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Water and the Future of the San Joaquin Valley

Technical Appendix F: Leveraging USDA Programs to Promote Groundwater Sustainability in the San Joaquin Valley

Jelena Jezdimirovic, Ellen Hanak

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Summary

The San Joaquin Valley—California’s largest agricultural region—has a large groundwater deficit, declining groundwater quality, and a growing number of vulnerable and endangered species. As the valley embarks on a multi-year effort to reduce its long-term groundwater overdraft under the state’s new Sustainable Groundwater Management Act (SGMA), financial and technical assistance from the state and federal governments will be critical for success. In the western United States, the US Department of Agriculture (USDA) is an important source of federal funding to address water- and drought-related challenges. In this report, we look in greater detail at recent USDA funding in the San Joaquin Valley.

Four offices within USDA are the principal providers of support to the valley. Water infrastructure for rural communities is provided by the Rural Utilities Service (RUS); agricultural disaster assistance is provided by the Risk Management Agency (RMA) and the Farm Service Agency (FSA); and resource stewardship assistance is provided by the FSA and especially the Natural Resources Conservation Service (NRCS).

Drawing on an analysis of recent spending patterns and conversations with program managers and stakeholders, we summarize program contributions and suggest additional opportunities to foster drought resilience and sustainable groundwater management in this region. We focus on three broad areas of water- and drought-related funding:

- **Rural water infrastructure:** Many of the valley’s communities have challenges in providing safe drinking water, reflecting both water quality and supply problems. During the latest drought USDA emergency funds were used in several San Joaquin Valley counties to restore drinking water supplies to disadvantaged communities. Yet the overall level of support in the valley seems to be below potential, in light of the long-term safe drinking water issues in the region. Efforts to strengthen the complementarity between USDA and state programs could help.
- **Farm disaster assistance:** USDA disaster assistance includes crop insurance and livestock disaster assistance. It is an important source of financial support for California and valley agricultural producers, and was crucial during the latest drought. These programs will continue to play an important role during future droughts and other disasters. But their respective roles may shift in response to increasing water scarcity as valley farmers implement SGMA. For instance, since pumping reductions are anticipated as part of groundwater sustainability plans, it is unlikely that crop insurance will be a mechanism for hedging future water scarcity risk. In contrast, programs that support the livestock sector—including crop insurance for non-irrigated pasture and rangeland and FSA disaster assistance for grazing losses—could help farmers hedge the risks of transitioning some lands out of irrigation.
- **Resource stewardship:** California and the valley already receive significant funding for resource stewardship on farms and ranches. Most funding is focused on establishing more efficient irrigation systems and replacing old diesel engines on farms. A much smaller share of funds in California—and barely any in the valley—has gone toward temporary or permanent easements to manage lands for conservation purposes or to protect agricultural land from development. USDA’s resource stewardship programs could potentially support on-farm recharge as well as efforts to steward lands that are transitioning out of irrigation to bring basins into balance. Some changes in program rules could help—such as NRCS authorization of groundwater depletion as a resource concern to more easily support recharge efforts.

Making the most of these programs will require valley growers and their partners at the local and state levels—including water managers, nonprofits, and state agencies such as the Department of Food and Agriculture and the Department of Water Resources—to work with USDA to articulate a shared vision for tackling the new challenges at hand.

ACRONYMS

ACEP	Agricultural Conservation Easement Program, Natural Resources Conservation Service	NRCS	Natural Resources Conservation Service
AGI	Adjusted Gross Income	NRWA	National Rural Water Association
AMA	Agricultural Management Assistance, Natural Resources Conservation Service	PPG	Predevelopment and Planning Grants, Rural Utilities Service
AWEP	Agricultural Water Enhancement Program, Natural Resources Conservation Service	RBCS	Rural Business–Cooperative Service
CA	California	RCPP	Regional Conservation Partnership Program, Natural Resources Conservation Service
CAT	crop insurance catastrophic coverage	RD	Rural Development, US Department of Agriculture
CIG	Conservation Innovation Grants, Natural Resources Conservation Service	RHS	Rural Housing Service
CREP	Conservation Reserve Enhancement Program, Farm Service Agency	RLF	Revolving Loan Funds, Rural Utilities Service
CRP	Conservation Reserve Program, Farm Service Agency	RMA	Risk Management Agency
CSP	Conservation Stewardship Program, Natural Resources Conservation Service	RUS	Rural Utilities Service
DAC	disadvantaged community	SDAC	Severely Disadvantaged Community
ECWAG	Emergency Community Water Assistance Grants, Rural Utilities Service	SEARCH	Special Evaluation Assistance for Rural Communities and Households, Rural Utilities Service
ELAP	Emergency Assistance for Livestock, Honeybees, and Farm-Raised Fish, Farm Service Agency	SGMA	Sustainable Groundwater Management Act
EQIP	Environmental Quality Incentives Program	SJV	San Joaquin Valley
EWP	Emergency Watershed Protection, Natural Resources Conservation Service	SNAP	Supplemental Nutrition Assistance Program
FSA	Farm Service Agency	SURE	Supplemental Revenue Assistance Payments, Farm Service Agency
FWP	Farmable Wetlands Program, Farm Service Agency	TAT	Technical Assistance and Training Grant, Rural Utilities Service
FY	fiscal year	US	United States
GDP	gross domestic product	US GAO	US Government Accountability Office
GRP	Grassland Reserve Program, Farm Service Agency	USDA	US Department of Agriculture
LFP	Livestock Forage Program, Farm Service Agency	WHIP	Wildlife Habitat Incentive Program, Natural Resources Conservation Service
LIP	Livestock Indemnity Program, Farm Service Agency	WRP	Wetlands Reserve Program
NAP	Noninsured Assistance Program, Farm Service Agency	WTO	World Trade Organization

Introduction

In the western United States, the US Department of Agriculture (USDA) is an important source of federal funding to state and local partners to address water- and drought-related challenges. In 2014, a year when many western states were experiencing drought, USDA programs provided nearly two-thirds of all federal funding awarded to state and local entities in the region for water and drought issues; in California, this share was roughly one-half (Mount et al. 2016a).

In this report, we look in greater detail at recent USDA funding in the San Joaquin Valley, California's largest agricultural region.¹ This region was hit especially hard by California's 2012–16 drought, and it faces the most significant challenges to reduce long-term groundwater overdraft under the state's new groundwater law, the Sustainable Groundwater Management Act (SGMA). We examine programs in three water-related areas:

- Rural water infrastructure
- Farm disaster assistance, and
- Resource stewardship.

Drawing on an analysis of recent spending patterns and conversations with program managers and stakeholders, we highlight program contributions and suggest additional opportunities to foster drought resilience and sustainable groundwater management in this region. The analysis covers programs under two Farm Bills, enacted in 2008 and 2014. Where relevant, we note how some of the changes under the 2018 Farm Bill, enacted as we completed this study, might affect programs in the San Joaquin Valley.

This review was conducted as part of a larger project looking at potential solutions to address water management challenges in the San Joaquin Valley. For more information on water issues in the region, please see the accompanying report, *Water and the Future of the San Joaquin Valley* (Hanak et al. 2019), as well as earlier reports from this project.²

We begin with some overview information on the San Joaquin Valley and USDA programs supporting water- and drought-related challenges. The following sections provide more detail on the three funding areas.³ Each section ends with key takeaways for leveraging USDA programs to support groundwater sustainability and related water management challenges. A final section provides some general conclusions on directions for increasing the impact of USDA programs to manage groundwater sustainably and provide safe drinking water to rural communities in the San Joaquin Valley.

¹ Please see the accompanying report, *Water and the Future of the San Joaquin Valley* (Hanak et al. 2019), for a complete list of acknowledgements.

² *Water Stress and a Changing San Joaquin Valley* (Hanak et al. 2017) highlights the importance of water in the valley's economy and describes a range of water-related challenges and potential solutions. *Replenishing Groundwater in the San Joaquin Valley* (Hanak et al. 2018) analyzes the potential for expanding groundwater recharge to help reduce the valley's overdraft.

³ Spending data are reported in federal fiscal years (FY), which run from October 1 of the prior calendar year to September 30 of the named year, except for crop insurance, which is reported in crop years (from July 1 of the preceding year to June 30 of the named year).

Agriculture, Water Stress, and the San Joaquin Valley

California has the largest agricultural sector in the United States, and the San Joaquin Valley accounts for roughly half of the state’s farm revenues and irrigated acreage.⁴ Within the valley, agriculture—including crop and animal products and related food and beverage processing—is an important economic driver; in 2015 it accounted for 20 percent of regional value added (a measure of gross domestic product or GDP) and 18 percent of jobs (Table F1).

TABLE F1

Comparison of various socio-economic characteristics of California and the San Joaquin Valley

Demographics	California	San Joaquin Valley	San Joaquin Valley share of California (%)
Total population (2010) /1	37,253,956	3,971,659	11%
% of population rural	5%	11%	
People in poverty (2016) /2	5,527,621	838,385	15%
Children 0-17 in poverty	1,782,764	336,708	19%
Unemployed people (2016) /3	1,044,835	176,144	17%
Unemployment rate (2016)	5.5%	9.6%	
Number of disadvantaged community places /4	685	201	29%
Population in disadvantaged community places	7,290,999	2,216,727	30%
Number of severely disadvantaged community places /4	391	132	34%
Population in severely disadvantaged community places	1,338,578	453,976	34%
Supplemental Nutrition Assistance Program (SNAP) participants (July 2016) /5	4,000,313	811,575	20%
Drinking water issues			
Community water systems out of compliance with Safe Drinking Water Act (July 2018) /6	233	128	55%
Population served by non-compliant community water systems 6/	357,239	175,513	49%
Number of domestic wells /7	290,154	69,244	24%
Number of households reporting drinking water supply shortages (2012–16) /8	2,598	2,033	78%
Economics and farm-related characteristics			
Gross domestic product (GDP) (2015) (\$ millions) /9	2,458,092	157,096	6%
Agriculture-related GDP (including food and beverage processing)	67,612	27,384	41%
Employment (2015) (\$ millions) /9	22.62	1.86	8%
Agriculture-related employment (including food and beverage processing)	0.75	0.31	41%
Farm revenues (crop and animal products) (2016) (\$ millions) /10	56,702	31,114	55%
Irrigated crop acreage (2016) /10	10,192,345	5,345,507	52%
Non-irrigated rangeland (2016) /10	19,695,400	4,760,000	24%
Number of all farms by annual sales (2012) /11	77,857	25,324	33%
Less than \$100,000	57,299	15,157	26%
\$100,000–\$499,999	11,039	5,020	45%
More than \$500,000	9,519	5,147	54%
Number of irrigated farms (2012) /11	53,546	19,954	37%
Irrigated farms share of total farms	69%	79%	

SOURCES: 1) 2010 Census. 2) USDA ERS State Facts sheets using Census Bureau Small Area Income and Poverty Estimates. 3) BLS Local Areas Unemployment Statistics. 4) DWR DAC Mapping Tool. Disadvantaged communities (DACs) and severely disadvantaged communities (SDACs) are defined in the Department of Water Resources Integrated Regional Water Management guidelines (2015) as Census geographies (place, tract, block group) with 80 percent (or 60%) or less of the state’s median household income. 5) USDA Food and Nutrition Service 2018, SNAP Bi-Annual (January and July) State Project Area/County Level Participation and Issuance Data. 6) State Water Resources Control Board, Human Right to Water data, as of November 2018. 7) Johnson and Belitz (2015). 8) Department of Water Resources, My Dry Water Supply as of July 2018. 9) MIG, Inc. (2017). Gross domestic product is value added from all economic production in the eight valley counties and employment includes full- and part-time jobs. Agriculture-related statistics include crop and animal production, agricultural support services, and food and beverage processing. 10) National Agricultural Statistics Service (NASS) County Agricultural Commissioner reports, using data from the eight valley counties. 11) USDA, 2012 Agricultural Census.

⁴ This section draws on Hanak et al. (2017, 2018, and 2019).

Irrigation is generally required to support crop production during the valley's long, dry growing season, and water scarcity is a growing challenge. Water sources include local rivers and water imported from rivers in Northern California. These sources make water available directly as surface water; because they also replenish groundwater basins, some of this water is also available as renewable groundwater. For decades, farmers have also pumped groundwater faster than it has been replenished—resulting in long-term overdraft of nearly 2 million acre-feet per year. The consequences of this overdraft include declining water levels and dry wells, sinking lands and infrastructure damage, and depletion of groundwater reserves—a critical resource during droughts. SGMA, adopted in 2014, will require groundwater users in the region to bring their groundwater basins into long-term balance and address the undesirable consequences of overdraft by 2040. Addressing this imbalance will require a combination of measures to augment supply and to manage demand. Hanak et al. (2019) estimate that up to one-quarter of the historical imbalance might be addressed with cost-effective investments to augment supplies, particularly through groundwater recharge. Demand management measures will likely be required to address the remaining gap. This translates to reductions of irrigated cropland by at least 535,000 acres, or 11 percent of the current irrigated footprint.⁵

Valley farmers also face growing requirements to address water and air pollution issues related to farming operations. Regulations to reduce nitrogen loading of groundwater from the application of inorganic fertilizers and manure have increased to address a growing public health problem of nitrate-contaminated drinking water. This has sped the adoption of on-farm practices to manage fertilizer application, including more efficient irrigation systems. The region's large dairy sector faces particular challenges in this regard given the difficulties of applying manure fertilizer precisely (Hanak et al. 2019, Box 3.2). Salt buildup in groundwater and soils is threatening long-term agricultural productivity. And although air quality in the valley has been improving, the region still has some of the worst air quality in the United States (World Health Organization 2018). Various air quality regulations apply to farming operations, including requirements to reduce emissions from diesel engines and to control dust.

Many of the valley's communities also have challenges providing safe drinking water—reflecting both water quality and supply problems (Table F1). The valley contains more than half of the 233 community water systems in California that were out of compliance with safe drinking water standards for nitrate and other contaminants such as naturally occurring arsenic as of July 2018. Although this total includes several larger water systems, most are very small, serving fewer than 500 residents. During the latest drought, the valley was also ground zero for domestic wells going dry, accounting for nearly 80 percent of California households that reported water shortages.

Like many agricultural regions, the valley also faces broader socio-economic challenges (Table F1). It has a higher rate of unemployment and a higher share of residents in poverty than the statewide average. It also has a higher share of residents living in small, economically disadvantaged communities. Economically vulnerable residents in some of these communities rely on USDA's Supplemental Nutrition Assistance Program (SNAP) for income support. While SNAP is an important safety net program (including during droughts), we do not examine the program further in this report.

USDA Programs Supporting Water-Related Challenges

In this study, we are particularly interested in three broad areas of water- and drought-related funding: rural drinking water and sanitation infrastructure, crop insurance and other types of agricultural disaster assistance, and

⁵ This estimate assumes that the valley will need to reduce overdraft by 1.8 million acre-feet per year, and that 460 thousand acre-feet of long-term supply augmentation can be undertaken. If the entire deficit had to be addressed with demand management, roughly 750,000 acres would need to come out of irrigation. Higher levels of land fallowing would also be needed if the future deficit were higher than the historical deficit, for instance as a result of changing hydrology or increased environmental flow requirements. For details, see Hanak et al. (2019).

resource stewardship activities on farms and ranches. Four offices within USDA are the principal providers of this support: water infrastructure for rural communities is provided by the Rural Utilities Service (RUS); agricultural disaster assistance is provided by the Risk Management Agency (RMA) and the Farm Service Agency (FSA); and resource stewardship assistance is provided by FSA and especially the Natural Resources Conservation Service (NRCS).⁶ Table F2 summarizes funding from 2012–17 for California and the San Joaquin Valley, and Figure F1 examines annual trends. Overall, California received roughly 3 percent of national payments in these three areas, and the San Joaquin Valley received nearly half of all payments to California, but with some variations across programs.

