting for the pumping of groundwater to offset surface water unavailability in 2022, overall water availability rose by more than 50 percent. These patterns offset to some extent, although they do have implications for the crop valuation estimates used elsewhere in the analysis.

The bottom line is that we believe that the estimates using the available data that are included in this analysis will fairly represent a reasonable estimate of the current economic footprint of the Westlands Water District.

APPENDIX B. SURVEY AND FOCUS GROUP RAW RESULTS FOR FRESNO AND KINGS COUNTY

FOCUS GROUP AND SURVEY METHODOLOGY AND PRIMARY DATA

SOURCES

To “tell the story” of the impacts of reduced water allocation, land retirement, and unemployment on workers and their families within the Westlands Water District (WWD), we have collected survey data from throughout the WWD geographic area through two different instruments (one long survey with mostly closed-ended questions and one brief survey with more open-ended questions). In addition, we engaged in and collected comments through focus groups with individuals residing within the designated area of Western Fresno County.

Below is a brief description of the three primary data sources for the findings presented in this report. Any secondary data sources utilized are noted through in-text citations with links to those sources and serve to supplement, contextualize, and/or corroborate primary source data.

1. A brief survey conducted in Western Fresno County communities as part of the focus groups and outreach for Rural Communities Rising³² between August 12 and February 28, 2024 (485 responses)
2. An extensive online survey conducted in Huron, CA (93234) as part of the Advancing Fresno County Guaranteed Income (GI) Project* between July 2 and August 28, 2024 (110 responses)
3. Focus group with 8 mothers participating in the Advancing Fresno County Guaranteed Income (GI) Project in Huron on July 13, 2024. The eligibility requirements to participate in this Advancing Fresno County Guaranteed Income Project in Huron are as follows:
 - 18 or older
 - live in 93234 zip code
 - have at least one child aged 0-5 or are pregnant
 - household income not exceeding area median income (\$35,103 in 93234)

³² Rural Communities Rising is a 501c3 nonprofit community benefit organization and its mission is “to connect residents in rural, Western Fresno County in order to organize, build community power, and secure the health, well-being and economic benefits our communities deserve.”

