REPORT

Salinas Valley Basin Groundwater Sustainability Agency (SVBGSA)

Demand Management Economic Analysis

March 2026

Prepared for:

Salinas Valley Basin
Groundwater Sustainability Agency

Prepared by:

ERA Economics
Environment • Resources • Agriculture

Table of Contents

List of Tables

List of Figures

List of Definitions

Measurable Objective (MO) - a specific quantitative target established by a Groundwater Sustainability Agency for various sustainability indicators of a groundwater basin. It represents the ideal groundwater conditions for the basin and allows the GSA to achieve its sustainability goals.

Minimum Threshold (MT) - a specific quantitative limit established by a Groundwater Sustainability Agency for various sustainability indicators of a groundwater basin. It represents the groundwater conditions at a representative monitoring site that, when exceeded individually or in combination with minimum thresholds at other representative monitoring sites, may cause an undesirable result(s) in the basin.

Salinas Valley – the six groundwater subbasins managed by the Salinas Valley Basin Groundwater Sustainability Agency.

Subbasin – A subbasin as defined by the Department of Water Resources Bulletin 118 that is determined to be within the jurisdiction of the Salinas Valley Basin Groundwater Sustainability Agency. Subbasins include the 180/400Foot Aquifer (180/400), Eastside Aquifer (Eastside), Forebay Aquifer (Forebay), Upper Valley Aquifer (Upper Valley), Langley Area (Langley), and Monterey Subbasins.

Sustainable Management Criteria (SMC) – a critical factor that Groundwater Sustainability Agencies must address in their Groundwater Sustainability Plans. Sustainable Management Criteria include: Sustainability Goals, Undesirable Results (UR), Minimum Thresholds (MT), Measurable Objectives (MO).

Sustainable Yield (SY) - volume of water that can be extracted from the aquifer without causing Undesirable Results.

Undesirable Result (UR) - an adverse outcome that Sustainable Groundwater Management Act (SGMA) aims to prevent by monitoring and managing the six sustainability indicators.

Willingness to Pay – an economic measure of the benefit that is the value that an entity or individual places on a good or service; it is not a measure of payment capacity.

List of Acronyms

AF – Acre-foot

AVA - American Viticultural Areas

BEA – Bureau of Economic Analysis

BGRP – Brackish Groundwater Restoration Project

Cal Water – California Water Service Salinas District

CalAm – California American Water Monterey

CIMIS – California Irrigation Management Information System

CSIP – Castroville Seawater Intrusion Project

DWR – Department of Water Resources

GDP – Gross Domestic Product

GEMS – Groundwater Extraction Management System

GSA – Groundwater Sustainability Agency

GSP – Groundwater Sustainability Plan

M1W – Monterey One Water

MCWD – Marina Coast Water District

MCWRA – Monterey County Water Resources Agency

MPWMD – Monterey Peninsula Water Management District

NPV – Net Present Value

O&M – Operations and Maintenance

PV – Present Value

SGMA – Sustainable Groundwater Management Act

SVBGSA – Salinas Valley Basin Groundwater Sustainability Agency

USDA – United States Department of Agriculture

1. Executive Summary

The Salinas Valley is one of the most productive agricultural regions in California, relying on groundwater to sustain its production, local industries, and communities. Groundwater overdraft has resulted in declining groundwater levels, inland migration of seawater in some aquifers, and increasing risks to both water supply reliability and regional economic productivity. The SVBGSA developed Groundwater Sustainability Plans (GSPs) that establish sustainability criteria, including Minimum Thresholds and Measurable Objectives for all sustainability indicators. The GSPs define Projects and Management Actions (PMAs) to meet these objectives, which include both supply augmentation and demand management strategies.

The SVBGSA prepared and published a Demand Management Framework (DM Framework) in November 2025 that defined potential demand management measures for agriculture and domestic water uses and users. At the same time several supplemental supply projects are also being evaluated. Capital projects typically require substantial investment, long implementation timelines, and carry uncertainty in permitting and funding. Demand management measures are being considered to complement supply-side projects.

The Salinas Valley agricultural economy forms the backbone of Monterey County, supporting more than one in five jobs and contributing significantly to regional and national food production for leafy greens and other vegetables. The agricultural economy is characterized by high-value specialty crops, efficient irrigation practices, and supported by local storage, processing, distribution, and labor markets. Groundwater is directly tied to economic output, employment, land values, and broader regional economic activity in Monterey County. Reductions in water availability - whether through physical scarcity or constraints imposed by specific measures - will generate measurable economic impacts across these interconnected sectors.

ERA Economics prepared an economic impact analysis of potential demand management measures based on groundwater modeling developed by Montgomery & Associated (M&A). The analysis integrates groundwater modeling that provides a range of illustrative pumping limits into an economic analysis to assess how reductions in groundwater pumping affect agricultural production, regional economic output, employment, and income. The analysis additionally quantifies the direct cost of various domestic and agricultural demand management measures.

1.1 Cost of Demand Management Measures

The cost of a demand management measure depends on its timing, scale, location, and other site-specific factors. For example, reducing water use on a ranch that has already invested in irrigation technology is likely to be more costly than on a ranch with fewer prior efficiency improvements. Similarly, a household with substantial outdoor irrigation can often reduce use at lower cost than a household whose demand is primarily indoor. To illustrate the potential range of costs for the measures included in the DM Framework, an analysis and literature review were conducted.

Table 1 summarizes the 10 demand management measures (6 agriculture, 4 domestic) included in the DM Framework. Measures were grouped into categories (type) that reflect the direct cost. The direct cost of each measure, or category or measures, was evaluated. The cost to domestic users is measured as the cost of investments in water efficiency practices and appliances, and as the loss in consumer value (also called welfare or surplus) that occurs when a household must reduce water use below its preferred level because supply is constrained. The cost to agricultural users is the cost of investments in efficient irrigation practices, and the cost of taking irrigated land out of production.