TABLE F2

USDA funding for the United States, California, and the San Joaquin Valley for selected areas (FY 2012–17)

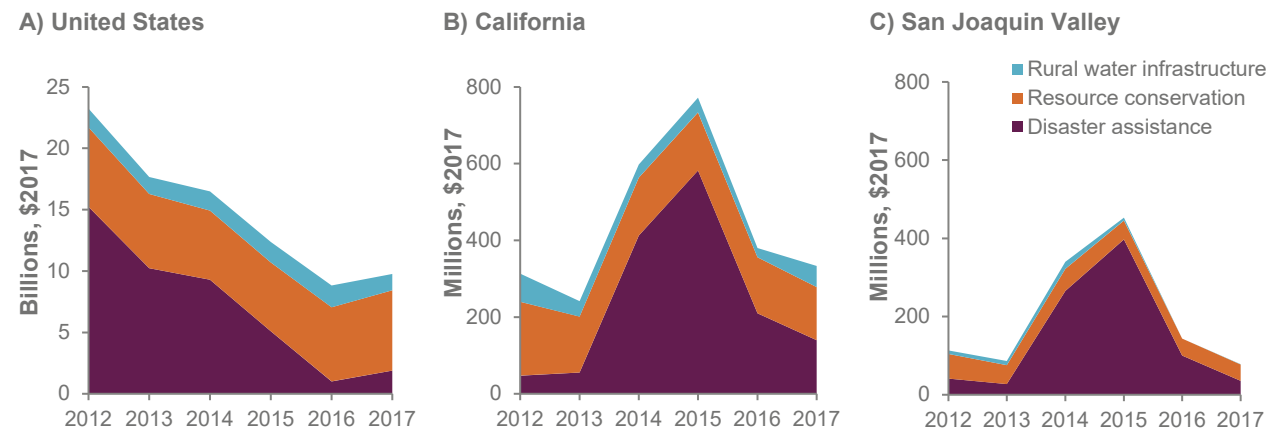
	United States	California	San Joaquin Valley	California share of United States	SJV share of California
Rural water infrastructure (RUS)	\$1,540	\$44	\$8	2.9%	19%
Disaster assistance (RMA, FSA)	\$7,129	\$241	\$145	3.4%	60%
Resource stewardship (NRCS, FSA)	\$6,057	\$154	\$50	2.5%	33%
Total	\$14,726	\$440	\$202	3%	46%

SOURCES: Author estimates using USDA data.

NOTES: Values are in millions of dollars, adjusted for inflation to 2017 values. Disaster assistance includes net indemnities from RMA’s crop insurance program (subtracting premiums and other payments by participating farmers) and disaster assistance payments from FSA. See later sections of the report for more details.

FIGURE F1

Disaster assistance was a major component of USDA funding both nationally and in California and the San Joaquin Valley from FY 2012–17



SOURCE: Author estimates using USDA data (see Table F2 and text).

NOTE: The values have been adjusted for inflation to 2017 dollars.

Rural Water Infrastructure

We focus on a suite of Water and Environmental Programs under the Rural Utilities Service (RUS), which provide funding for rural water and wastewater infrastructure. Several of these programs were also used to

⁶ Changes in the organization of USDA could change program names and funding lines described here. As an example, FSA and NRCS are now under one Under Secretary, and Rural Development is now directly under the Secretary of Agriculture. But the authority for the programs (wherever located and named) comes from the Farm Bill.

provide emergency drinking water supplies for households facing shortages during the 2012–16 drought. In all, the San Joaquin Valley received nearly \$50 million from 2012–17, averaging \$8 million annually. Relative to the challenges this region faces in providing safe drinking water, its share of all California spending on these programs is relatively small (19%). We look at how Water and Environmental Programs spending might be further leveraged to address persistent drinking water quality and supply problems in the San Joaquin Valley.

Disaster Assistance

Subsidized crop insurance offered by the Risk Management Agency is a major farm safety net program. Since the 1990s, the expansion of crop insurance to specialty crops has made the program a more relevant risk management tool for California, with significant shares of crop acreage insured. Technically the assistance is provided through premium subsidies in every year. Along with reinsurance, this allows private insurance companies to provide indemnity payments in drought years, and for other causes of loss (e.g., crop damage from flooding or temperature anomalies). Crop insurance indemnities were an important source of financial assistance to farmers in California during the recent drought, particularly in the San Joaquin Valley. From 2012–17, an average of \$128 million annually—70 percent of net California insurance payouts—went to farmers in the San Joaquin Valley.

The Farm Service Agency also runs disaster assistance programs that provide compensation for drought- and fire-related grazing losses, livestock deaths, and other emergency support. From 2012–17, these programs averaged \$61 million annually in payouts to California (peaking at \$116 million in 2014); just over a quarter of these funds went to farmers and ranchers in the San Joaquin Valley. We consider how the roles of crop insurance and other disaster assistance programs may change as the region implements SGMA.

Resource Stewardship

This category includes conservation programs administered by NRCS and FSA. NRCS has a significant presence in California through the Environmental Quality Incentives Program (EQIP), for which California is one of the top recipients nationally. This program—which accounted for the bulk of the nearly \$290 million in NRCS spending in the valley from 2012–17—supports various types of resource management upgrades on farms, such as low-water irrigation systems and cleaner engines.

Both NRCS and FSA also provide landowner incentives for voluntary land conservation. Although this is not currently a major area of USDA funding for resource stewardship in California, support for voluntary land conservation has played an important role in conservation efforts across the state. This report looks at the potential for these programs to support groundwater recharge on farmland. And because agricultural lands in California—and especially the San Joaquin Valley—will be undergoing significant shifts in land use as a result of long-term programs to bring groundwater basins into balance and manage groundwater salinity, we also consider the potential for these programs to help facilitate successful transitions to non-irrigated land uses.

Other USDA Support

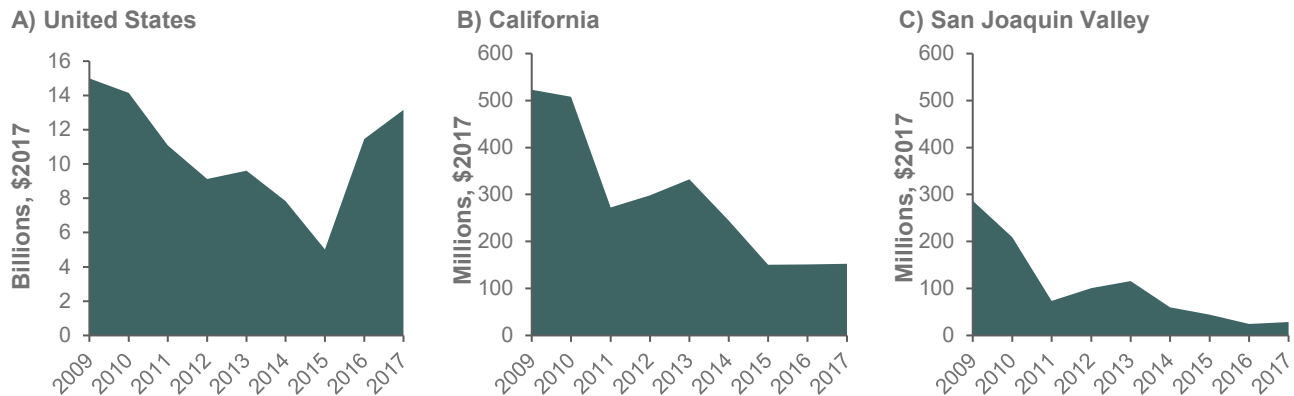
The Farm Service Agency also administers a suite of income and price support programs (Figure F2). The 2014 Farm Bill brought major changes to this area, by eliminating direct crop subsidies and making significant alterations to the dairy support program (Lee and Sumner 2014, Angadjivand 2018).⁷ These shifts may have

⁷ Under both the 2008 and 2014 Farm Bills, only producers with “base acres” for covered crops (corn and other feed grains, wheat, rice, soybeans and other oilseeds, peanuts, and pulses) were eligible for these crop-related payments. Whereas the 2008 Farm Bill made direct payments every year to participating farmers, the 2014 Farm Bill’s Agricultural Risk Coverage program payments are made when county-level revenue drops below a guarantee level based on recent-average of county-level crop revenue.

contributed to declining use of income and price support programs in California and the San Joaquin Valley in the past eight years (Figure F2). We do not examine this area of funding in this report.

FIGURE F2

The use of income and price support programs has declined in California and the San Joaquin Valley since 2009



SOURCE: USDA

NOTES: Income and price support program spending includes: Agricultural Risk Coverage, Price Loss Coverage, Cotton Transition Program, Margin Protection Program, Facility Loans, Marketing Assistance Loans, Loan Deficiency Payments, Cotton Ginning Share, Organic Cost Share, Trade Adjustment Assistance, Dairy Loss Assistance*, Milk Income Loss Contract*, Direct and Countercyclical Payments (Direct subsidies, SURE, ACRE)*, and Asparagus Market Loss Program*. A '*' indicates that program was eliminated in the 2014 Farm Bill.

Rural Water Infrastructure

USDA’s Office of Rural Development (RD) is the federal government’s leading agency administering programs to support economic and social programs in rural communities.⁸ It consists of three services: the Rural Housing Service (RHS), the Rural Business-Cooperative Service (RBCS), and the Rural Utilities Service (RUS).⁹ The three services operate close to 60 programs. The Rural Business-Cooperative Service offers business development funds and job training opportunities. The Rural Housing Service provides funding for building and repairing single- and multi-family housing, and for essential community facilities (e.g., fire and police stations, hospitals, libraries, irrigation districts). The Rural Utilities Service (RUS) funds water, electricity, and telecommunications infrastructure improvements.

We focus on the programs administered by the Rural Utilities Service, under the Water and Environmental Programs account. These are the most directly relevant for drought resilience and sustainable groundwater management, because they support the ability of rural communities to develop safe drinking water systems as well as sanitation systems that protect groundwater quality. Although we are unable to provide detailed breakdowns, it also bears noting that several RHS programs can support drought resilience. For instance, community facility loans and grants have been used by irrigation districts in California for infrastructure improvements.¹⁰ At the peak of the 2012–16 drought, some eligible homeowners also used RHS home repair grants and loans to drill new wells

⁸ Sixteen federal agencies administer 88 rural development programs. USDA’s Rural Development runs roughly 60 of these programs, and also disburses the most funds to rural counties. USDA became the official federal lead in rural development through the Rural Development Policy Acts of 1972 and 1980 (Cowan 2016).

⁹ Rural Development and its three sub-agencies were established in 1994 by the Agricultural Reorganization Act of 1994 (P.L. 103-354).

¹⁰ In 2018, USDA awarded a \$449 million loan for building infrastructure related to Sites Reservoir in the Sacramento Valley, the largest single community facility loan ever made (Smith 2018). These loans also support a range of smaller projects. For instance, the Lindsay-Strathmore Irrigation District in the San Joaquin Valley received a loan of \$11.3 million to replace steel irrigation pipes and make road improvements in 2017 (USDA 2017).

(USDA RD 2016a). Rural Development’s 2014 report (USDA RD 2014) also points to RHS efforts to expedite facility and infrastructure assistance for food banks as a priority at that time.

The distribution of RD funding is based on formulas (7 CFR 1780.18). For Water and Environmental Programs the state’s factor is based on its share of the nation’s rural population (50% weight), rural population with incomes below the poverty level (25% weight), and nonmetropolitan unemployment (25% weight).

National Spending Snapshot

Rural Development awarded close to \$250 billion nationally from FY2009 to 2016, with roughly 70 percent from RHS, 25 percent from RUS, and 5 percent from RBCS (Table F3). Water supply and waste disposal programs accounted for \$14.8 billion (6%). California received about 3 percent of total RD funds over this period, with somewhat higher shares from RHS (4% of the US total) and RBCS (5%), and a smaller share from RUS (1%)—reflecting much lower shares of funding for electrification and telecom. California’s share of RUS water supply and waste disposal spending was on par with its overall average (3%), with awards totaling nearly \$470 million.

TABLE F3

United States and California awards from Rural Development programs, FY 2009–16

	United States		California			
	Funds awarded (\$millions)	Number of awards	Funds awarded (\$millions)	% US funds	Number of awards	% US awards
Rural Business-Cooperative Service	13,325	28,162	649	5	1,018	4
Rural Housing Service	174,410	1,308,341	7,286	4	37,936	3
Rural Utilities Service	62,037	26,812	676	1	536	2
- Electric Loans and Loan Guarantees	38,328	1,059	111	0	5	0
- Telecom Grants and Loans	7,048	1,639	49	1	36	2
- Water and Waste Disposal Grants, Loans and Loan Guarantees	14,842	11,980	468	3	330	3
All other programs	1,819	12,134	48	3	165	1
Total	249,773	1,363,315	8,611	3	39,490	3

SOURCE: USDA Rural Development (2016b).

NOTE: Award amounts are in current dollars.

States are required to obligate half of their allotment by the middle of the federal fiscal year (end of March), and all of it by the beginning of August (US GAO 2017). If the funds are not obligated at that time, the state is required to return them, and they are reallocated to other state offices. Meeting these spending deadlines has been a challenge for some programs in California.

Relevant Program Details

RUS’s Water and Environmental Program funding includes grants, loans, and loan guarantees. The funds are mostly used for capital improvements and technical assistance. The list below outlines major characteristics of each program (USDA RD 2018).¹¹

¹¹ Most of the programs listed here appear in the categories of water and waste disposal loans, grants, and loan guarantees in Table F3. The circuit rider program appears in “other” in that table. Water and Environmental Programs also include solid waste management grants, not described here. From FY 2012–17, California received \$780,000 for solid waste management projects.

- **Water and Waste Disposal Loans and Grants**
Purpose: Funding for drinking water systems, sewage and solid waste disposal, and storm water drainage to households and businesses in eligible areas. Grants can supplement loans to lessen the user costs of projects. Every year 1–3 percent of program funds are set aside for technical assistance. Funds can also be occasionally used for legal and engineering fees, land acquisition, and start-up operations and maintenance (O&M) costs. The payback period for loans is up to 40 years, and interest rates depend on the median household income of the area. **FY 2018 appropriated funding:** \$5 billion. **Eligibility:** State and local governments, nonprofits, and tribes. Areas served must have populations of 10,000 or less. For a grant of up to 70 percent of eligible costs, service area median household income must be below the poverty level or 80 percent of the state non-metropolitan median household income.
- **Water and Waste Disposal Loan Guarantees**
Purpose: Loan guarantees for projects addressing drinking water systems, sewage and solid waste disposal, and storm water drainage to households and businesses in eligible areas. **FY 2018 appropriated funding:** \$50 million. **Eligibility:** State and local governments, nonprofits, and tribes. Areas served must have populations of 10,000 or less. In FY 2019 obligations, USDA was seeking to change the population limit for loan guarantees to 20,000 or less, due to program underutilization.
- **Water and Waste Disposal Loans and Grants to Tribes, Colonias, Alaskan Villages, and Hawaiian Homelands**
Purpose: Congress sets aside funds from the Water and Waste Disposal Program to develop and construct water and waste systems for specific disadvantaged groups. This set-aside used to be a specific dollar amount, but was changed to a percentage of total Water and Waste Disposal Fund spending in 2016. **FY 2018 appropriated funding:** \$50 million. **Eligibility:** Special groups (federally recognized tribes, colonias, Alaskan villages, and Hawaiian homelands) and other entities serving them (e.g., local governments and nonprofits).
- **Predevelopment and Planning Grants (PPG)**
Purpose: Funding to communities applying for water and waste disposal program funds. **FY 2018 appropriated funding:** Included in the water and waste disposal loans and grants. **Eligibility:** State and local governments, tribes, and nonprofits. Awards must serve rural areas with populations of 10,000 or less. The areas must also have incomes below the poverty line, or 80 percent of the statewide non-metropolitan household income.
- **Technical Assistance and Training Grants (TAT)**
Purpose: Funding for technical assistance and training to evaluate solutions to water and waste problems; assists applicants to prepare applications for water and waste disposal loans and grants; helps associations improve O&M in rural areas. **FY 2018 appropriated funding:** \$40 million. **Eligibility:** Nonprofits providing these services in rural areas with populations of 10,000 or less.
- **Special Evaluation Assistance for Rural Communities and Households (SEARCH)**
Purpose: Funding to very small, economically distressed rural communities for predevelopment and feasibility studies, design, and technical assistance for water and waste-water projects. **FY 2018 appropriated funding:** Included in the water and waste disposal loans and grants. **Eligibility:** State and local governments, tribes, and nonprofits. Areas to be served must have populations of 2,500 or less, and median household income below the poverty line, or 80 percent of the statewide non-metropolitan median household income.
- **Emergency Community Water Assistance Grants (ECWAG)**
Purpose: Funding to help prepare for or recover from an emergency threatening the availability of safe drinking water. Emergencies can include various natural disasters, chemical spills, etc., and a federal disaster declaration is not required. Grants of up to \$500,000 may be used for constructing a new water source, intake, or treatment facility; grants of up to \$150,000 may be used to construct water service line extensions and to repair breaks or leaks. **FY 2018 appropriated funding:** \$47 million. **Eligibility:** State and local governments, tribes, and nonprofits. Areas to be served must have populations of 10,000 or less,

with median household income below the state’s median household income for non-metropolitan areas. USDA is authorized to set aside 3–5 percent of the total water and waste disposal program to ECWAG (RUS Budget justification 2017).

- **Revolving Loan Funds (RLF)**

Purpose: Funding to nonprofits to create and operate their own revolving loan funds. Borrowers can be other nonprofits and state and local governments. Loans can be used for predevelopment costs for water and waste-water treatment projects, and other small capital improvements, but not regular operations and maintenance. Individual loans may not exceed \$100,000, and the maximum repayment term is 10 years. **FY 2018 appropriated funding:** \$1 million. **Eligibility:** Nonprofits serving rural areas and towns with populations of 10,000 or less.