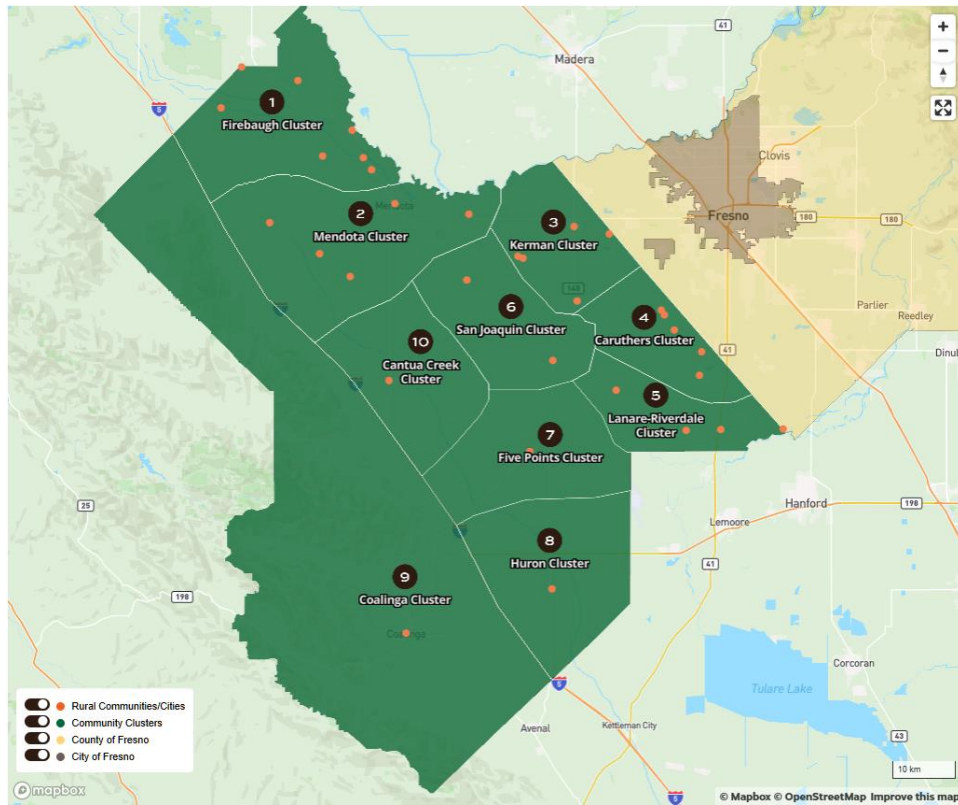
DESCRIPTION OF THE SAMPLES

BRIEF SURVEY & FOCUS GROUPS CONDUCTED IN WESTERN FRESNO COUNTY COMMUNITIES

485 responses (Location, # of responses, percentage of total)

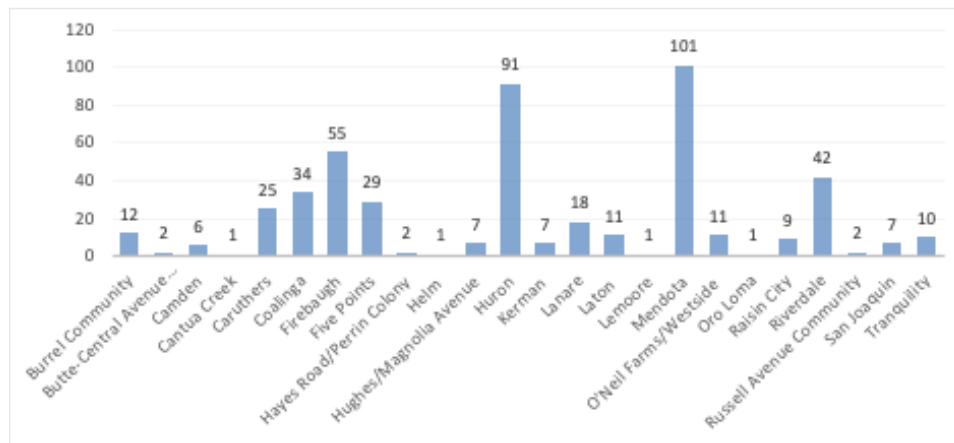
- Burrel Community (12) – 2.5%
- Butte-Central Ave Neighborhood (2) – 0.4%
- Camden (6) – 1.2%
- Cantua Creek (1) – 0.2%
- Caruthers (25) – 5.2%
- Coalinga (34) – 4.0%
- Firebaugh (55) – 11.3%
- Five Points (29) – 6.0%
- Hayes Road/Perrin Colony (2) – 0.4%
- Helm (1) – 0.2%
- Hughes/Magnolia Avenue (7) – 1.4%
- Huron (91) – 18.8%
- Kerman (7) – 1.4%
- Lanare (18) – 3.7%
- Laton (11) – 2.3%
- Lemoore (1) – 0.2%
- Mendota (101) – 20.8%
- O'Neil Farms/Westside (11) – 2.3%
- Oro Loma (1) – 0.2%
- Raisin City (9) – 1.9%
- Riverdale (42) – 8.7%
- Russell Ave Community (2) – 0.4%
- San Joaquin (7) – 1.4%
- Tranquility (10) – 2.1%