Table 1. Summary of Potential Demand Management Measures

Category	Measure	Type	Description
Agriculture	On-farm Water Use Efficiency	Irrigation efficiency	Incentivize water efficiency practices through technical assistance or financial support
	Groundwater Extraction Fee	Financial incentives	Tiered pricing or per-acre-foot extraction fees to disincentivize pumping
	Rotational Fallowing / Fallow Bank	Temporary fallowing	Incentivize temporary fallowing of land
	Land Repurposing	Permanent fallowing	Develop programs to incentivize transition of land use to less water-intensive beneficial uses
	Pumping Limits / Allocation System	Temporary fallowing	Design and implement pumping limits, such as through a groundwater allocation system
	Penalty Charges	Financial incentives	Charges applied for pumping above allocated amounts, may be tied to replacement cost
Domestic	Education and Outreach	Water use efficiency	Provide resources and guidance to support household water efficiency
	Incentivized Efficiency	Water use efficiency	Rebates or incentives for indoor and outdoor efficient appliances or practices
	Mandatory Efficiency	Water use restrictions	Required efficiency standards for landscape, appliances, or plumbing
	Water Pricing Mechanisms	Financial incentives	Tiered pricing or rebate structures to encourage water efficient behavior

Table 2 summarizes the results of the direct cost analysis and literature review for domestic and agricultural demand management measures. For agricultural measures, estimated unit costs range from about $100 to more than $2,100 per AF for irrigation efficiency, $1,400 to more than $2,300 per AF for temporary fallowing, and $450 to more than $1,045 per AF for permanent fallowing. For domestic measures, estimated unit costs range from about $100 to more than $3,500 per AF for water use efficiency and $135 to more than $1,015 per AF for water use restrictions. Financial incentives for both agricultural and domestic users are not expressed as a single unit cost because the effect depend on the magnitude and design of the price signal.

Table 2. Demand Management Measures Cost Example Range

Category	Type	Cost ($/AF) Range	Notes
Agriculture	Irrigation efficiency	$100 - $2,100+	Lower cost alternatives include irrigation management and practices, with higher cost options including comprehensive technologies for soil moisture monitoring and irrigation scheduling
	Temporary fallowing	$1,400 - $2,300+	Costs depend on scale of pumping limits, timing, and location, with higher unit costs in the northern portions of the Salinas Valley
	Permanent fallowing	$450 - $1,045+	Permanent is slightly lower cost than temporary fallowing, depending on the productivity of the land and location within the Salinas Valley
	Financial incentives	n/a	Pricing signals to encourage more efficient water use depend on the magnitude of the price increase
Domestic	Water use efficiency	$100 - $3,500+	Costs vary depending on the technology, equipment, rebates, and indoor and outdoor uses
	Water use restrictions	$135 - $1,015+	Shortage cost to households from changing water use in response to limits, with costs varying by scale and location of restrictions
	Financial incentives	n/a	Pricing signals to encourage more efficient water use depend on the magnitude of the price increase

Section 4 of this report provides a detailed review of the cost of each measure. Table 3 shows an example summarizing the direct economic cost of demand management for illustrative 10 percent and 20 percent pumping reductions by sector and subbasin. These correspond to agricultural temporary fallowing measures and domestic water use restrictions. This example shows that unit costs vary by water user, timing, scale, and location. For domestic users, shortage (water use restriction) costs range from about $135 to $675 per AF at a 10 percent reduction and $200 to $1,015 per AF at a 20 percent reduction, with the lowest costs in the Forebay and the highest in Langley. For agricultural users, estimated costs range from $1,400 to $1,900 per AF at a 10 percent reduction and $1,700 to $2,300 per AF at a 20 percent reduction. Across both sectors, costs increase as pumping reductions become more severe, reflecting the higher economic burden of achieving deeper reductions in water use.

Table 3. Fallowing and Water Restrictions Measures Example Cost Summary

Water Use and Subbasin	10% Shortage / Reduction ($/AF)	20% Shortage / Reduction ($/AF)
Domestic		
180/400 Foot Aquifer	$250 – $505	$380 – $760
Eastside	$250 – $500	$375 – $750
Forebay	$135 – $270	$200 – $405
Upper Valley	$180 – $360	$270 – $540
Langley	$340 – $675	$505 – $1,015
Agricultural		
180/400-Foot Aquifer	$1,750 - $2,100	$2,150 - $2,600
Eastside	$1,500 - $1,800	$1,800 - $2,150
Forebay	$1,500 - $1,750	$1,800 - $2,050
Upper Valley	$1,400 - $2,150	$1,550 - $2,400
Langley	$1,350 - $1,550	$1,650 – $1,850

The direct cost of implementing different demand management measures shows the cost to the user. For example, the lifecycle cost of equipment, operations and maintenance, and replacement for irrigation efficiency technologies and improvements. An economic impact analysis was developed to evaluate how affected industries respond and measure direct and indirect economic losses to different industries and the greater Monterey County economy. A demand management scenario was defined based on M&A groundwater modeling for specific pumping cuts by region and sector.

1.2 Demand Management Scenario

M&A prepared an analysis to establish a potential range of demand management (pumping cuts) by subbasin. The analysis applied the Salinas Valley Operational Model (SVOM) to estimate how much agricultural groundwater pumping would need to be reduced in each subbasin to avoid groundwater-level Undesirable Results by about 2040/2041 if demand management were used alone. The analysis is explicitly limited to groundwater levels because earlier SWIM groundwater modeling showed that demand management provides only minimal improvement to the 500 mg/L chloride isocontour and is not an effective approach (implemented in isolation) for managing seawater intrusion.