- **Household Water Well Systems**

Purpose: Funding to nonprofits to create and operate revolving loan funds. The RLF borrowers should be households in rural areas using the money to construct, service or refurbish an individual household well system. Individual loans cannot exceed \$11,000 per household, with 1 percent interest rate and maximum repayment term of 20 years. Loans cannot be used for septic systems/sewer. **FY 2018 appropriated funding:** \$993,000. **Eligibility:** Nonprofits serving rural areas and towns with populations of 50,000 or less.

- **Individual Water and Wastewater Grants**

Purpose: Grants for hooking up a residence to a service line, paying utility hook-up fees, or installing indoor plumbing fixtures. **FY 2018 appropriated funding:** none. **Eligibility:** Households located in colonias.

- **Circuit Rider Program**

Purpose: Funding for technical assistance to rural water utilities experiencing operational, managerial, or financial issues. RD contracts with the National Rural Water Association to provide consultants knowledgeable in day-to-day utility operation issues. **FY 2018 appropriated funding:** \$19 million. **Eligibility:** Rural water system can request assistance, or RD can request assistance on their behalf.

California and the San Joaquin Valley: Recent Spending Trends

From 2012–17, a total of nearly \$265 million in grants and loans were awarded to California under the Water and Environmental Programs account (Table F4). Annual awards were highest at the beginning of this period, and lowest in 2016, the last year of the latest drought (Figure F3). The composition of spending also shifted somewhat over time, with water and waste disposal loans and grants declining significantly from 2013 to 2016, and Emergency Community Water Assistance Grants (ECWAG) becoming significant. These years also saw an uptick in grants for water and waste disposal to tribes and colonias—important outside of the San Joaquin Valley.¹² The much smaller household water well systems program also grew during the drought.

¹² Colonias consist of peri-urban subdivisions of substandard housing, generally lacking in basic services such as potable water, electricity, paved roads, proper drainage, and waste management. They are most commonly found near the southern border with Mexico.

TABLE F4

Water and environmental programs awards in California and the San Joaquin Valley, 2012–17

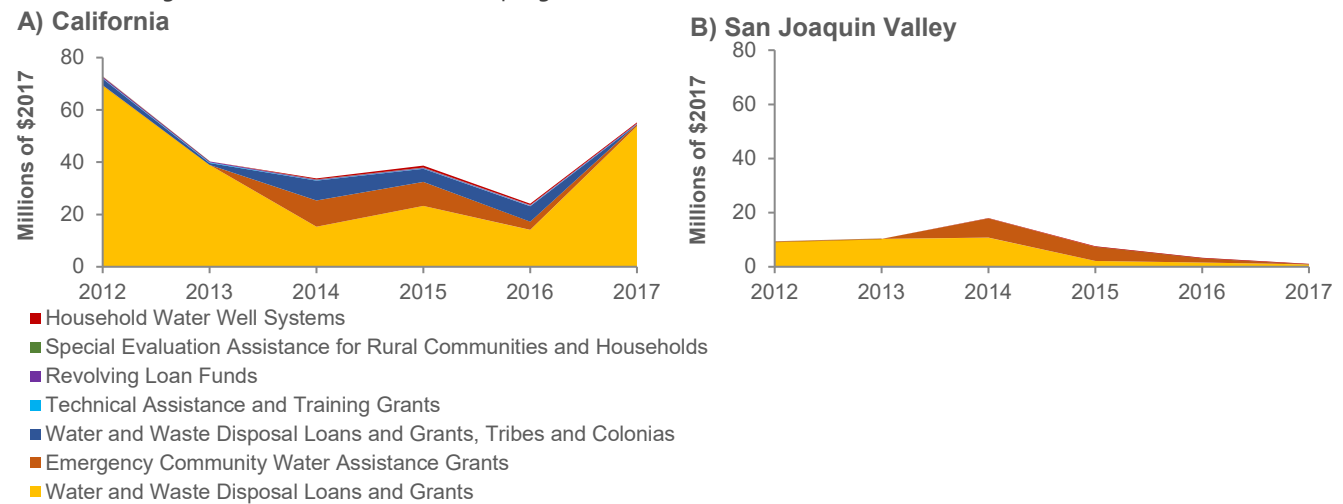
Program	California			San Joaquin Valley			SJV Share of CA
	Grants	Loans	Total	Grants	Loans	Total	
Water and Waste Disposal Loans and Grants	\$46,322	\$168,399	\$214,721	\$13,146	\$21,837	\$34,982	16%
Emergency Community Water Assistance Grants	\$23,096	-	\$23,096	\$13,921	-	\$13,921	60%
Household Water Well Systems	\$2,077	-	\$2,077	\$715	-	\$715	34%
Special Evaluation Assistance for Rural Communities and Households	\$130	-	\$130	\$28	-	\$28	22%
Technical Assistance and Training Grants	\$875	-	\$875				-
Revolving Loan Funds	\$1,845	-	\$1,845				-
Water and Waste Loans and Grants, Tribes, and Colonias	\$21,941	-	\$21,941				-
Total	\$96,286	\$168,399	\$264,685	\$27,810	\$21,837	\$49,646	19%

SOURCE: Author estimates using RUS data.

NOTES: Grants, loans, and totals are total for funds awarded from FY 2012–17, in thousands of 2017 dollars. Some awards that appear in the California column include support for communities in the San Joaquin Valley (e.g., technical assistance and training grants and revolving loan funds).

FIGURE F3

Annual funding for water and environmental programs in California



SOURCE: Author estimates using RUS data.

NOTES: Grants, loans, and totals are total for funds awarded from FY 2012–17. See notes to Table F4 for details.

Of the \$265 million awarded to California from 2012–17, nearly \$50 million went to entities in the San Joaquin Valley (Table F4).¹³ This is a relatively small proportion of awards (19%) relative to the valley’s share of the state’s low-income rural population and population with drinking water challenges (Table F1). The two areas where the valley’s share of funding is substantially higher are ECWAG (60% of the statewide total) and

¹³ This total understates the funding that went to San Joaquin Valley in several areas of assistance (RLF, Household Water Well, TAT grants) where the awards are to nonprofits not based in the valley who run programs there, such as the California Rural Water Association and the Rural Community Assistance Corporation (RCAC). For instance, RCAC (based in West Sacramento) received \$554,000 grant from RD and \$1 million from the California State Water Board and was able to provide loans and grants to 130 homeowners across the state during the latest drought (RCAC 2016).

assistance with household wells (34%)—both programs that helped address drought-related challenges of dry community and household wells, which valley residents experienced to a much larger degree than residents in other parts of California. ECWAG funded a range of emergency supply projects, including water hauling, purchases of bottled water, water acquisitions, and well replacements (Allen-Price 2014). California was also the largest recipient nationally of funds for household well assistance in 2015 and 2016.¹⁴

Key Takeaways on USDA Support for Rural Water Infrastructure

RUS's Water and Environmental Programs provide important support to rural communities that face drinking water and sanitation challenges in California and the San Joaquin Valley. During the latest drought the emergency funds were used in several valley counties to expeditiously restore drinking water supplies to disadvantaged communities. RUS has also undertaken numerous efforts to streamline the application process, making it easier to get funds out the door.¹⁵ We also heard from grantees that they appreciated the speed with which RUS funds can be made available once they are awarded, particularly relative to state programs.

Yet the overall level of support in the San Joaquin Valley seems to be below potential, in light of the long-term safe drinking water issues in the region. There are several possible reasons for this gap:

- **Eligibility constraints.** Programs funded by RUS have strict population and income eligibility requirements. These requirements are likely to make some rural communities that could benefit from support ineligible for funding. In relatively populous rural areas like the San Joaquin Valley, for instance, some observers suggested that the 10,000 resident cut-off limits funding access to some severely disadvantaged rural communities with unsafe drinking water that might be able to make good use of the grant-plus-loan award funding RUS provides. Meanwhile, some much smaller communities with drinking water safety issues may have difficulties supporting loan repayments. Other program limits might hinder broader participation. For instance, the household water well program limits well replacement spending to \$11,000 per individual loan, but the costs of well replacement are much higher in California.¹⁶
- **Difficulty of finding funding-ready projects.** Meeting spending deadlines has been a challenge for some programs in California. For instance, in FY 2016, RUS in California was not able to give out about \$21 million in loan funding in the Water and Waste Disposal Program. Staff indicated that finding funding-ready projects is a major difficulty (US GAO 2017).
- **Availability of other types of funding.** In recent years, grant funding from state bonds has become an important source of funding for safe drinking water programs in disadvantaged communities. Some experts we interviewed suggested that this likely dissuades rural communities from seeking RUS funding, which generally includes a loan component.

Looking ahead, efforts to strengthen the complementarity between RUS and state programs might improve safe drinking water efforts in the San Joaquin Valley. In particular, greater RUS support for nonprofits to provide technical assistance and revolving loan funds for rural communities may increase the capacity to develop and implement viable projects. It may also be worth exploring the potential for RUS to work with state and local partners in the development of early warning systems to anticipate and mitigate vulnerability to dry wells in future droughts.¹⁷ In this way, RUS emergency water assistance programs such as ECWAG and the Household Water Well Systems could further limit the exposure of households and communities to drinking water shortages.

¹⁴ In these two years, the program received a slightly higher level of funding obligations (\$1.2 million) than authorizations (\$996,000), and California received 57 percent and 46 percent of the total obligated, respectively. Only five other states received funds for this program, with totals ranging from \$50,000 to \$150,000 (USDA RUS 2017).

¹⁵ In 2015 RD introduced a new online portal, [RD apply](#), and a complementary online [preliminary engineering template](#) developed to be consistent with other federal agencies that provide assistance. In 2016, they introduced a [streamlined environmental review process](#) that resulted in shorter review times.

¹⁶ A nonprofit service provider noted that this per household spending cap was a constraint, and supplemented it with some other funds to a maximum of \$18,000 (RCAC 2016).

¹⁷ See Fencl et al. (2018) for a discussion of how better data analysis can help anticipate and speed response to dry well problems.

Disaster Assistance for Farmers and Ranchers

For California and the San Joaquin Valley, disaster assistance is the largest of the three areas of USDA support examined in this study, providing an average of more than \$240 million per year statewide and \$145 million per year in the valley. We first examine the crop insurance program operated by RMA. We then look at the suite of disaster assistance programs administered by FSA, largely focused on livestock. We conclude with some key takeaways regarding disaster assistance in the San Joaquin Valley.

Crop Insurance

Approximately 130 crops are now insurable under the federal crop insurance program. Coverage has historically been most comprehensive for the “covered commodities” that also have been the focus of price and revenue support programs (corn and other feed grains, wheat, rice, soybeans and other oilseeds, peanuts, and pulses), along with cotton.¹⁸ Coverage of specialty crops (fruits, nuts, vegetables, and nursery crops)—which are especially relevant for California—became more widespread starting in the early 1990s (Lee and Sumner 2013). In contrast to many other farm programs, farmers are eligible to participate regardless of their income level.

To create an actuarially sound product, RMA makes administrative policy decisions on the availability of insurance for particular crops in particular counties (Shields 2015). Insurable causes of loss defined in agency regulations include: (1) adverse weather conditions (including floods, droughts, and adverse temperatures), (2) fire, (3) insect damage (but not if due to poor management practices), (4) plant disease (but not if due to poor management practices), (5) wildlife, (6) earthquake, (7) volcanic eruption, (8) and failure of irrigation supply (but only if it occurs for any of the preceding reasons) (USDA RMA 2015). As shown later in Figure F11, failure of irrigation supply was an important cause of losses at the height of the latest drought in California. Adverse temperatures were even more important for California and the valley.

The two main types of crop insurance offered are:

- **Yield-based policies.** These policies cover farmers for losses related to declines in yields. Catastrophic coverage (CAT) is the basic policy offered. The government covers the entire premium, and the farmer is responsible for an administrative fee of \$300 per crop per county. (This can be waived for beginner farmers). The CAT coverage is called 50/55: 55 percent of the price established by RMA is paid on yield losses in excess of 50 percent. Most farmers are enrolled in “buy-up” insurance which extends coverage up to 85 percent of average historical yield and 100 percent of the price, in exchange for paying part of the premium. Some policies are based on the individual farm’s yield history, while others trigger losses if the county yield falls beneath a certain level (Shields 2015).
- **Revenue-based policies.** These policies guarantee average historical revenue, and therefore protect the producer from both yield and price declines. This type of crop insurance was introduced in the late 1990s, and is now the most popular crop insurance product nationwide; 77 percent of policies in the US in 2014 were revenue-based (Shields 2015). However, this is not true in California, because revenue-based policies are difficult to establish for specialty crops.¹⁹

The 2014 Farm Bill did away with direct subsidy payments to crops, but it significantly expanded some components of the crop insurance program.²⁰ This included the creation of supplemental coverage for some commodities, which was expected to add an estimated \$5 billion to crop insurance costs over ten years (Shields

¹⁸ For a summary of the 2014 Farm Bill’s information on covered commodities, see this [link](#).

¹⁹ These commodities often lack a centralized mechanism for developing price projections prior to planting (such as a futures exchange), and actual harvest-time prices needed to determine the insurance guarantee and potential grower indemnity. To deal with this, RMA developed the Actual Revenue History policy, assuming average historical revenue/price is a good indicator for expected future price. This assumption is more problematic for commodities that are storable, where previous year stock can affect current year prices (Shields 2012).

²⁰ In 2002, Brazil initiated the World Trade Organization (WTO) cotton dispute, alleging that US upland cotton subsidies caused price suppression in the world market, harming Brazil. WTO ruled in favor of Brazil, and the solution was to cut direct subsidies to cotton in the 2014 Farm Bill (WTO 2014).

2014). These changes had few implications for California (Lee and Sumner 2014). The 2014 Farm Bill also required producers receiving crop insurance subsidies to comply with USDA conservation guidelines for highly erodible lands and wetlands.

Recent Trends: Comparing California and the US

Here we examine trends for several key crop insurance indicators in the United States, California, and the San Joaquin Valley. From 2009–17, the number of policies was relatively stable across all three geographic areas, but there were significant increases in acreage covered, especially in California and the San Joaquin Valley (Figure F4). For the United States as a whole, covered acreage rose 16 percent, from 268 million in 2009 to 311 million in 2017. In California, covered acreage rose 75 percent (from 3.7 million to 6.5 million, respectively), and in the San Joaquin Valley it rose 32 percent (from 2.3 million to 3.1 million). Most of the California acreage increase reflects expanded coverage of pasture—including non-irrigated rangeland (Figure F6).²¹

Even with this acreage increase, California still has a relatively small share of US policies (2% in 2017) and acres enrolled (2.1%). As a point of reference, California has a similar share of national cropland acreage (2.5%), but a much larger share of irrigated acreage (14%).²² Within California, the San Joaquin Valley looms large, with 61 percent of the state’s policies and 48 percent of California acres enrolled in 2017—a similar proportion to the region’s share of irrigated cropland (Table F1).

Revenue-based programs now dominate coverage nationally, but they are much less important in California. Supplemental policies—additional coverage for certain crops introduced with the 2014 Farm Bill—were taken out by some farmers in all three regions. A small number of livestock policies were taken out starting in 2012.

Figure F5 compares indemnity payments across the three regions over this same period. Nationally, payments spiked in 2012—reaching over \$18.6 billion—during a major drought in the Midwest (Pitt 2013). For California and the San Joaquin Valley, the largest payouts were in the two worst years of the latest California drought—2014 and especially 2015. In 2015, total payouts reached \$627 million for California growers, and 75 percent of this total went to the San Joaquin Valley. Net insurance payouts—subtracting farmers’ contributions to premiums—are lower, but follow similar patterns (Figure F5).²³ Over the nine years examined here, net indemnities averaged 53 percent of total indemnities for all three regions. The average rate of return on crop insurance was 15 percent for US farmers overall, 11 percent for California farmers, and 14 percent for San Joaquin Valley farmers.²⁴

California’s (and the valley’s) share of indemnity payouts tends to be high relative to the number of policies and acreage covered, but low relative to the value of crops insured (or “liabilities”), or the value of agricultural output. To see this, it is useful to compare values for 2017, a non-drought year in California and the Midwest. California’s share of policies sold was 1.4 percent of the national total, with 2.1 percent of covered acres. California’s share of indemnity payouts was 3 percent, whereas its share of insured crop value was 8 percent, and its share of national crop revenues was 20 percent.²⁵ This lower share of indemnity payouts relative to liabilities or total crop value may reflect the greater limitations of the insurance program for specialty crops relative to the major commodity groups like corn and soybeans, and the more limited coverage for drought-related water shortages on irrigated cropland relative to rainfed agriculture.

²¹ Non-irrigated pasture, rangeland, and forage indemnities are paid when the rainfall index falls below the guaranteed rainfall index (Vandevier and Berger 2013).