Figure B.1—Map of Western Fresno County Clusters



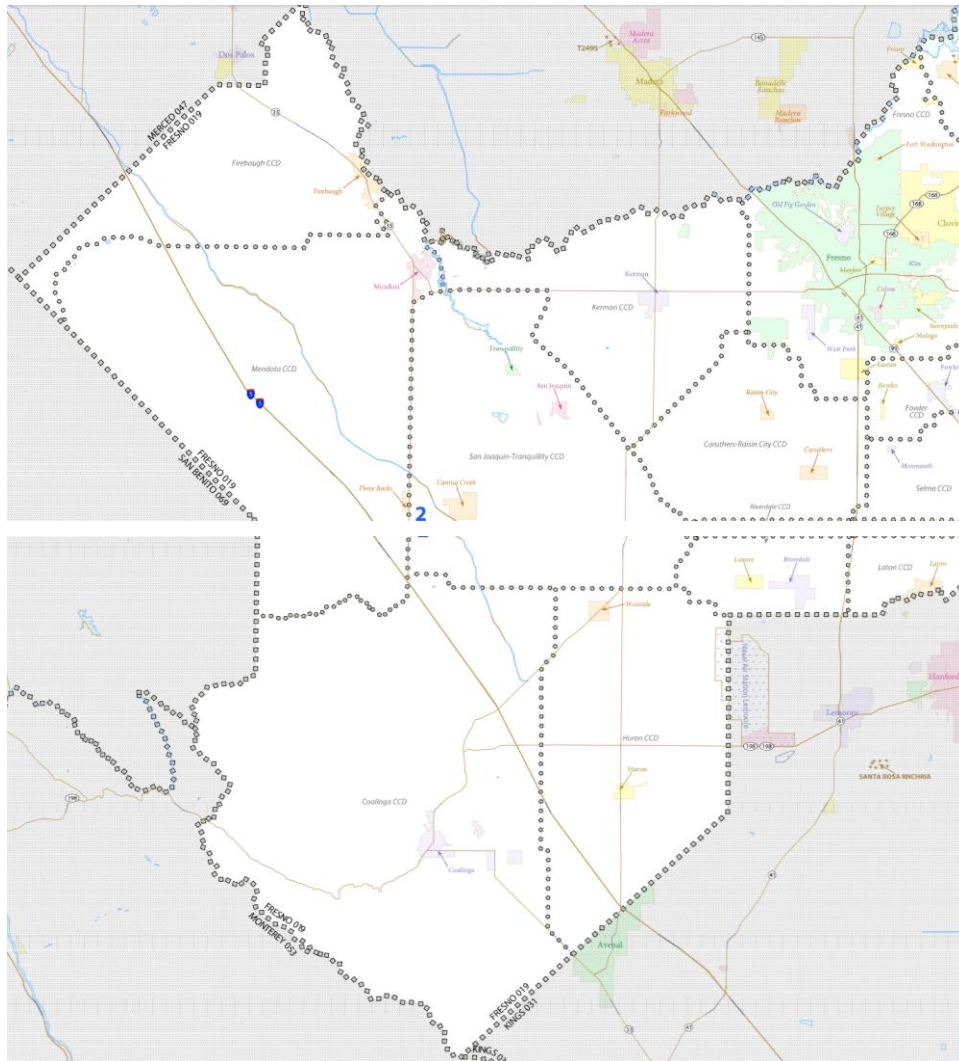
Source: Rural Communities Rising.

Figure B.2—Number of Survey Respondents by City/Town of Residence



Based on 485 respondents.

Figure B.3—2020 Census Tract Reference Map



Source: U.S. Census *Note: Additional demographic profiles available for each Census Tract via Census Reporter.

EXTENSIVE ONLINE SURVEY & FOCUS GROUP CONDUCTED IN HURON, CA

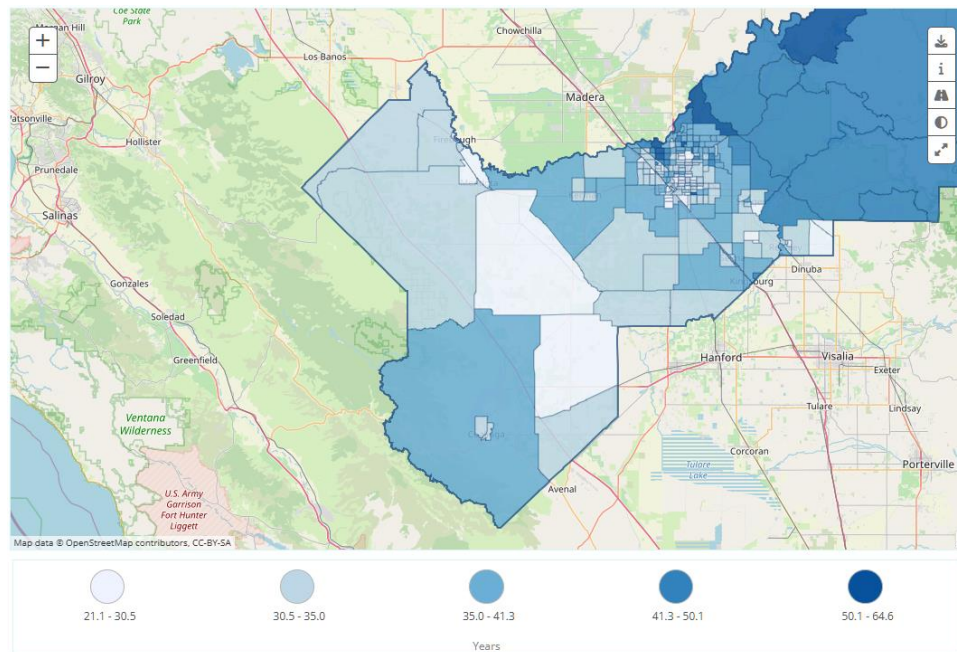
TOTAL SAMPLE: 110 responses (61 participants in the GI Project; 49 nonparticipants)