The groundwater modeling changes only agricultural pumping in the target subbasin, leaves domestic pumping at baseline levels, and applies incremental reductions beginning in 2030 under a repeating historical-climate baseline with no added PMAs. Importantly, groundwater modeling evaluates the effect of demand management in each subbasin individually. Implementing pumping limits in multiple subbasins simultaneously would affect groundwater levels because basins are hydrologically connected. If demand management were to be implemented in multiple subbasins simultaneously then the pumping reduction in any individual subbasin may be less.

The purpose of groundwater modeling and economic analysis is not to identify an ultimate demand management approach, measure or program, but to estimate the approximate pumping-reduction range for each subbasin and provide a basis for later analysis of combined PMAs. A low and high scenario was developed to provide a range of pumping cuts and resulting economic impacts.

Table 4 summarizes the pumping cuts by subbasin and aquifer for the low and high scenario. Cuts range from less than 9 percent in the Upper Valley Subbasin to 45 percent in the 180/400-Foot Subbasin deep aquifers.

Table 4. Demand Management Summary by Subbasin and Aquifer

Subbasin	Low Pumping Cut Scenario	High Pumping Cut Scenario
180/400 Subbasin – 180-Foot Aquifer	18%	27%
180/400 Subbasin – 400-Foot Aquifer	27%	36%
180/400 Subbasin – Deep Aquifers	30%	45%
Eastside Subbasin	17%	25%
Forebay Subbasin	4.5%	9%
Upper Valley Subbasin	Not currently needed	Not currently needed
Monterey	Included with 180/400	Included with 180/400
Langley	Not applied	Not applied

The economic analysis applies the pumping cuts to each subbasin individually, simultaneously. The pumping cuts are assumed to apply to each subbasin/aquifer and are assumed to be enforceable limits that apply to annual pumping. No specific policy for pumping limits is defined (e.g., how limits would be managed and enforced, carry over provisions, penalties, spatial provisions, and other related elements described in the SVBGSA Demand Management Framework). No limits are imposed in Upper Valley. Langley also has no limits, but the economic analysis does not allow pumping to increase. The pumping cuts apply to agriculture only and there are no additional domestic cuts.

An economic model of Salinas Valley agriculture[1] was applied to quantify direct economic impacts of demand management to Salinas Valley agriculture. An input-output model, IMPLAN[2], was applied to evaluate the resulting indirect and induced (also called secondary) economic impacts to Monterey County. The models are calibrated to water use and market conditions in the Salinas Valley. The analysis illustrates the potential range and magnitude of economic impacts.

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[1] See Appendix A, Brackish Groundwater Restoration Project and Alternative Water Supply Project Economic and Financial Analysis. ERA Economics. Report Prepared for SVBGSA. March 2026.

[2] See Appendix B, Brackish Groundwater Restoration Project and Alternative Water Supply Project Economic and Financial Analysis. ERA Economics. Report Prepared for SVBGSA. March 2026.

No specific demand management measure has been defined at this time so it is not possible to quantify specific economic impacts. Rather, a range of potential impacts is presented along with preliminary estimates and a discussion of the distributional considerations underlying each measure. Economic effects (e.g., the effect of fallowing on crop prices and the distribution of production) will continue to be reviewed and revised as SVBGSA planning for demand management and other PMAs progresses.

Measures of economic impact include:

- **Direct**. Changes in acreage, crops, gross farm revenues, and market conditions. A measure of economic impact at the farm.
- **Indirect**. Changes in related expenditures on input suppliers and related industries.
- **Induced**. Changes in expenditures by employees in the directly and indirectly affected industries.

The total economic impact is the sum of the direct, indirect, and induced impacts. Values are in current dollars, expressed as annual losses, and the present value (PV) of the future stream of annual losses is reported for some economic metrics.

1.3 Direct Economic Impacts

Demand management causes near-term economic impacts to the agricultural sector and the broader regional economy. These impacts vary depending on the magnitude, timing, and spatial distribution of demand reductions, as well as the availability of alternative water supplies and economic responses by water users.

The direct economic impact is a reduction in irrigated agricultural production. As groundwater pumping is reduced, growers would either fallow land, shift to lower water-use crops, or rely on higher-cost technologies on farm, where feasible. These adjustments result in a decline in gross crop revenues, including for high-value specialty crops that dominate the Salinas Valley. The magnitude of this impact increases with the scale of demand management (i.e., greater pumping cuts).

Table 5 summarizes the results of the direct economic impact analysis under the high and low scenarios across all Salinas Valley subbasins. The net pumping cut is between 41,000 and 61,000 AF annually across all subbasins. Total fallowing is between 37,000 and 54,000 acres. Gross farm revenue losses are between $509 million and $717 million annually.

Table 5. Annual Direct Economic Impact Summary, Salinas Valley Total

Measure	Low Pumping Cut Scenario	% Change	High Pumping Cut Scenario	% Change
Net pumping cut / reduction (AF)	41,000	-9%	61,000	-14%
Acres fallow (acres)	37,000	-11%	54,000	-17%
Gross revenue loss ($M)	$509	-9.5%	$717	-13.4%

There are regional differences underlying the total effect for the entire Salinas Valley. Economic impacts are concentrated in subbasins where pumping limits are imposed. As production decreases due to agricultural land fallowing this causes a modest increase in the price of some commodities. Some production shifts to areas with greater water supply, which affects total pumping, and gross revenues increase for remaining production. The economic analysis illustrates a range of potential outcomes that will need to be further refined through ongoing SVBGSA demand management planning efforts.

1.4 Total Economic Impacts

Secondary (i.e., indirect and induced) impacts are a result of direct losses in farm production and changes that ripple through the broader Monterey County economy. When irrigated acreage declines and growers reduce output, businesses that depend on agriculture—such as farm labor contractors, input suppliers, equipment services, processors, packers, haulers, and distributors—also experience lower demand. That in turn reduces business revenue, household income, and consumer spending across the region. In Monterey County, where agriculture supports roughly one in five jobs and is linked to a broader network of related industries and community spending, demand management can produce measurable indirect and induced impacts in employment, wage income, and local economic activity. The total economic impact is the sum of the direct and secondary (indirect and induced) effects.