²² The comparisons of acreage are from USDA’s 2012 Agricultural Census.

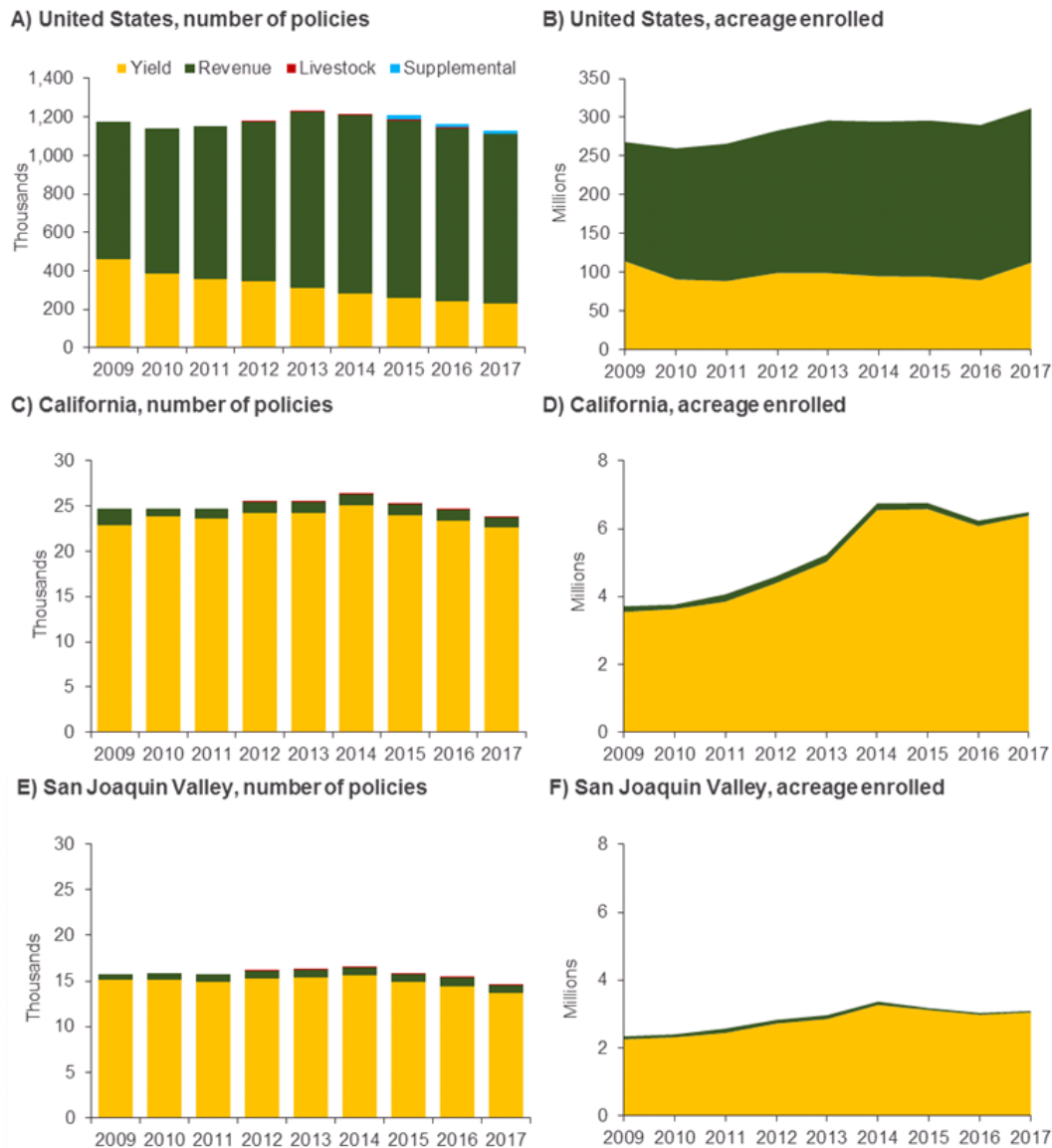
²³ Farmer contributions are estimated by subtracting the federal subsidy from total premiums.

²⁴ The rate of return is calculated as the ratio of net indemnities to farmer premiums, minus 1.

²⁵ California’s share of national crop insurance liabilities for 2009–17 was 6 percent, with the highest share (10%) in 2016. The San Joaquin Valley consistently has roughly two-thirds of California’s total crop insurance liabilities, a bit higher than its share of crop revenues. Crop revenue comparisons between California and the US for 2017 are from USDA’s Economic Research Service [database](#).

FIGURE F4

Policies and acres enrolled by insurance type, United States, California, and the San Joaquin Valley

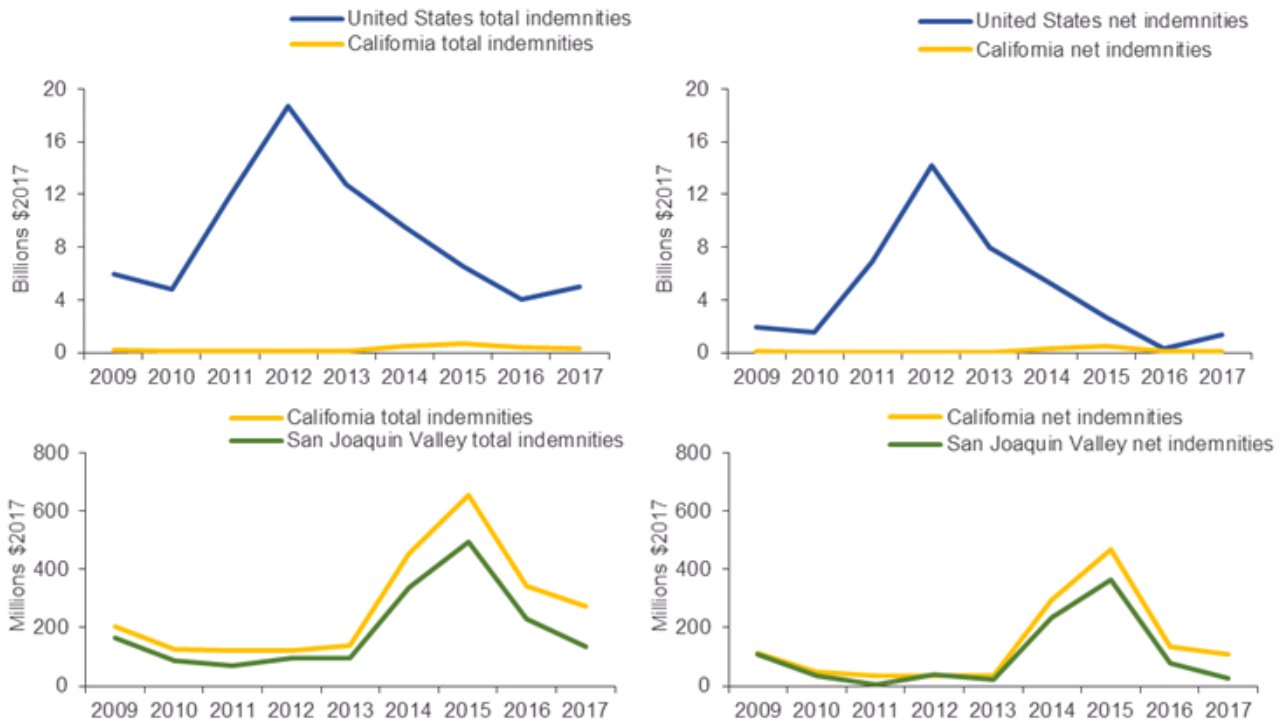


SOURCE: Author estimates using RMA "Summary of Business" data.

NOTES: (1) Revenue-based plans include: Adjusted Gross Revenue, Adjusted Gross Revenue Lite, Pecan Revenue, Crop Revenue Coverage, Revenue Assurance, Avocado Revenue Coverage, Actual Revenue History, Income Protection, Indexed Income Protection, Group Risk Income Plan, Revenue Protection, Revenue Protection with Harvest Price Exclusion, Area Revenue Protection, Area Revenue Protection with Harvest Price Exclusion, Whole Farm Revenue Protection and Margin Protection. (2) Yield-based plans include: Actual Production History, Tree Based Dollar Amount of Insurance, Dollar Amount, Rainfall Index, Vegetation Index, Aquaculture Dollar, Yield Based Dollar Amount of Insurance, Group Risk Plan, Yield Protection, and Area Yield Protection. (3) Supplemental coverage plans include: Stacked Income Protection Plan-Revenue Protection, Supplemental Coverage Option-Revenue Protection, and Supplemental Coverage Option-Revenue Protection with Harvest Price Exclusion, Stacked Income Protection Plan-Revenue Protection, and Supplemental Coverage Option-Yield Protection. (4) Livestock plans include: Livestock Risk Protection and Livestock Gross Margin.

FIGURE F5

Crop insurance payouts are high during droughts, both nationally and in California



SOURCE: Author estimates using RMA "Summary of Business" data.

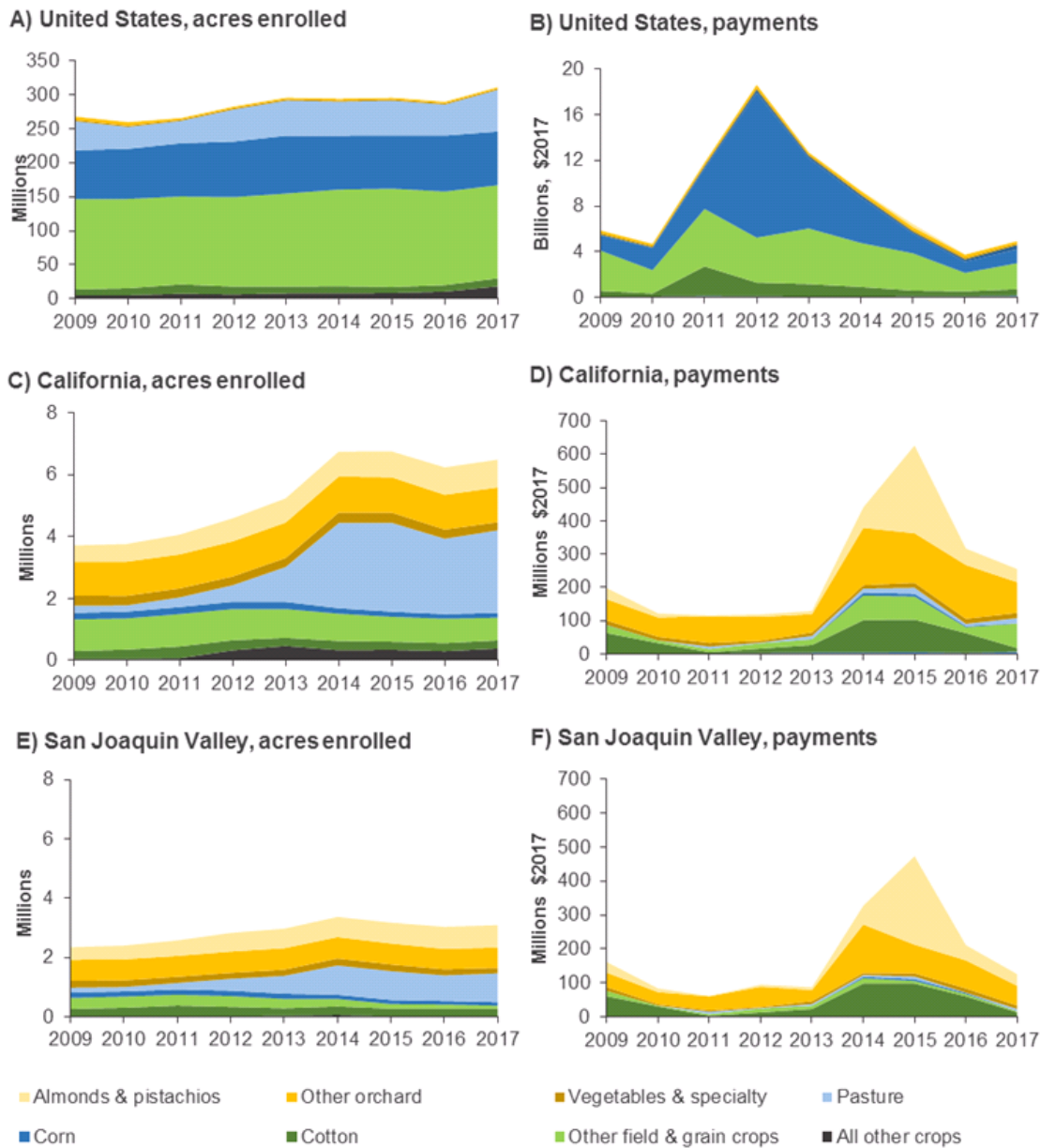
NOTES: Net indemnities are payments to farmers minus their contributions to premiums. They can be negative in years with low payouts (e.g., 2011 in the San Joaquin Valley).

Another way to see the difference between national and California patterns of coverage and indemnities is to compare coverage across major crop groups (Figure F6). Nationally, cotton and the "covered commodities" (corn, other field and grain crops) predominate in both acreage and payouts—with corn receiving by far the largest payments during the Midwest drought. The one crop with substantial enrolled acreage but limited payments is pasture, which has a relatively low value per acre. Specialty crops are of very limited national importance in the program, averaging just 2 percent of acreage and 5 percent of payments.

In California and the San Joaquin Valley, by contrast, a relatively large proportion of total acreage enrolled is in trees and other specialty crops (41% and 54%, respectively), and these crops also account for a large share of indemnities (64% and 68%). However, various field crops are also important, with cotton receiving particularly large payouts during the drought. Acreage enrolled in pasture increased significantly from 2012 onwards—reaching 43 percent of all acres covered by 2015 in California (31% in the San Joaquin Valley), but its share of payouts remained small, reflecting the low values per acreage.

FIGURE F6

Acres enrolled and indemnity payments by crop (2009–17)



SOURCE: Author estimates using RMA "Summary of Business" data.

NOTES: The figure reports total payouts, without subtracting farmer premiums. Net payouts for some crops are negative in some years.

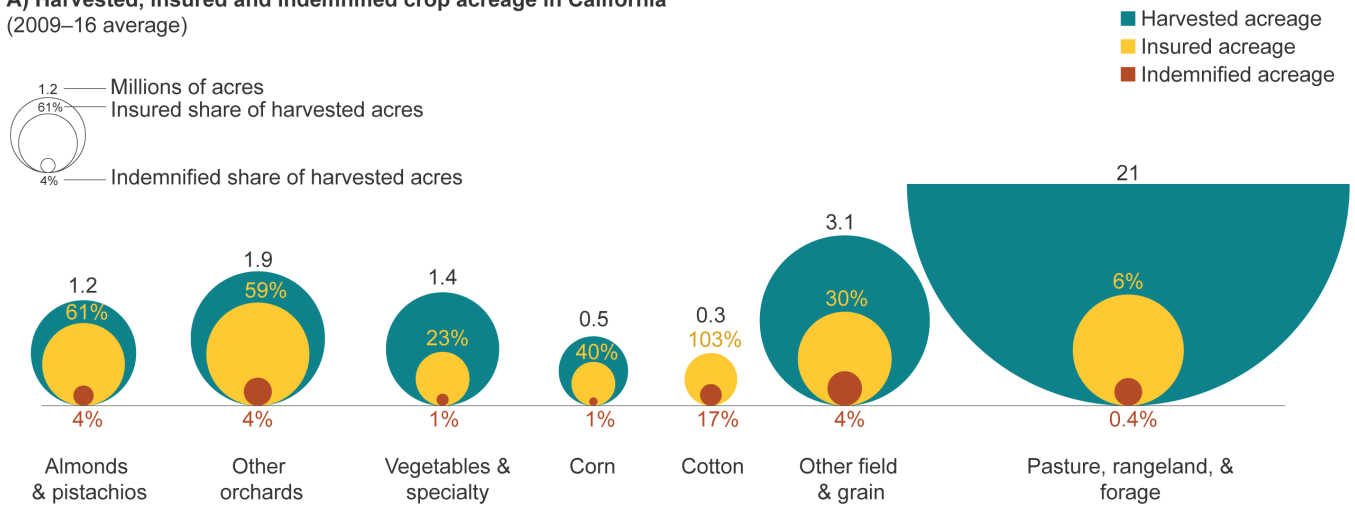
Digging Deeper: Recent Trends in California and the San Joaquin Valley

Figure F7 provides more insights on which crops California and San Joaquin Valley farmers are insuring, and which crops they are collecting insurance payments on. The green circle shows the average harvested acreage for each crop group from 2009 to 2016; the yellow circle shows the insured portion of that acreage, and the red circle shows the portion that was indemnified by the crop insurance program. Enrollment was especially high for cotton—with coverage on virtually the entire crop—and tree crops—with roughly 60 percent of acreage covered. Coverage was also fairly high for cotton (40%), corn (33%) and other field and grain crops (30%).