SURVEY LANGUAGE: 61 surveys completed in Spanish; 49 completed in English

AGE: Participants ranged in age from 19 to 47 with an average age of 32

Figure B.4 shows the median age throughout Western Fresno County, ranging from 25.9 and 33.7 in Census Tracts # 83.03 and # 83.04 in Mendota to 37.4 in Census Tract # 79.03 in Coalinga, within the Westlands Water District. That means half of all residents in the latter census tract in Mendota are younger than 33.7 years old and half of all residents are older than 33.7 years. The relatively young population of residents suggests a significant “stake” for families in the future of this region.

Figure B.4—Median Age, Fresno County, 2023



Source: Healthy Fresno County Data

Figure B.5—Demographics of Huron Sample Gender, Huron

Gender		
Male	8	7%
Female	100	93%
Total	108	100%

Employment Status		
Unemployed (seeking)	39	36%
Unemployed (disabled)	10	9%
Not employed (not looking)	10	9%
Employed (part-time)	29	27%
Employed (full-time)	20	19%
Total	108	100%

Ethnicity		
White, Non-Hispanic	11	10%
Hispanic	90	83%
African American	6	6%
American Indian	1	1%
Total	108	100%

Marital Status		
Never married	63	59%
Married	27	25%
Separated	14	13%
Divorced	2	2%
Widowed	1	1%
Total	107	100%

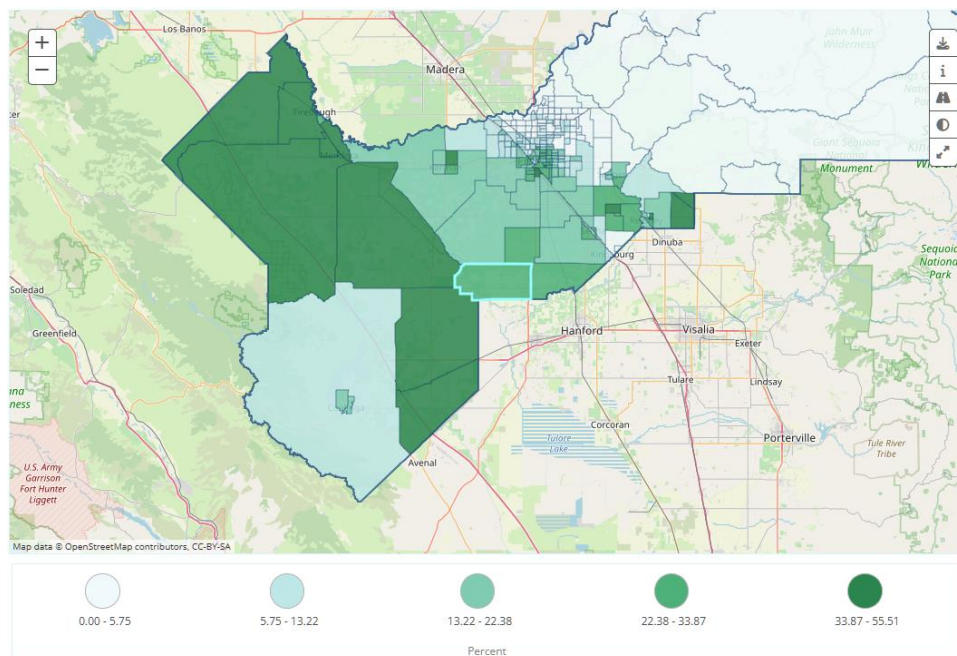
Educational Attainment		
BA/BS degree	2	2%
AA/AS degree	7	6%
Some College	19	18%
High school graduate	36	33%
Some high school	8	7%
Less than high school	36	33%
Total	108	100%

Housing Status		
Live in a motel	1	1%
Rent a room	4	4%
Rent an apartment or home	97	90%
Own home	1	1%
Neither own nor rent	5	5%
Total	108	100%

Huron sample includes 108 respondents.