Table 6 summarizes the total economic impact under the high and low scenarios. Total economic impacts include a preliminary estimate of the effect on forward linked industries (e.g., processing and distribution) that are not typically included in IMPLAN input-output analysis. Total jobs (full time equivalent – FTE, which is 2-3 seasonal jobs), income, value added, and output value losses and are presented as a range to provide the reader with an understanding of potential outcomes. Total annual losses range from 5,835 to 8,230 FTE jobs, $571 million to $803 million in labor income, $915 million to $1.291 billion in value added, and $1.358 billion to $1.932 billion in total output.

Table 6. Total Annual Economic Impact Summary, Salinas Valley Total

Measure	Low Pumping Cut Scenario	High Pumping Cut Scenario
Jobs lost (FTE)	5,835	8,230
Income lost ($M)	$571	$803
Value added loss ($M)	$915	$1,291
Output value loss ($M)	$1,358	$1,932

1.5 Economic Impact Summary

Demand management has important market effects. The timing, scale, and structure of demand management that results in pumping cuts can substantially change the direct economic cost.

Limits imposed in one area can affect crop prices, shift where crops are grown, affect groundwater use in other regions, and ultimately affect land values.

The economic effects of demand management also depend on the rules applied to reduce pumping. For example, pumping limits factors such as spatial and temporal rules, ramp-down schedules, incentives, and enforcement provisions can materially change outcomes. These implementation details were not defined in the economic analysis because they would need to be developed through future public processes. The economic analysis is intended to provide an understanding of the range of potential direct and indirect economic impacts and may be refined as additional data are developed, and additional details for potential demand management measures are proposed.

The economic impacts illustrate the effect of agricultural demand management. Other factors are held constant. Other regulatory compliance costs, including requirements such as Ag Order 4.0, can further increase costs for producers and resulting economic impacts. These cumulative economic costs were beyond the scope of this assessment but could be considered for future analyses.

Ther regional economic effects of demand management are particularly important in Monterey County where a substantial share of local economic activity is linked to agricultural industries. Effects would extend beyond on-farm operations to upstream and downstream industries, and could have meaningful implications for local communities that depend on agricultural production and related economic activity. Key findings include:

- Market effects matter: the timing, scale, and design of demand management affect direct economic costs and subbasin groundwater conditions.
- Pumping limits in one area can affect crop prices, production, crop location decisions, and water use across the Salinas Valley. Economic impacts can be expressed as annual losses or reported as capitalized changes in land values across the region.
- The economic analysis does not specify demand management implementation details because they would be determined through later public processes.
- Additional regulatory requirements and cost pressures, such as Ag Order 4.0, pest pressure, labor costs, fuel and other input costs, could interact with demand management and affect overall economic impacts.
- Regional impacts in Monterey County could be significant, including effects on downstream industries and local communities.

The economic analysis is based on the available data and groundwater modeling at this time. A range of potential economic outcomes are shown. As the demand management measures and overall approach are refined the economic framework can be updated applied to expanded evaluation of how costs/impacts may be distributed. M&A groundwater modeling and this economic analysis illustrate that Salinas Valley Subbasins are both economically and hydrologically connected – changes in one area implications for other areas, but the magnitude and importance of this linkage varies. Subsequent work can help inform future decision-making, stakeholder engagement, and the integrated implementation planning effort. This can also support discussion of cost allocation, including how program costs, compliance obligations, and economic burdens may be distributed among beneficiaries, regulated parties, Monterey County communities, and other affected sectors.

2. Overview

The Salinas Valley Basin is one of California's most productive agricultural regions, relying heavily on integrated surface and groundwater to support farms, communities, the environment, and the regional economy. The region's water resources support production of healthy leafy greens, vegetables, berries, and other crops that are a substantial share of spring and summer produce for U.S. consumers. The valley's diverse climate with coastal influence supports a long growing season and cool-climate wine grapes that are produced across four American Viticultural Areas (AVAs). The agricultural industry employs thousands of workers that live locally, supporting vibrant communities and local businesses in the Salinas Valley and greater Monterey County.

The Salinas Valley groundwater subbasins face the challenge of addressing long-term groundwater overdraft to comply with the Sustainable Groundwater Management Act (SGMA) while continuing to support productive agriculture, domestic sector, environment, and regional economy. Complying with SGMA requires evaluating, developing, and implementing a cost-effective mix of projects to augment groundwater supplies and measures to reduce groundwater demand. Supply augmentation and demand management efforts are costly to develop, implement, and can impose direct and indirect economic costs on local communities.

The Salinas Valley Basin Groundwater Sustainability Agency (SVBGSA) was formed to coordinate sustainable management of the Salinas Valley Basin's groundwater resources as required under the Sustainable Groundwater Management Act (SGMA) and corresponding Department of Water Resources (DWR) regulations. The SVBGSA is responsible for developing, updating, and implementing Groundwater Sustainability Plans (GSPs) for the Basin's six (6) subbasins: 180/400-Foot Aquifer, Eastside Aquifer, Forebay, Upper Valley, Monterey, and Langley. As required under SGMA, the SVBGSA is charged with managing groundwater to avoid significant and unreasonable impacts to sustainability indicators including storage, levels, quality, interconnected surface water, groundwater-dependent ecosystems, and seawater intrusion.