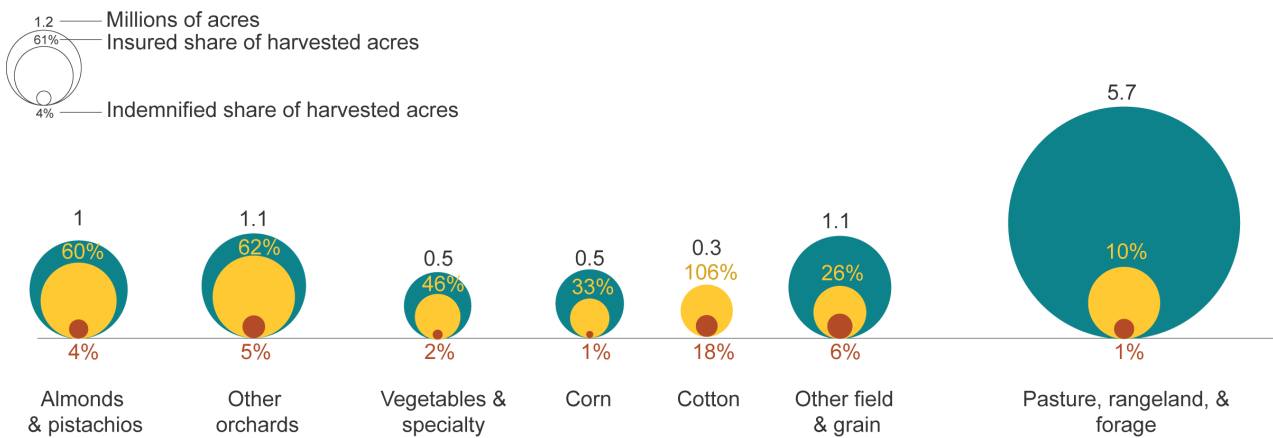
FIGURE F7

High shares of cotton and tree crop acreage are enrolled in crop insurance in California and the San Joaquin Valley

A) Harvested, insured and indemnified crop acreage in California
(2009–16 average)



B) Harvested, insured and indemnified crop acreage in San Joaquin Valley
(2009–16 average)



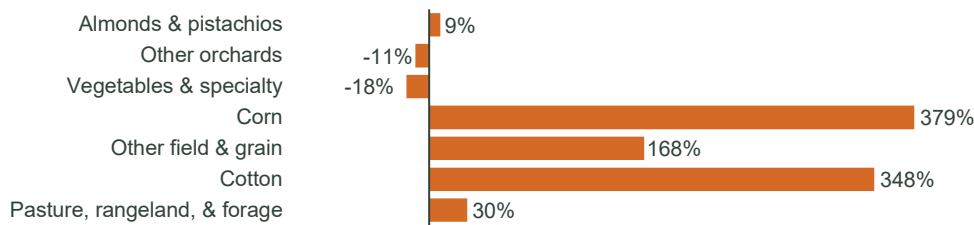
SOURCES: Author estimates using data from NASS county agricultural commissioner data for harvested acreage and RMA “Summary of Business” for acreage enrolled and indemnified.

NOTES: The figure shows the ratio of insured and indemnified acres to harvested acres. For cotton this ratio is higher than 100 percent because insured planted acreage is higher than harvested acreage. “Vegetables & specialty” includes non-tree fruit crops and nursery crops.

Over this period, field crops, pasture, and almonds and pistachios had a positive rate of return on investment in crop insurance (Figure F8). The return was particularly high for cotton and corn, at more than 300 percent. In contrast, on average farmers paid out more in premiums than they received in insurance payments for other orchard crops and vegetables and other specialty crops (mainly non-tree fruits).

FIGURE F8

Crop insurance has an especially high rate of return for annual crops in the San Joaquin Valley



SOURCE: Author estimates using RMA "Summary of Business."

NOTE: The figure reports the average rate of return for 2009–16, calculated as the ratio of net indemnities to farmer premiums.

Figure F9 breaks down the California and San Joaquin indemnity information by cause of loss, showing both acres indemnified and payments made. Before 2014, one of the main ways “covered commodities” acreage was indemnified was through “area protection” policies, which paid producers if the county revenue or yield for the insured crop fell below a certain level.²⁶ These payments were relatively small, however. Other adverse weather conditions (generally conditions that are either too wet or too cold) were important in all years in both acreage indemnified and payouts. In 2014 and 2015, at the height of the California drought, drought-related causes of loss predominated. Because this drought was characterized by unusually high temperatures, which aggravated drought conditions, we include heat and related factors (hot winds, insufficient chilling hours) as a drought-related cause of loss, in addition to water shortages (drought, failure of irrigation supplies).

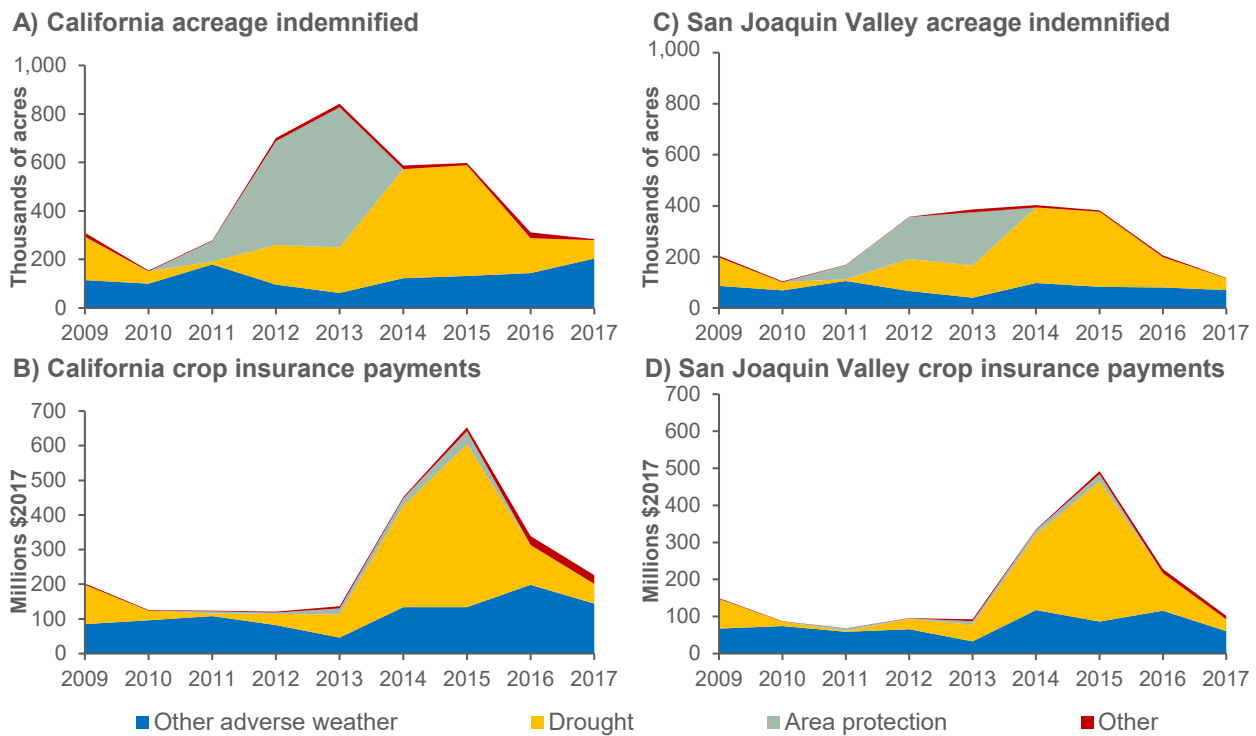
Among drought-related causes of loss, claims were principally made for excessive heat and failure of irrigation water supplies (Figure F10). Perennial crops were the main recipients of payments for heat, as well as for other adverse weather (Figure F11). In contrast, cotton and other field and grain crops were much more likely to be indemnified for failure of irrigation supply. This reflects the difference in coverage available for this cause of loss. Field crops are eligible to be indemnified for “prevented planting” if irrigation water supply shortfalls become apparent *after* the insurance policy is taken out. This option is not available to perennials, which are already planted at the time the policy is written. Thus, insurance for cotton and other field crops—which have generally been declining in importance—can serve as a hedge against water supply shortfalls in California’s (and the San Joaquin Valley’s) predominantly irrigated agricultural systems.

Coverage for failure of irrigation water supply is generally *not* available if the shortfall results from requirements to meet environmental flows, however (USDA RMA 2014). Such shortfalls occur in California, particularly for water delivered to the San Joaquin Valley through the Sacramento–San Joaquin Delta by the Central Valley Project and the State Water Project. And to the extent that groundwater pumping reductions required under SGMA will be *anticipated* as part of groundwater sustainability plans, it is unlikely that crop insurance will be a useful tool for hedging against these cutbacks to irrigation water supplies.

²⁶ In 2014 RMA changed the levels at which payments are triggered (Schnitkey 2014). This may explain the significant decline in use of the program thereafter.

FIGURE F9

Acreage indemnified and crop insurance payments by cause of loss (2009-2017)

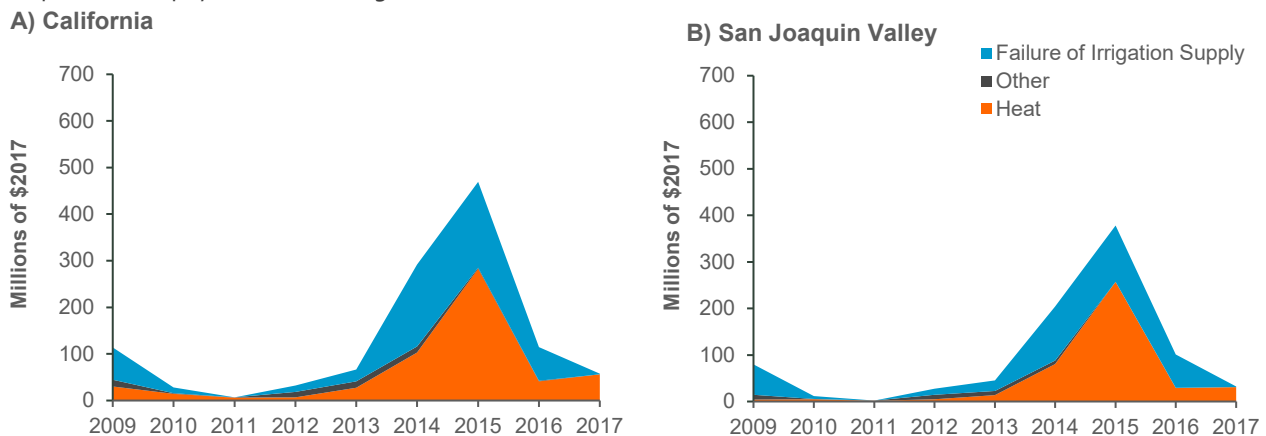


SOURCE: Author estimates using RMA "Cause of Loss" data.

NOTES: The figure reports total indemnity payouts. Crops indemnified under "area protection" in RMA data are corn, grains, pasture, and a category identified as "all other crops." Drought includes the following causes of loss: drought, heat, hot wind, failure of irrigation supply, and insufficient chilling hours. "Other adverse weather" includes: frost, excess moisture/precipitation/rain, cold wet weather, freeze, wind/excess wind, hail, cold winter, flood, tornado, hurricane/tropical depression, snow, lightning, etc. "Other" includes: failure of irrigation equipment, inability to prepare land for irrigation, plant disease and insects, decline in price, earthquake, fire, losses due to wildlife, crops indemnified under supplemental policies, or losses due to state or federal destruction orders.

FIGURE F10

Crop insurance payments for drought-related causes of loss

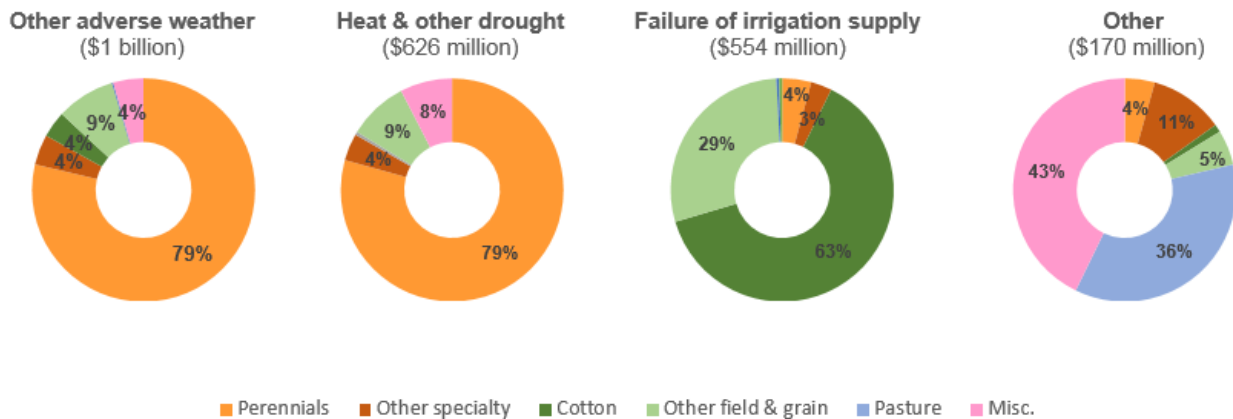


SOURCE: Author estimates using RMA "Cause of Loss" data.

NOTES: The figure reports total indemnity payouts. "Other" causes of loss include insufficient chilling hours, drought, and hot wind.

FIGURE F11

San Joaquin Valley perennials are mainly indemnified for heat and other adverse weather, while cotton and other field crops are a hedge against failure of irrigation water supplies



SOURCE: Author estimates using RMA "Cause of Loss" data.

NOTE: The figure reports total indemnity payouts from 2009–2017. "Other field and grain" includes corn.

Farm Service Agency Disaster Assistance Programs

The suite of disaster assistance programs run by the Farm Service Agency provided nearly \$11 billion nationwide to farmers and ranchers from 2012–17, with \$365 million to California and \$101 million to the San Joaquin Valley. These programs provide assistance during natural disasters and other emergencies. The largest programs support livestock producers.

Adjusted Gross Income Limits

Most programs administered by FSA and the Natural Resources Conservation Service were significantly changed with the 2014 Farm Bill. Each FSA program used to have its own eligibility cap; now most programs are only available to producers not exceeding \$900,000 in adjusted gross income (AGI) over a three-year average (USDA 2016).²⁷ At the national level, this income cap appears likely to limit less than 1 percent of all farms, and may have actually increased the number of farms eligible for programs (Durst and Williams 2016). It is likely that the new limits have reduced the eligible number of farms and farm acreage in California and the San Joaquin Valley. The share of farms excluded by the AGI limits is likely somewhat higher in California than nationally (Table F5). While comparable data are not available at the county level, the share excluded is likely even higher in the San Joaquin Valley. Although there are many smaller farms in the valley, it has some of the largest farms in California, and there has been a trend toward consolidation in recent years (Hanak et al. 2017, Technical Appendix B).

²⁷ Before the 2014 Farm Bill, income limits that applied to some programs were for agricultural income only; now they apply to all income. Programs generally allow farmers that are part of partnerships or joint ventures to participate if their individual incomes are below the cap, but the payments are reduced in proportion to the interest held in the partnership or venture by ineligible individuals (USDA FSA 2016a).

TABLE F5

Farm tax returns by adjusted gross income in California

Adjusted Gross Income	Number of farm tax returns in California	Share of total
Under \$200,000	47,630	78%
\$200,000 under \$500,000	8,270	14%
\$500,000 under \$1,000,000	2,410	4%
\$1,000,000 or more	2,080	3%

SOURCE: Author calculations using 2015 income data from the Internal Revenue Service.

Program Summaries

Here we describe the main program highlights. Programs included in our data, but that were discontinued by the 2014 Farm Bill (or that are otherwise inactive), are denoted with an asterisk. Unless otherwise indicated, the \$900,000 AGI eligibility limit applies.