- Figure B.7 shows the percentage of adults ages 25 and over with less than a 9th-grade education, ranging from 11.84% in Census Tract # 79,03 in Coalinga to 29.2% in Census Tract # 77.00 in the Lanare-Riverdale Cluster to 55.51% in Census Tract # 83.03 in Mendota, within the Westlands Water District. The relatively lower educational attainment of residents suggests the potential for significant re-skilling for future employment opportunities.

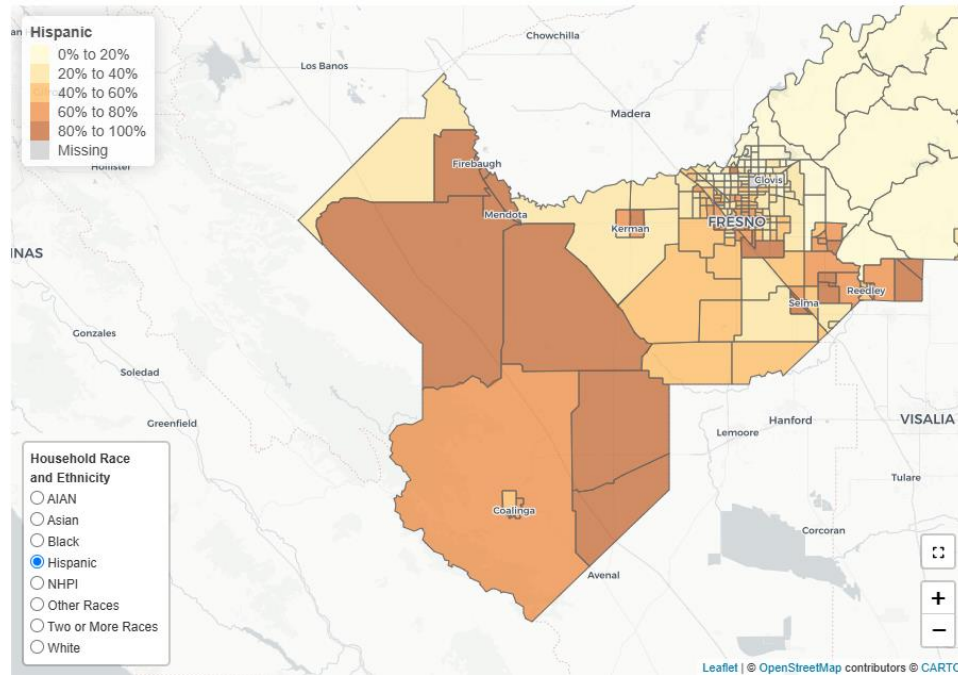
Figure B.7—Population Age 25+: Less than 9th Grade Education, Fresno County, 2023



Source: [Healthy Fresno County Data](#)

Figure B.8 reveals the homeownership rates among Hispanics in Western Fresno County, ranging from 59.84% within the Lanare-Riverdale Cluster to 100% within Census Tract #83.01 (in Mendota) Cluster, within the Westlands Water District.

Figure B.8—Homeownership among Hispanics, Fresno County, 2022



Source: [Healthy Fresno County Data](#)

Figure B.9 reveals the median years of residential tenure among homeowners and renters in Western Fresno County, ranging from 6 years in the Huron Cluster to 14 years in the Lanare-Riverdale Cluster, within the Westlands Water District.

That means half of all households in the Lanare-Riverdale Cluster have moved into their housing unit within the past 14 years, and half of households have lived in their housing unit for more than 14 years. The relatively high rates of homeownership and long rates of residential tenure suggest a significant “stake” residents have in the future of this area.

Figure B.9—Median Number of Years Residents have lived in their Home, Fresno County, 2022