Achieving and maintaining sustainable groundwater conditions to comply with SGMA in the SVBGSA will be accomplished through a combination of projects to increase groundwater supply and demand management measures:

- Supply augmentation projects are being evaluated by the SVBGSA, Monterey County Water Resources Agency (MCWRA), California American Water (CalAm), Marina Coast Water District (MCWD), Monterey One Water (M1W), California Water Service – Salinas District (Cal Water), and other partners as part of GSP implementation and other regional water supply planning efforts. Several feasibility studies are advancing potential projects.
- Demand management approaches have been evaluated and described in the SVBGSA Demand Management Framework (DM Framework), which was completed in

November 2025. The DM Framework defined potential DM measures, provided an outline for steps to implement measures, a process for identifying when measures could apply, and a preliminary qualitative assessment of costs.

Supply projects and DM measures potentially affect domestic water supply costs and farming costs in the Salinas Valley. This affects what crops are grown, where, the profitability of farming activities, and supporting industries. This has implications for local communities through direct and indirect effects in terms of jobs, income, and spending in Monterey County. In short, as the cost and availability of groundwater changes there are direct and indirect economic effects in the Salinas Valley and local communities in Monterey County.

SVBGSA commissioned this economic analysis of DM to understand the potential direct and indirect economic effects. The purpose of the economic analysis is to quantify the impacts of DM, including direct costs of different DM measures as well as indirect effects on local industries and communities and implications for land use, crop markets, land values, water costs, and related factors in the Salinas Valley. The analysis can also provide information to support future project implementation by illustrating the cost of DM measures that can be compared to potential supply projects. This includes the following:

- Analyzing baseline economic conditions in the SVBGSA regions that would potentially realize costs or benefits from DM, including factors such as irrigated acreage, jobs, income, and regional economic activity.
- Analyzing the direct economic cost of potential DM measures for agriculture and domestic water users, as defined in the DM Framework
- Coordinating with SVBGSA and its groundwater modeling consultant, Montgomery & Associates (M&A), to establish a range of potential demand management by aquifer and subbasin.
- Applying data, economic models, and methods to quantify the direct economic impact of DM, as well as indirect and induced economic impacts for local communities in Monterey County.
- Describing the potential range of economic outcomes for DM in the Salinas Valley, including effects on crop prices, production, groundwater use, and industries, and how data can support GSP planning efforts.

The report is structured as follows.

- Section 3 of this report provides a concise overview of baseline economic conditions in the Salinas Valley, including crop production and trends, gross crop value, and water use.
- Section 4 provides an overview of the potential DM measures (as described in the DM Framework), and the estimated direct cost of implementing each measure. Direct costs are standardized and reported on a $/AF basis.

- Section 5 defines the DM scenarios based on groundwater modeling conducted by M&A that include a high and low scenario to illustrate the potential range of economic outcomes.
- Section 6 summarizes the economic impact analysis. This includes an overview of the data, methods, and modeling approach and summary of direct economic impacts, as well as a summary of other economic considerations.
- Section 7 described regional economic impacts to Monterey County.
- Section 8 summarizes the analysis, limitations, and potential extensions.

This economic impact analysis does not define or implement any specific DM measure. The economic analysis is based on the available data and preliminary groundwater modeling that establishes an illustrative range of pumping cuts that would avoid groundwater level Minimum Thresholds (MTs), but does not address other sustainability indicators (e.g., seawater intrusion). The cost of potential DM measures as well as the direct and indirect economic impacts of DM are reported as ranges to illustrate potential outcomes and can be refined as DM measures are further developed.

3. Baseline Economic Conditions

Baseline domestic and agricultural water use and economic conditions establish the foundation for evaluating the economic impact of DM. A summary[3] of current crop acreage, agricultural production values, and the economic contribution of irrigated agriculture in supporting jobs, income, and regional economic activity across Monterey County is presented. An overview of domestic water use is also presented.

Monterey County has a population of more than 430,000 residents of which about 68 percent, or 294,000, residents live in the Salinas Valley. The average median income of census tracts in the SVBGSA jurisdiction is $94,500, just below the state median income of $96,300[4] and below the average median income of Monterey County census tracts not overlapping the SVBGSA ($116,000). Median income masks regional differences, including in communities near Salinas, Greenfield, and King where median income is less than one third of the state average.

Local Salinas Valley communities are heavily dependent on farming and farming related jobs. Monterey County had approximately 186,000 full time positions as of 2023. The top three occupation classes were: Management and Financial (24,000; 13%), Education, Legal, and Media (20,000; 11%), and Farming (19,000; 10%). Farming does not include other, related agricultural industries that are linked to (depend on) local farming.

Figure 1 illustrates farming employment as a share of total employment for each census tract in the county as of 2023. The highest centers of agricultural workers are located in Salinas, Soledad, Greenfield, and King where over 35 percent of the population is in farming. This does not account for transportation, logistics, and other agriculture-dependent jobs that would likely push this share substantially higher in many regions.