- **Noninsured Assistance Program (NAP).** Provides coverage to producers whose crops are not eligible for crop insurance. The basic coverage level is 50/55, and additional coverage is available by paying part of the premium. Weather-related factors are the only eligible causes of loss, and producers cannot receive more than \$125,000 annually from the program (USDA FSA 2017).
- **Livestock Forage Program (LFP).** Provides compensation to livestock producers who have suffered grazing losses for covered livestock on pastureland or land planted for grazing. Grazing losses must be due to a qualifying drought or fire condition during the normal grazing period for the county. The LFP monthly payment rate for drought is equal to 60 percent of the lesser of the monthly feed cost for all of the producer's livestock or a calculated estimate of the feed value of the normal carrying capacity of the grazing land. No producers can receive more than \$125,000 in ELAP, LFP, and LIP combined assistance annually (USDA FSA 2018a).
- **Livestock Indemnity Program (LIP).** Provides up to 75 percent of market value to livestock producers for livestock deaths in excess of normal mortality. Eligible losses include adverse weather, eligible diseases, and eligible wildlife attacks. Producers cannot receive more than \$125,000 in ELAP, LFP, and LIP combined assistance annually (USDA FSA 2018b).
- **Emergency Assistance for Livestock, Honeybees, and Farm-Raised Fish (ELAP).** The 2014 Farm Bill authorized up to \$20 million annually for this program. The assistance is provided for losses not covered under LIP/LFP, and the same AGI and payment eligibility requirements apply (USDA FSA 2018c).
- **Tree Assistance Program.** Provides financial assistance to eligible orchardists and nursery tree growers to replant or rehabilitate crops lost to natural disasters. Eligible trees, bushes, and vines are those from which an annual crop is produced for commercial purposes (timber is not eligible). Trees must have suffered more than a 15 percent mortality loss in the stand due to natural disaster. A grower can only receive TAP payments for up to 500 acres annually. No grower can receive more than \$125,000 in TAP assistance annually (USDA FSA 2018d).
- **Dairy Indemnity Program.** Provides payments to dairy producers when they are directed to remove raw milk from the market due to contamination. Payments are also available to producers of dairy products if contamination is due to pesticides. The \$900,000 AGI limit does not apply (Schnepf 2014).
- ***Crop Disaster Assistance Program.** Repealed in the 2014 Farm Bill. The CDP used to provide financial assistance for crop production losses due to natural disasters (USDA FSA 2005).
- ***Supplemental Revenue Assistance Payments (SURE).** Repealed in the 2014 Farm Bill. The program used to provide financial assistance for crop production losses due to natural disasters (USDA FSA 2008).

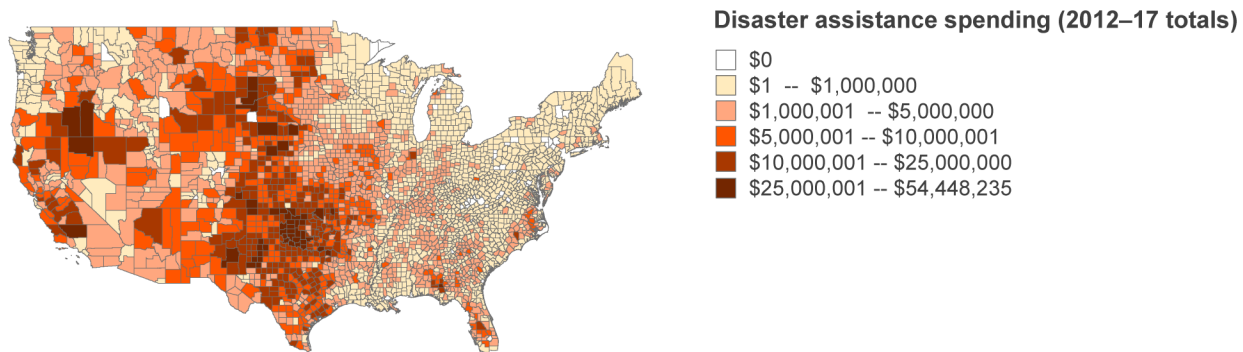
- ***Livestock Compensation Program.** Provided assistance to livestock producers for feed and forage losses due to eligible natural disasters (USDA FSA 2007).

Recent Spending Trends

These programs are most utilized in the western United States, where most livestock producers are located (Figure F12). Figure F13 shows annual spending trends in the US, California, and the San Joaquin Valley for the main disaster assistance programs. Spending was highest in 2014, a drought year across the West. California received roughly 3 percent of US payments, similar to its share of livestock production.²⁸

FIGURE F12

FSA's disaster assistance is mostly provided to producers in western states

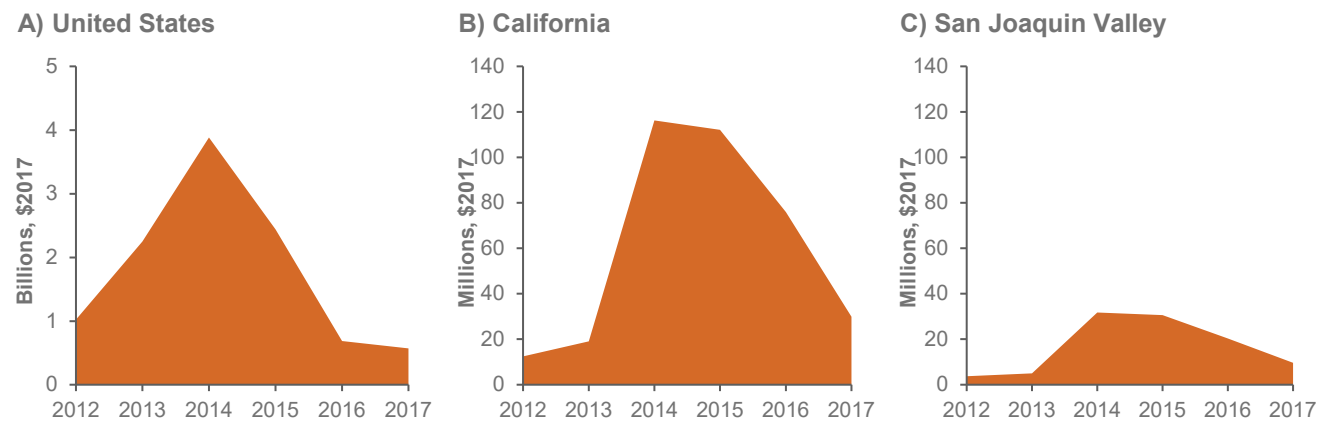


SOURCE: Author estimates using FSA spending data.

NOTE: The figure shows total spending by county for 2012–17, adjusted for inflation to 2017 dollars.

FIGURE F13

In recent years, FSA disaster assistance was highest in 2014, during a west-wide drought



SOURCE: Author estimates using FSA spending data.

NOTE: Spending data are adjusted for inflation to 2017 dollars.

From FY 2012–17, a total of \$365 million in grants and loans were awarded to California under various FSA disaster assistance programs (Table F6). Most of the funding was provided under the Livestock Forage Program, followed by Noninsured Assistance Program. Total funding peaked in 2014, the year with the largest assistance from the LFP (Figure F14).

²⁸ California's average share of non-dairy livestock production from 2012–17 was 3.6 percent (author estimates using USDA Economic Research Service data).

TABLE F6

FSA disaster assistance in California and the San Joaquin Valley, FY 2012–17

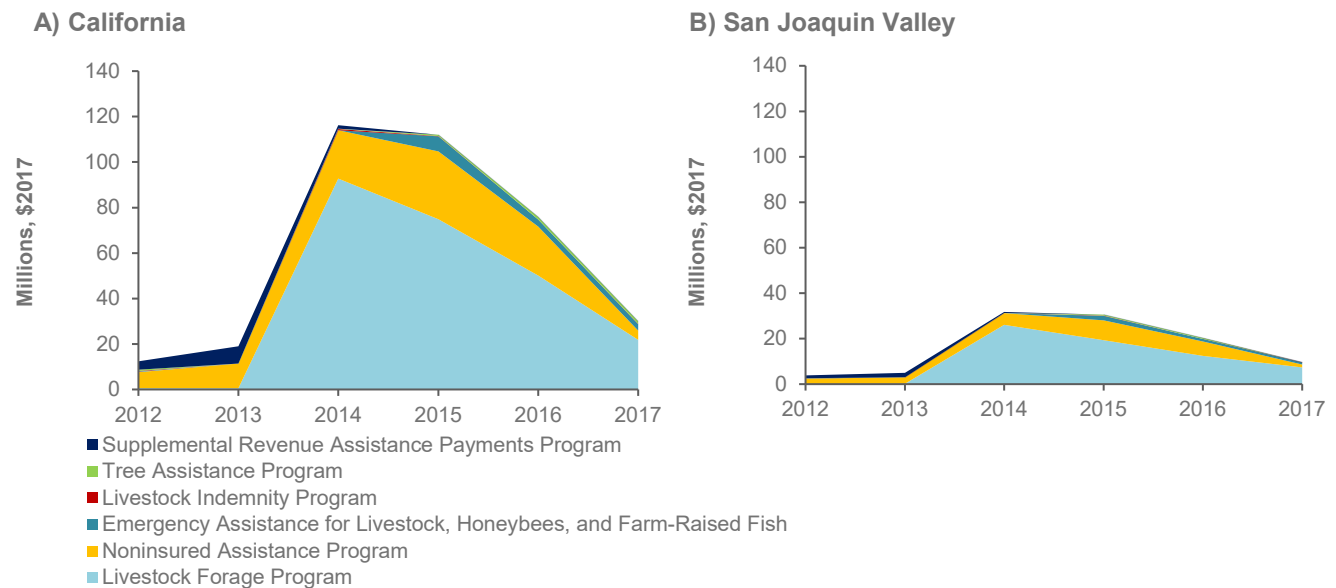
Program	California	San Joaquin Valley	SJV share of California
Noninsured Assistance Program	\$94,658,695	\$26,517,366	28%
Emergency Assistance for Livestock, Honeybees, and Farm-Raised Fish	\$12,777,142	\$4,256,494	33%
Livestock Forage Program	\$240,582,955	\$65,521,785	27%
Livestock Indemnity Program	\$1,090,972	\$47,992	4%
Tree Assistance Program	\$3,391,891	\$1,087,629	32%
Supplemental Revenue Assistance Payments Program*	\$12,917,936	\$3,577,968	28%
Total	\$365,419,591	\$101,009,234	28%

SOURCE: Author estimates using FSA spending data.

NOTES: Spending data are adjusted for inflation to 2017 dollars. The Supplemental Revenue Assistance Payments program was repealed in the 2014 Farm Bill.

FIGURE F14

Annual FSA disaster assistance spending in California and the San Joaquin Valley



SOURCE: Author estimates using FSA spending data.

Key Takeaways on USDA Disaster Assistance

USDA disaster assistance is an important source of financial support for California and San Joaquin Valley agricultural producers, and was crucial during the latest drought. RMA’s crop insurance program has high rates of participation, especially in the San Joaquin Valley, and the rates of return on investment are positive for most crop groups. FSA disaster assistance compensated livestock producers who suffer drought-related grazing losses.

These programs will likely continue to play an important role during future droughts and other disasters. But their respective roles may shift in response to increasing water scarcity as San Joaquin Valley farmers implement SGMA. Insurance coverage for drought-related water shortages in irrigated agriculture is largely limited to cotton and other field crops, for which growers can demonstrate that they were prevented from planting intended acreage. With the exception of silage crops for the dairy and livestock industry, these crops have been in decline since the early 1980s, making way for perennial crops that now cover nearly half of irrigated cropland in the valley. These

same field crops are anticipated to further decline with groundwater pumping reductions under SGMA, as farmers reserve scarce supplies for more profitable uses (Hanak et al. 2019, Chapter 2). But since pumping reductions are likely to be anticipated as part of groundwater sustainability plans, it is unlikely that crop insurance will be a mechanism for hedging this risk.

In contrast, programs that support the livestock sector—including crop insurance for non-irrigated pasture and rangeland, and FSA disaster assistance for grazing losses—could help farmers hedge the risks of transitioning some lands out of irrigation. Grazing will be an important component of land stewardship on non-irrigated lands, and these programs can provide a supplemental source of income, helping to manage the risk associated with high year-to-year variability in precipitation (and grazing needs) on the valley floor.

Resource Stewardship

USDA provides significant funding for resource stewardship and farmland conservation. Most of these programs are operated by NRCS, which provides farmers and ranchers with technical and financial support to improve water use efficiency and to conserve soils, water, and wildlife habitat through on-farm investments. NRCS also runs easement programs that pay farmers to permanently restore their fields to wetlands or to maintain agricultural production on land that might otherwise be developed. Additionally, FSA operates conservation programs, the largest of which is also a type of easement program that pays farmers to idle environmentally sensitive cropland and replace it with a cover crop for 10–15 years.

Broadly speaking the conservation programs in the Farm Bill can be grouped into three categories:²⁹

- **Working land programs**, which focus on resource stewardship on lands in production (e.g., NRCS’s Environmental Quality Incentives Program and Conservation Stewardship Program).
- **Temporary land retirement programs** (under the Farm Service Agency’s Conservation Reserve Program), and
- **Longer term or permanent programs** to convert agricultural lands to wetlands—or to keep land in agricultural production (under NRCS’s Agricultural Conservation Easement Program).

NRCS also provides technical assistance to support these efforts.

The 2014 Farm Bill made significant changes to the conservation title (Stubbs 2014):³⁰

- **It simplified the conservation portfolio.** Prior to the 2014 Farm Bill, NRCS and FSA administered 20 different conservation programs. The bill repealed 12 active and inactive programs, created two new programs, and merged two programs into existing ones.
- **It standardized eligibility limits.** As with most FSA programs, eligibility was generally limited to producers with no more than \$900,000 in AGI over a three-year average. (See the discussion above about implications for California of this change.)
- **It reduced total funding for the conservation title.** An estimated \$3.97 billion decrease over 10 years. To put this in perspective, conservation amounts to 6 percent of total Farm Bill spending, or \$58 billion over 10 years in the 2014 Farm Bill.

²⁹ For a helpful discussion, see Stubbs (2014).

³⁰ As noted earlier, it also required producers receiving crop insurance subsidies to comply with conservation guidelines for highly erodible lands and wetlands.

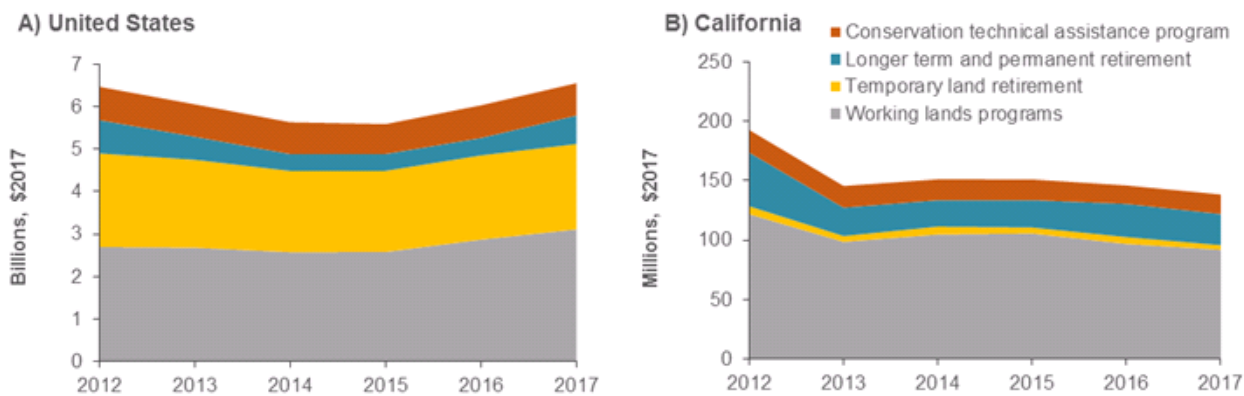
The 2018 Farm Bill broadly maintains the programs and eligibility limits of the 2014 Farm Bill, at roughly the same overall size.³¹ As described below, the new law makes some changes which will increase flexibility in the use of funds (e.g., making irrigation districts eligible for some awards).

National and California Spending Trends

Over the last three farm bills, working land programs have been growing in popularity. The shift is partly due to high commodity prices in recent years and changing land rental rates, which have reduced interest in temporary or permanent land retirement (Stubbs 2014). Working land programs are especially popular in California (Figure F15), where they’ve accounted for 67 percent of total agricultural conservation funding annually—or approximately \$103 million per year—from 2012–17. Longer term and permanent retirement is a smaller share, averaging \$29 million per year. At just \$4 million annually, FSA’s temporary land retirement programs are not widely used in California. In contrast, they accounted for 32 percent of annual conservation spending nationally from 2012–17.

FIGURE F15

Working land programs are the most popular stewardship programs, especially in California



SOURCES: Author estimates using NRCS and FSA spending data.

Relevant Program Details

Here we provide an overview of resource stewardship programs administered by NRCS and FSA (Stubbs 2018). Programs included in the earlier years of our spending review, but discontinued with the 2014 Farm Bill, are denoted with an asterisk (*). California is not currently eligible for several smaller programs.³²

Working Lands

- Environmental Quality Incentives Program (EQIP).** Provides financial and technical assistance to producers and landowners to plan and install conservation practices on eligible lands, to alleviate natural resource problems. At least 60 percent of EQIP funds must target practices benefiting livestock nationwide, and \$25 million must be spent for air quality. The minimum one-year contract length was waived in the 2014 Farm Bill. Five percent of EQIP funds are allocated for wildlife habitat practices, as a replacement for the Wildlife Habitat Incentive Program (WHIP), discontinued in the 2014 Farm Bill. Payment limitations

³¹ The Congressional Budget Office (2018) indicates that there will be an additional \$555 million for conservation over five years relative to the baseline, but a decrease of \$6 million over ten years, but ten year baseline is a decrease of 6 million. Some shifting of funds will occur among the specific programs.