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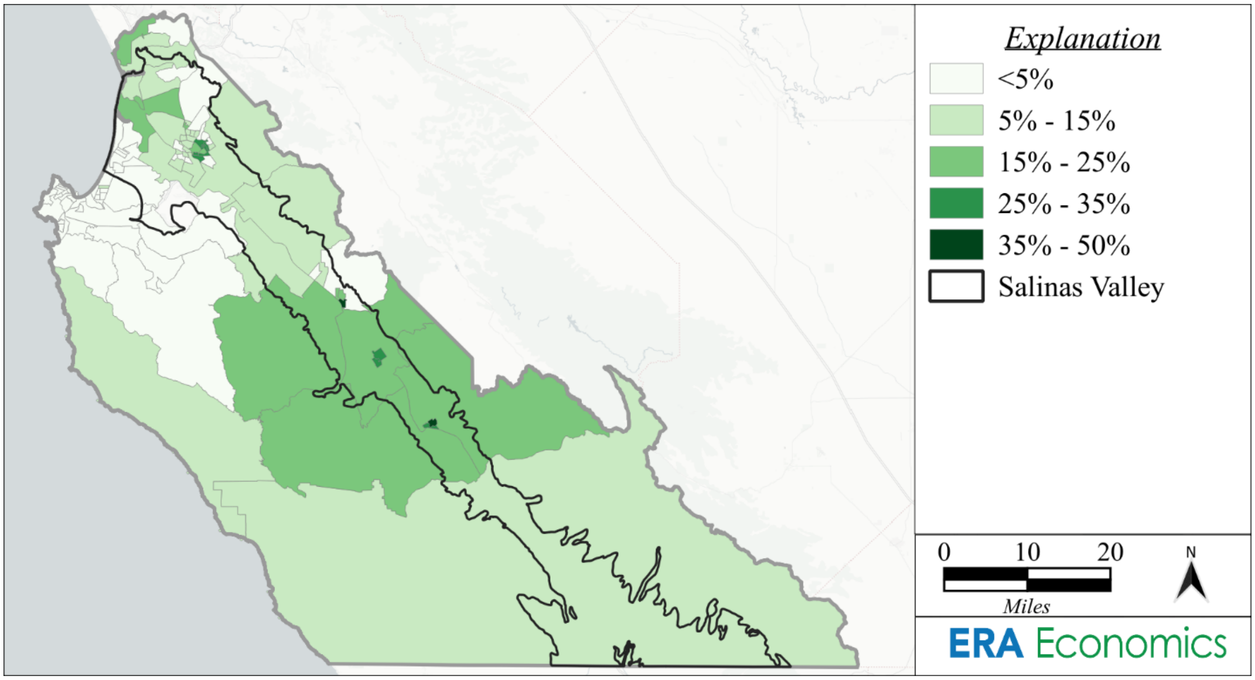
[3] Additional discussion and analysis of Salinas Valley farming and water use is available in the SVBGSA Demand Management Framework.

[4] US Census Bureau American Community Survey.

Figure 1. Agricultural Employment as a Share of Total Employment



Source: US Census American Community Survey. 2023.

Salinas Valley is the primary producer of U.S. leafy greens, brassicas, berries, and related fresh-cut crop and supply chains. The most valuable commodities include strawberries, leaf lettuce (including romaine), head lettuce, broccoli, cauliflower, celery, spinach, and wine grapes. These crops drive much of the Salinas Valley's year-round harvest and packing, processing, and shipping industries. These industries support the diverse workforce and local communities.

An irrigated acre is planted and harvested in multiple seasons, with up to 3 crops per year[5]. Total planted (also called harvested) acreage in a year substantially exceeds the irrigated footprint. The total planted acreage in Monterey County is 367,000, and in the SVBGSA's jurisdictional area is about 335,500 acres (about 94% of the county total). Table 7 summarizes planted acreage in each of the Subbasins as of 2023.

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[5] The term "irrigated acre" is used to refer to the land area that receives irrigation to produce at least one crop. The term "harvested or planted acre" refers to the land area harvested or planted throughout the year, with some "irrigated acres" being harvested more than once.

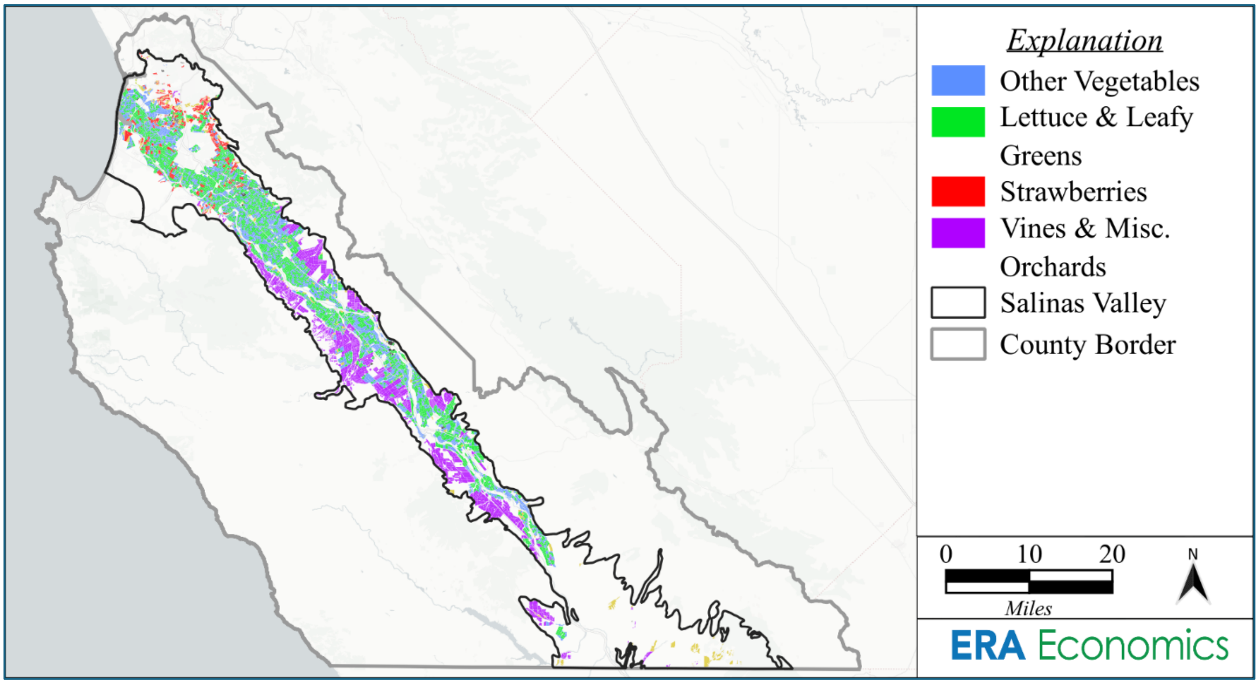
Table 7. SVBGSA Planted Acreage by Major Crop Type and Subbasin, 2023

Crop Type	180 / 400	Eastside	Forebay	Upper Valley	Langley	Monterey	Planted Acres
Artichokes	1,400	600	1,300	400	0	0	**3,700**
Broccoli	23,800	10,700	18,800	11,400	0	200	**64,900**
Other Leafy Greens	15,700	9,400	12,800	12,000	0	100	**50,000**
Cauliflower	10,000	4,100	6,200	3,500	0	100	**23,900**
Celery	4,000	1,800	2,800	1,500	0	100	**10,200**
Carrots	300	300	1,300	800	0	0	**2,700**
Greenhouse	100	300	300	0	0	0	**700**
Head Lettuce	13,900	7,900	10,400	11,200	0	100	**43,500**
Leaf Lettuce	18,700	10,600	14,400	14,000	0	200	**57,900**
Onions	200	300	1,100	1,900	0	0	**3,500**
Field Crops	2,500	2,000	2,700	2,000	500	0	**9,700**
Strawberries	8,100	6,300	0	0	1,000	100	**15,500**
Tree Fruit	200	100	1,900	400	0	0	**2,600**
Grapes	1,600	3,100	19,900	21,800	200	0	**46,600**
Planted Acres	**100,600**	**57,500**	**93,900**	**80,900**	**1,700**	**900**	**335,500**

Note: Data from Department of Water Resources crop mapping with additional crop types represented from ERA Economics data.

Differences in crops, microclimates, soils and geology affect pumping and the costs, benefits, and usefulness of DM measures. These factors would be further analyzed as part of developing DM measures. Figure 2 illustrates the distribution of irrigated acreage as of 2023.

Figure 2. Major Crop Categories within Salinas Valley, 2023



Source: California Department of Water Resources. 2023.

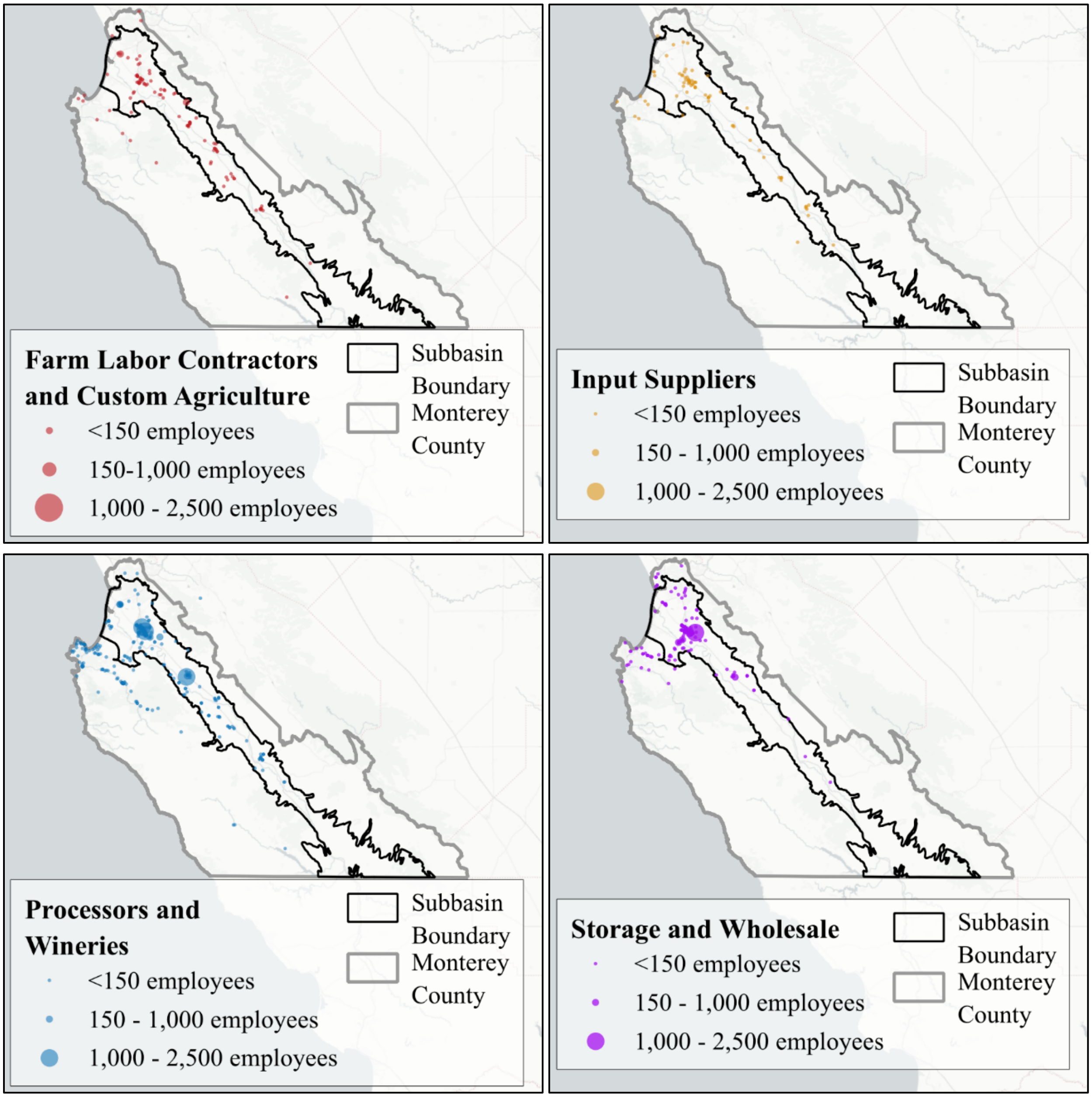
The gross value of Salinas Valley farming is around $5 billion at the farm. The industry value has been relatively stable over time, with year-to-year variability driven by changes in crop price and production and modest shifts in irrigated and harvested acreage. Table 8 summarizes the gross farm value of Salinas Valley crops by subbasin.