³² This includes Agricultural Management Assistance, which assists producers in 16 states implement various conservation practices, the Healthy Forests Reserve Program, which provides long-term contracts and permanent easements to restore forest ecosystems in selected states, and the Water Bank Program, which provides long-term support to keep water on the land for the benefit of migratory wildlife such as waterfowl. (NRCS n.d.).

are set at \$450,000 for a single producer from FY 2014–18. Starting in 2015, eligible producers' average AGI cannot exceed \$900,000. The 2018 Farm Bill expands the EQIP program, and adds some additional flexibility by authorizing irrigation districts and other water management entities to directly receive funds for some conservation practices (Moran, 2018).

- **Conservation Innovation Grants (CIG).** Part of the EQIP program, CIG provides competitive grants for innovative conservation tools, strategies, and technologies for working lands, and market-based conservation approaches. Multi-year projects are possible, but not to exceed three years. Projects may be watershed-based, regional, multi-state, or nationwide in scope. The natural resource concerns eligible for funding through CIG may change annually to focus on new, emerging, and high priority natural resource concerns. FY 2011 saw the highest level of awards (\$29 million nationally), followed by FY 2016 (\$26.5 million). Since the program began in 2004, CIG funding totals \$286.7 million for 711 projects. Environmental Defense Fund's Central Valley Habitat Exchange Model is an example of a California project funded in 2016 (USDA 2016). CIG has also supported piloting work to recharge groundwater on San Joaquin Valley farmland (Bachand et al. 2016).
- **Conservation Stewardship Program (CSP).** Provides financial and technical assistance for working lands; it is aimed at producers interested in expanding or enhancing their already ongoing conservation efforts. Contracts are five years in length, with renewal options. There are two types: an annual payment for installing new and maintaining old conservation practices, and a supplemental payment for adopting a resource-conserving crop rotation. The Farm Bill sets a national enrollment cap at 10 million new acres per year. CSP contracts cannot exceed \$200,000 to a person or legal entity during the five-year period from FY 2014 through FY 2018. Land enrolled in retirement or easement programs (e.g., CRP and ACEP, described below) is not eligible. Starting in 2015, the producer's average AGI cannot exceed \$900,000. Stakeholders and USDA staff interviewed for this study noted that the program rules are generally too rigid to be attractive in the California context, since farmers must commit to a fixed set of practices for a fixed area of land over the entire five-year period—something that is more challenging to do in California's highly diversified agricultural economy.
- **Regional Conservation Partnership Program (RCPP).** Launched with the 2014 Farm Bill to provide financial and technical assistance for multi-state or watershed-scale projects. This represents a shift relative to most conservation programs, which are provided to individual farmers. Project areas are defined by eligible partners and are selected through a competitive state or national competition. Partnership agreements are for five years with a possible one-year extension. In addition to defining the project area, providing assistance, and possibly acting on behalf of the producers within the project area, partners must also provide a "significant portion" of the overall cost of the project. Funding is statutorily divided into three areas: critical conservation areas (CCAs) selected by NRCS (35%), national projects (40%), and state projects (25%). The RCPP receives 7 percent of available covered conservation program funds (EQIP, CSP, ACEP, and HFRP) plus an additional \$100 million annually. Current CCAs include the Chesapeake Bay Watershed, Great Lakes Region, Mississippi River Basin, Colorado River Basin, Longleaf Pine Range, Columbia River Basin, Prairie Grasslands Region, and the California Bay-Delta—a region that includes the San Joaquin Valley. The AGI limits can be waived for participating producers if NRCS determines that the waiver is necessary to fulfill the objectives of the project. The 2018 Farm Bill foresees an expansion of the RCPP—with a tripling in funds available.
- **Emergency Watershed Protection (EWP).** Provides funds for clean-up and recovery in watersheds that have been impacted by natural disasters.
- **Emergency Conservation Program.** Administered by FSA. Provides funding and technical assistance to producers to recover after natural disasters. Activity examples include emergency water conservation in the case of droughts, or removing debris from other natural disasters such as floods.
- **Emergency Forest Restoration Program.** Administered by FSA. Cost share assistance to private forest owners to repair damage on private forest lands from natural disasters.

- **Source Water Protection Program.** A joint program by FSA and the National Rural Water Association (NRWA) to help prevent source water pollution by installing voluntary practices on the local level. State branches of NRWA deliver technical assistance to landowners in the development of source water protection plans. Recent appropriation levels nationally ranged from \$10 million in FY 2014, to \$6.5 million in FY 2016 (USDA FSA 2016b).
- ***Agricultural Water Enhancement Program (AWEP).** Repealed in the 2014 Farm Bill. A subprogram of EQIP used to provide assistance to producers to implement water enhancement activities on agricultural land to conserve surface and ground water and improve water quality. Participants entered into multi-year agreements with NRCS.
- ***Wildlife Habitat Incentive Program (WHIP).** Folded into EQIP by the 2014 Farm Bill. WHIP provided assistance to landowners who wanted to implement conservation practices that benefit wildlife habitat.

Temporary Land Retirement

- **Conservation Reserve Program (CRP).** Administered by FSA. Provides annual rental payments to producers over a 10–15 year period to replace crops on environmentally sensitive lands with long-term, resource-conserving plantings. The main CRP program has a sign-up period during which bids to enroll land are accepted. Bids are chosen using an “environmental benefits index” that includes the following factors: wildlife, water quality, erosion, enduring benefits, air quality, and cost.

CRP also includes subprograms addressing specific resource concerns, which are available for continuous sign-up throughout the year. These include CREP and FWP (both described below) and TIP—the Transition Incentive Program, which allows land from expiring CRP contracts to be transitioned back into sustainable grazing or crop production by a beginning, veteran, or socially disadvantaged farmer or rancher. Over time, other habitat- and geography-specific programs have been created (e.g., longleaf pine plantings, and SAFE—state acres for wildlife enhancement). In addition to rental payments, some programs include cost-share payments for implementing stewardship practices.

CRP rental rates are based on the county average land rental rate and a measure of soil productivity (a calculation that determines the ability of land to produce crops on non-irrigated soil). The 2014 Farm Bill reduced the total acreage ceiling to 24 million acres enrolled as of FY 2018. Producers exceeding \$900,000 average AGI are ineligible, and the total annual rental payment to a person/legal entity should not exceed \$50,000. If landowners choose to leave CRP before their contract is up, they must repay all of the benefits paid to them, with interest and other fees. As of 2013, CRP payments are considered a part of taxable farm income. Hunting can be conducted on CRP lands.³³

- **Conservation Reserve Enhancement Program (CREP).** A sub-program of CRP involving a partnership with states at their request. States propose sub-state areas, such as a watershed, where environmental or resource concerns are more concentrated and can be addressed by enrolling up to 100,000 acres per project. States contribute 20 percent of the funding to allow for larger payments, in order to encourage greater participation. Sign-up is held on a continuous basis. There are 47 CREP agreements in 34 states, including 64,057 contracts on 43,071 farms, enrolling a total of 1.1 million acres, as of September 2017 (Stubbs 2018). Some western states—including Colorado, Idaho, Kansas, and Nebraska have used CREP as a mechanism to idle land to reduce irrigation water withdrawals.³⁴ There are no CREP programs in California.
- **Farmable Wetlands Program (FWP).** Administered by FSA. This is also a sub-program of CRP, capped at 750,000 acres nationally, and no more than 100,000 acres in any state. It enrolls small isolated agricultural wetlands of no more than contiguous 40 acres per tract of land. Eligible lands include wetlands

³³ Useful references on CRP include: CRS (2014) on program details and issues; Hellerstein (2017) on the evolution of CRP enrollment; and Hellerstein and Malcolm (2011) on CRP enrollment issues, including the disincentive role of low rental rates and high commodity prices.

³⁴ See the descriptions of state programs on the [CREP webpage](#).

that were cropped in three of the preceding 10 years, on which wetland conditions are restored and vegetative cover established.

Longer Term or Permanent Land Protection

- **Agricultural Conservation Easement Program (ACEP).** Provides financial and technical assistance through two types of easements: (1) Agricultural Land Easement (ALE) and (2) Wetland Reserve Easement (WRE):
 - **ALE easements:** USDA is required to partner with eligible entities (state, local government, or nonprofit) to purchase agricultural land easements, with intent to keep them in agricultural production. The federal share of easement acquisition cannot exceed 50 percent of the appraised fair market value, or 75 percent if it is determined to be a grassland of special environmental significance. Eligible parcels must include at least 50 percent prime, unique, statewide, or locally important farmland. The easement is held by the local entity, which provides a degree of local control on the specifics of the easement as long as NRCS requirements are met.
 - **WRE easements:** NRCS provides technical and financial assistance directly to landowners. Eligible land includes farmed or converted wetland that can be successfully and cost-effectively restored. Enrollment options include: 1) permanent easement, where NRCS pays for 100 percent of the purchase, and covers 75–100 percent of restoration costs; 2) 30-year easements, where NRCS pays for 50–75 percent of the purchase and covers 50–75 percent of restoration costs; 3) term easements or the maximum duration under state law, for which cost shares are same as for 30-year easements; 4) 30-year contracts—only available to tribes—with cost shares the same as for 30-year easements. The easement is held by the United States, which makes adjustments in easement terms more difficult than for ALE easements. WRE easements allow some land uses, such as certain recreation activities, including hunting. The landowner maintains subsurface rights and water rights on the property, which could be important in the context of water allocations and recharge in the context of SGMA implementation.

California was the largest recipient of ACEP funding in FY 2016 (\$23.1 million). The standard AGI requirement applies.

- ***Grassland Reserve Program (GRP).** Provided long-term easements and contracts and permanent easements to landowners to voluntarily protect grazing lands from future cropping and/or development, not including forage production. Repealed in the 2014 Farm Bill and folded into the ACEP program.
- ***Wetlands Reserve Program (WRP).** Provided payments to landowners who wanted to restore and protect wetlands on their properties. Repealed in the 2014 Farm Bill and folded into the ACEP program.
- ***Farm and Ranch Land Protection Program.** Provided funds to keep agricultural lands in production. Repealed in 2014 Farm Bill and folded into the ACEP program.

Conservation Technical Assistance Program

Technical assistance in resource stewardship is administered by NRCS. Activities include assistance in drafting resource conservation plans, planning and designing conservation practices, and assessing effects of conservation practices on the land. Conservation plans developed through conservation technical assistance can be implemented through NRCS conservation programs. Stakeholders we interviewed suggested that the service has a good track record of partnership in California and the San Joaquin Valley, but that the availability of NRCS technical assistance staffing can be a constraint to more on-the-ground cooperation.

Recent Spending Trends in California and the San Joaquin Valley

Table F7 provides a breakdown of 2012–17 spending in major conservation programs, for the United States, California, and the San Joaquin Valley. California is a major recipient of EQIP funding—NRCS’s largest single

program—with 6 percent of roughly \$8 billion in total obligations. California receives a much smaller share of CSP funding (0.1% of roughly \$6.2 billion). California participation is also limited in the CRP, at just 0.3% of the national total. These programs are better suited for midwestern states, where participation is much higher.

TABLE F7
Funding for major conservation programs, 2012–17 (thousands of 2017\$)

	United States	California	San Joaquin Valley	California share of US	SJV share of CA
Working land programs	16,521,831	619,708	288,761	4%	47%
Environmental Quality Incentives Program (EQIP)	8,747,532	568,579	274,545	6%	48%
Conservation Stewardship Program (CSP)	6,207,436	4,875	348	0.1%	7%
Regional Conservation Partnership Program (RCPP)	160,184	7,550	406	5%	5%
Emergency Watershed Protection (EWP)	767,581	6,452	-	1%	-
Emergency Conservation Program (administered by FSA)	237,322	5,662	436	2%	8%
Emergency Forest Restoration Program	50,253	-	-	-	-
*Agricultural Water Enhancement Program (AWEP)	146,963	24,806	13,027	17%	53%
*Wildlife Habitat Incentive Program (WHIP)	157,897	1,181	-	1%	-
+Agricultural Management Assistance (AMA)	26,579	-	-	-	-
+Healthy Forests Reserve Program	20,083	603	-	3%	-
Temporary land retirement programs	11,738,955	25,021	853	0.2%	3%
Conservation Reserve Program (CRP) (including CREP and other subprograms)	11,738,955	25,021	853	0.2%	3%
Longer term and permanent land protection programs	3,543,579	175,875	8,344	5%	5%
Agricultural Conservation Easement Program (ACEP)	1,524,409	90,583	4,700	6%	5%
*Grassland Reserve Program (GRP)	340,810	7,686	1,171	2%	15%
*Wetlands Reserve Program (WRP)	1,380,796	68,321	110	5%	0%
*Farm and Ranch Land Conservation Program	297,564	9,285	2,363	3%	25%
Conservation technical assistance	4,536,518	104,263	4,936	2%	5%
Total	36,340,883	924,868	302,895	3%	33%

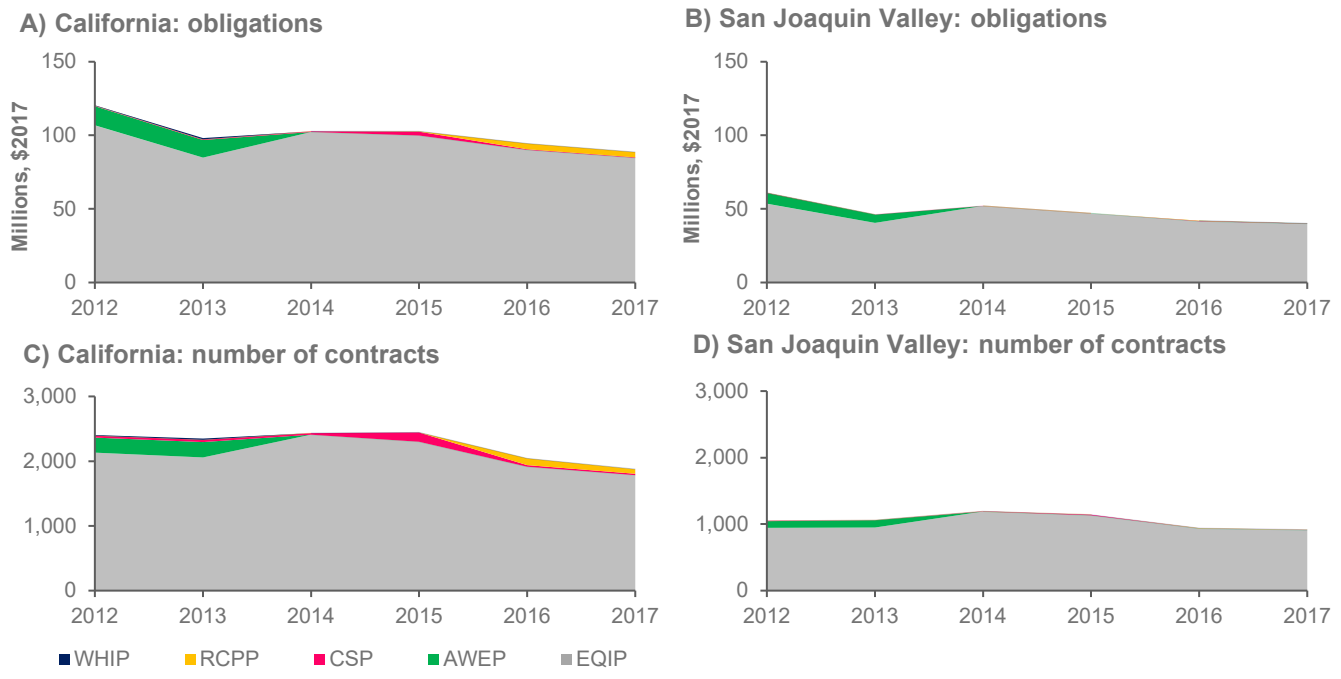
SOURCES: Author estimates using NRCS spending data and online Program Results Data for the United States.

NOTES: This table does not include spending for several smaller NRCS conservation programs, for which the data was not available. Programs discontinued with the 2014 Farm Bill are denoted with an asterisk (*), and programs for which California is not currently eligible are denoted with a plus sign (+). Values shown in *italics* for the San Joaquin Valley were estimated based on total spending in those programs in California, and the share of acres enrolled in the valley for the same programs.

Working land programs are the predominant form of conservation spending in California and the San Joaquin Valley. Figure F16 shows trends from 2012–17 for funding obligations for the main programs, along with the number of contracts—a proxy for the number of participants. Consistent with planned declines in conservation programs with the 2014 Farm Bill, total obligations declined somewhat over the period as some of the older programs—and particularly AWEP—were phased out (Claassen 2014). EQIP—always the largest program both for California and the San Joaquin Valley—is even more important since 2014. From 2012–17 EQIP accounted for 61 percent of the \$925 million obligated to California and 91 percent of the \$303 million obligated in the San Joaquin Valley.

FIGURE F16

Main working land conservation program trends in California and the San Joaquin Valley



SOURCE: Author estimates using NRCS spending data.

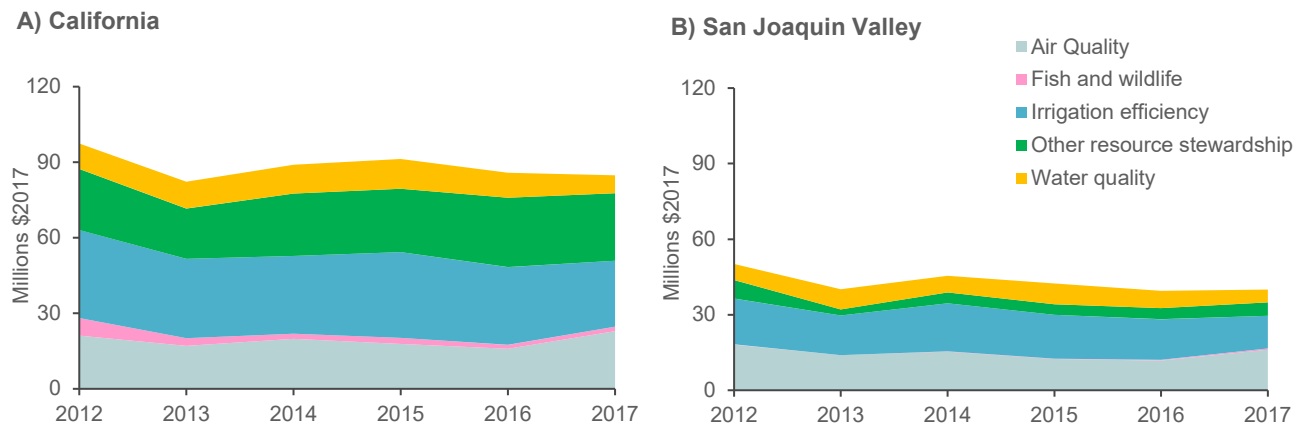
NOTES: The figure shows the funding obligations and number of contracts issues under the EQIP and AWEP programs. AWEP was discontinued in the 2014 Farm Bill.

Figure F17 provides more detail on EQIP and the former AWEP programs for California and the San Joaquin Valley, breaking down spending into five broad areas of resource stewardship on working lands:

- **Irrigation efficiency:** Funding to support irrigation system upgrades on farms is a major EQIP program, accounting for \$189 million in obligations in California and \$99 million in the San Joaquin Valley since 2012. Over this period, 106,428 acres in San Joaquin Valley were converted to low-water irrigation systems with USDA assistance.
- **Air quality:** This is another major area of focus in both California (\$115 million since 2012) and the San Joaquin Valley (\$88 million)—principally with assistance to farmers to convert older diesel engines on farm equipment to cleaner engines to comply with emission regulations (NRCS 2011).
- **Water quality:** This category principally supports activities to manage water quality on dairies, which face significant management challenges to prevent nitrate loading from lagoons and especially the application of manure fertilizers on cropland (see Hanak et al. 2019, Chapter 3). With roughly 85 percent of the state’s dairy cows, San Joaquin Valley farmers are the largest recipients of this funding in California (\$41 million since 2012, of a statewide total of \$61 million).
- **Fish and wildlife:** Programs to support fish and wildlife include activities to improve habitat on or adjacent to working lands—e.g., protecting on-farm streambanks and shorelines, installing hedgerows for pollinators, or creating artificial structures to enhance wildlife habitat. Statewide, this funding accounted for \$18 million since 2012—but very little (just \$1 million) was spent in the San Joaquin Valley.
- **Other resource stewardship:** A variety of activities were supported to improve soil health, reduce livestock impacts on sensitive lands (e.g., with fencing), improve the health of forested areas, and improve energy efficiency. In total, these programs accounted for \$148 million in California since 2012, and \$28 million in the San Joaquin Valley.

FIGURE F17

EQIP and AWEF spending by major resource concern



SOURCE: Author estimates using NRCS spending data.

NOTE: As described in the text, AWEF was discontinued in the 2014 Farm Bill.

Key Takeaways on USDA Support for Resource Stewardship

California and the San Joaquin Valley already receive significant funding for resource stewardship on farms and ranches. From 2012–17, this spending averaged roughly \$155 million and \$50 million per year, respectively. Most funding comes through EQIP, now especially focused on establishing more efficient irrigation systems and replacing old diesel engines on farms. A much smaller share of funds in California—and barely any in the valley—went toward temporary or permanent easements to manage lands for conservation purposes or to protect agricultural land from development.³⁵ Low enrollment in these programs reflects a variety of factors, including low payments relative to California’s high land values for irrigated cropland. In particular, the rental rates for the largest of these programs—FSA’s Conservation Reserve Program—are based on non-irrigated land productivity, which does not provide an adequate financial incentive for repurposing irrigated lands in the San Joaquin Valley.

Managing water scarcity and bringing groundwater basins into long-term balance under SGMA will require continued adaptation of resource stewardship approaches in San Joaquin Valley agriculture. Priorities include finding cost-effective ways to augment water supplies—particularly by recharging groundwater basins with available water in high-flow periods—and managing demand in ways that are as protective as possible of the regional economy, public health, and the environment. This includes making the best use of more than half a million acres of currently irrigated cropland that will need to transition to other uses. USDA conservation programs in the valley are not currently focused on helping to address these challenges, but there is ample potential for them to do so.

Here are some ideas for consideration, based on our analysis of promising solutions to the valley’s challenges (Hanak et al. 2019) and discussions with stakeholders and USDA staff:

Supporting Groundwater Recharge

One of the most cost-effective ways to recharge groundwater basins is by spreading high-flow water on suitable farmland (Hanak et al. 2018). Roughly half of the more than 5 million acres of irrigated cropland on the valley floor have at least moderately good soils to support recharge, and this is also true for the roughly 3 million acres

³⁵ Because permanent easements are held in perpetuity, the portfolio of easement lands is larger than is reflected by spending in the 2012–17 period.

of rangeland and other open space.³⁶ Along the valley’s east side, agricultural lands surrounding many of the valley’s urban communities (their “spheres of influence” where they are slated to expand) have especially suitable soils (Jezdimirovic 2018 and Hanak et al. 2019, [Technical Appendix E](#)). A 2017 survey of the valley’s water managers found that interest in expanding recharge is high, and that on-farm recharge is well below potential (Hanak et al. 2018).

USDA conservation programs are currently limited in their ability to actively support groundwater recharge, because groundwater depletion is not an officially recognized resource concern, and is not analyzed in programmatic documents that support the EQIP program.³⁷ As a result, NRCS staff need to find other resource concerns (e.g., water quality) to justify support for relevant EQIP conservation practices, such as investments to manage drainage on fields. Agency staff in California have found that the RCPP—which can address issues from a broader watershed perspective—offers some flexibility to support recharge efforts more directly. Changes under the 2018 Farm Bill, which will authorize irrigation districts to directly apply for and receive EQIP funding, might also help by facilitating investments in local conveyance to help get water to suitable fields. But ultimately, making groundwater depletion an official resource concern could help utilize EQIP funds to support groundwater sustainability more directly in California and the many other states where groundwater overdraft is an important issue for agricultural water management.

In the near term, NRCS should seek to avoid the unintended consequences of EQIP investments in irrigation efficiency, which have made on-farm recharge more difficult. In most years, surface water provides a significant share of irrigation water supplies in the valley. Historically, the water not consumed by crops or evaporated from soils was a major source of recharge for the valley’s groundwater basins. This practice has declined as farmers have shifted toward irrigation systems that apply less water to fields. While low-water irrigation has many other benefits—including improving crop quality and reducing polluted runoff—it does little to improve the water balance, and it is increasingly recognized as a limiting factor for on-farm recharge.³⁸ Making sure that farmers do not disable the furrow irrigation systems they are replacing, and supporting technical assistance to install low-water systems in ways that are most compatible with recharge when extra surface water is available, could make these investments more compatible with broader water management goals.

Finally, there may be potential to use the Agricultural Conservation Easement Program to support groundwater recharge. In particular, the Agricultural Land Easement component of this program—which compensates landowners for not developing agricultural land—might be a useful vehicle for protecting some farmlands with high recharge suitability which are in urban spheres of influence. This might be especially useful for maintaining some farmlands in uses that generate lower profits—such as alfalfa or non-irrigated rangeland—but support multiple benefits.³⁹

Supporting Stewardship on Non-Irrigated Lands

With the expected land use changes in the valley, USDA conservation programs can also contribute meaningfully to stewarding non-irrigated lands. Farmers are likely to permanently retire some lands, and rotate other lands in

³⁶ This is true using both a measure of surface soil conditions from UC Davis and a measure that also considers suitability of conditions at deeper levels within the aquifer from the company Land IQ (see Hanak et al. 2019, Chapter 3 and [Technical Appendix E](#)).

³⁷ Conservation practices funded through EQIP are meant to address an administratively defined set of resource concerns. Programmatic environmental reviews of these resource concerns under the National Environmental Policy Act makes it possible for NRCS to streamline the approval of individual awards.

³⁸ Irrigation efficiency does little to improve the overall water balance because it mainly reduces return flow, not evapotranspiration from crops and soils (See Hanak et al. 2019, Box 2.1). In our 2017 survey on groundwater recharge, 42 percent of agricultural water managers in the valley reported that drip irrigation systems were a barrier to recharge in their districts (Hanak et al. 2018).

³⁹ Alfalfa is a relatively flexible crop that is particularly suitable for recharge because it does not require nitrogen fertilizer and it is usually flood irrigated. It also provides habitat for birds. Non-irrigated rangeland can be managed for intermittent recharge and habitat purposes, with grazing as a vegetation management strategy.

and out of irrigated crops. There is a spectrum of potential conservation objectives to consider on these lands, from mitigating the harmful impacts of dust, pests, and weeds; to building soil health and storing carbon; to providing habitat opportunities for native species (See Hanak et al. 2019, Table 4.1 and related discussion).

NRCS already recognizes many relevant resource concerns related to these stewardship objectives, and the 2018 Farm Bill’s conservation program descriptions have been updated to include soil health and carbon sequestration as targeted outcomes.⁴⁰ EQIP, in particular, can support a portfolio of relevant management practices. The RCPP is another useful vehicle, given its flexibility to manage at a watershed scale, involve a wider set of partners, and waive the AGI requirement for participating producers when there are programmatic reasons for doing so. Such waivers might be warranted for strategic, coordinated stewardship of lands coming out of production. Unlike investments in practices such as irrigation efficiency, these activities do not generally increase revenue-generating potential on farmlands; they improve ecosystem services and public health. Moreover, given the structure of valley farming, there is a likelihood that larger growers will own some of the lands that are most suitable for transitioning from a broader planning perspective.

There is also potential for using other longer term programs—including the Conservation Stewardship Program and the Conservation Reserve Program—for these purposes. Although the CSP is sometimes seen as too rigid for use on irrigated cropland in California, its combination of payments and support for management practices may make it useful as a complement to stewardship efforts launched under EQIP or RCPP. And while the regular CRP is not ideal for California—both because of its enrollment cap and its restrictions on land grazing—this program includes special initiatives that can be regional in nature. In particular, the Conservation Reserve Enhancement Program might be especially suitable in the valley, because it could be used to incentivize enrollment of large areas of land in a coordinated manner. Several other western states are already using CREP to support irrigated land reduction as part of their water savings strategies. Establishing a CREP for the valley would require state leadership, because CREPs are created through state and federal partnerships.

The key will be looking for ways to leverage the opportunities afforded by the various programs, to see how they might work—alone and in combination—to support both temporary and long-term fallowing. The fact that these lands are now irrigated presents opportunities to jumpstart transitions in innovative ways—for instance, using irrigation to help establish native plants or other cover crops that will protect soils once irrigation ends. Valley farmers and communities will need partners to help them with the technical aspects of finding what works best on these lands, as well as funding to help cover the costs. NRCS is already a familiar partner on the ground—particularly through the EQIP program—which presents an advantage for the work ahead.

Building USDA’s Partnership with the San Joaquin Valley on Sustainable Groundwater Management

USDA programs for rural water infrastructure, disaster assistance, and resource stewardship already provide important support to valley communities, farmers, and ranchers. As the region takes on the challenge of managing groundwater sustainably, while tackling other urgent issues such as access to safe drinking water, USDA can leverage these programs to increase their impact.

⁴⁰ The new Farm Bill earmarks \$25 million annually for on-farm conservation innovation trials that test emerging conservation approaches. EQIP funding under the 2014 Farm Bill has supported carbon farm planning through Resource Conservation Districts in five San Francisco Bay Area counties (see [link](#)).

Safe Drinking Water in Rural Communities

Groundwater is the primary source of drinking water in the San Joaquin Valley, particularly in small rural communities. As the region works to implement SGMA, ensuring safe and reliable drinking water in these communities will remain an urgent priority. Relative to the extent of the safe drinking water problem in the valley, this region receives a fairly limited share of USDA funding for rural water infrastructure. But Rural Utilities Service programs are appreciated for their nimbleness—particularly their ability to quickly disburse funds once approved—and they were especially helpful for addressing water shortages when shallow domestic and community wells went dry during the 2012–16 drought. The fact that most RUS funding contains a loan component may limit its attractiveness in the current funding environment, when state grants are available for capital investments. Beyond funding, technical and managerial gaps are also a major challenge for water systems in these communities.

Efforts to strengthen the complementarity between RUS and state programs could improve safe drinking water efforts. Greater RUS support for nonprofits to provide technical assistance and revolving loan funds for rural communities could increase the capacity to develop and implement viable projects. Working with state and local partners to develop early warning systems that identify vulnerable areas can limit the exposure of households and communities to drinking water shortages in future droughts. This could make it possible for RUS to more quickly activate its emergency water assistance programs.

Disaster Assistance for Farmers and Ranchers

USDA disaster assistance is an important source of support for California and San Joaquin Valley agricultural producers, and provided crucial support during the latest drought. RMA’s crop insurance program has high rates of participation in the San Joaquin Valley, and the rates of return on investment are positive—particularly for cotton and other field crops. FSA’s disaster assistance compensated livestock producers who suffered drought-related grazing losses.

Although these programs will likely continue to be important during future droughts and other disasters, their roles may shift as San Joaquin Valley farmers implement SGMA. Since pumping reductions are likely to be anticipated in groundwater sustainability plans, it is unlikely that crop insurance will be a mechanism for hedging this risk. In contrast, programs that support the livestock sector—including crop insurance for non-irrigated pasture and rangeland, and FSA disaster assistance for grazing losses—could help farmers hedge the risks of transitioning some lands out of irrigation. Grazing will be an important component of land stewardship on non-irrigated lands, and these programs can provide a supplemental source of income, helping to manage the risk associated with high year-to-year variability in precipitation (and grazing needs) on the valley floor.

Resource Stewardship

There appears to be considerable potential for USDA conservation programs to support sustainable groundwater management in the San Joaquin Valley, and changes introduced with the 2018 Farm Bill will increase USDA’s capacity to provide this help. Funding for EQIP—the largest conservation program in the valley—has been increased, and the program is now available to support projects by local water management agencies and associations as well as farmers. Funding has tripled for the innovative RCPP program, which leverages public and private dollars to tackle regional conservation challenges, and the application process has been simplified. And throughout the farm bill, conservation program descriptions have been updated to include soil health and carbon sequestration as targeted outcomes.

Nationwide, USDA conservation programs already support a diverse array of management actions on working lands, as well as stewardship of lands that are temporarily retired or protected under longer term easements. In the

San Joaquin Valley, these programs can be particularly helpful in supporting on-farm recharge—one of the most cost-effective ways to augment water supplies—as well as stewarding lands that are transitioning out of irrigation as part of water use reductions required to bring basins into balance. Indeed, USDA could play a major role in supporting the stewardship of these lands for multiple benefits, including water conservation, groundwater recharge, soil health, wildlife habitat, and grazing.

Some changes in program rules could help achieve these goals. In particular, NRCS could more easily support recharge efforts if it authorized groundwater depletion as a resource concern, analyzed groundwater recharge in programmatic environmental documents for EQIP, and developed specific design guidance and practice standards for recharge. Increased on-the-ground technical assistance capacity from NRCS could also help farmers and other partners scale up an effective response to SGMA. But even more important is that valley growers and their partners at the local and state levels—including water managers, nonprofits, and state agencies such as the California Department of Food and Agriculture—work together with USDA to articulate a vision for how it can partner with the valley on tackling the new challenges at hand.

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Sacramento, CA 95814
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