Table 8. Gross Value of Salinas Valley Agriculture

Subbasin	Annual Value ($ Millions)
180/400 Foot Aquifer	$1,941
Eastside Aquifer	$1,318
Forebay Aquifer	$1,083
Monterey	$26
Upper Valley Aquifer	$862
Langley	$111

Farming supports other industries in the Salinas Valley for packing, storage, transportation, and related industries. These are important for local employment. Figure 3 illustrates major agricultural industries and jobs across the Salinas Valley. This includes farm labor contractors and other management and consulting services for farming operations, input suppliers (e.g., equipment, farm inputs, technology), processors (e.g., wash plants, packing, shipping) and wineries, as well as storage and other wholesale and transportation businesses. The data illustrates the jobs associated with these businesses, both within the Salinas Valley and across Monterey County.

Figure 3. Location and Size of Selected Monterey County Agricultural Industries



3.1 Water Use

Water demand in the Salinas Valley is predominately agricultural and uneven across subbasins. Agriculture accounts for an average of 429,700 acre-feet per year (AFY) of groundwater pumping, with the largest average agricultural pumping in the Forebay (about 134,000 AFY), followed by Upper Valley (about 121,000 AFY), 180/400 (about 111,000 AFY), and Eastside (about 78,000 AFY). Langley and Monterey have more limited agriculture, pumping less than 5,000 AFY. Domestic groundwater use is lower at about 38,000 AFY valley wide, or roughly 8 percent of total groundwater pumping. Domestic pumping is concentrated in the more populated subbasins, especially Eastside and 180/400, which also have the largest numbers of drinking water connections, followed by Forebay. Domestic demand is lower in Upper Valley, Monterey, and Langley. Domestic DM measures are still important but should be targeted where population and system connections are concentrated and smaller systems in Langley and Monterey, where domestic use makes up a larger share of total pumping even though overall volumes are lower.

Table 9 summarizes approximate groundwater pumping by subbasin and aquifer, for domestic and agricultural users.

Table 9. Water Use Summary

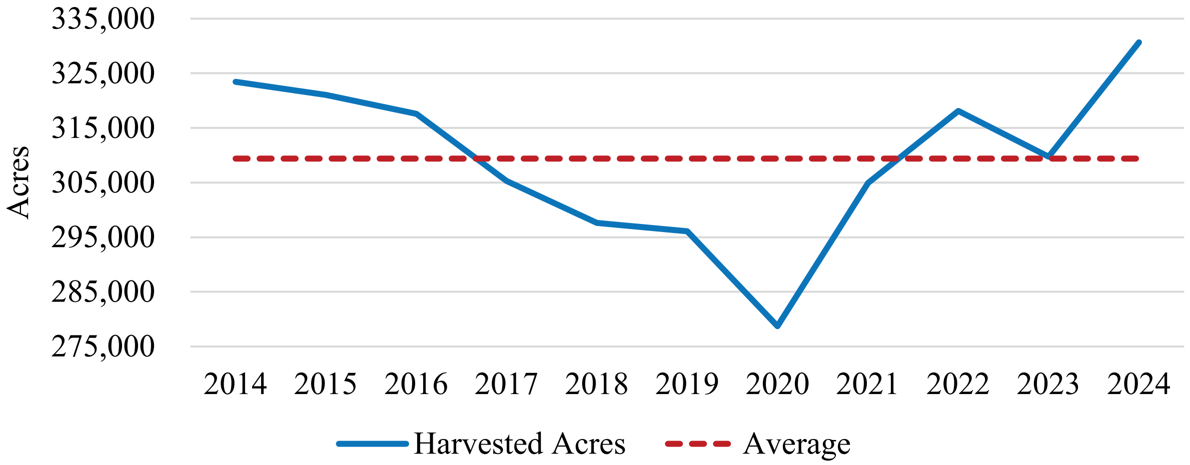
Subbasin	Agricultural (AFY)	Domestic (AFY)
180/400 Foot Aquifer	111,500	14,300
Eastside Aquifer	78,500	10,000
Forebay Aquifer	133,500	5,500
Upper Valley Aquifer	121,000	3,000
Langley	3,500	4,000
Monterey	1,500	1,700

3.2 Land Use

The growing conditions in the Salinas Valley are unique. During the summer months there are few other regions able to produce the leafy greens and vegetable crops grown in the valley. Historically, total irrigated and planted acres have fluctuated in the valley based on anticipated market conditions and water supply. The total harvested acreage also varies based on costs, weather, crop quality, and pest pressures. The

Figure 4 illustrates this variability in Monterey County harvested acreage from 2014 through 2024 using estimates from the Monterey County Agricultural Commissioner's Office. Over that period, harvested acreage ranged from approximately 278,000 to 330,000 acres, with an average of about 309,000 acres per year. Annual harvested acreage therefore fluctuated within a band of roughly 30,000 acres below to 20,000 acres above the long-term average. This variation shows that agricultural production in the valley is not fixed, and that growers regularly adjust acreage in response to economic and operational pressures.

Figure 4. Harvested Acreage Trends, Monterey County



Planted acreage varies over time and by subbasin. Figure 5 summarizes the range of planted acreage by subbasin from 2014 through 2024 and highlights meaningful differences between the northern and southern portions of the valley. In the northern valley, including the 180/400-Foot, Eastside, Monterey, and Langley Subbasins, planted acreage ranged from about 89,100 to 94,200 acres, or approximately 3 percent below to 2 percent above the long-run average. In the southern valley, including the Forebay and Upper Valley Subbasins, planted acreage ranged from about 108,000 to 117,700 acres, or about 4 percent below to 5 percent above long-run average. Planted acreage varies over time and is distributed differently across regions depending on local production conditions, and water supply constraints.

Figure 5. Irrigated Acreage by Region, 2014 - 2024

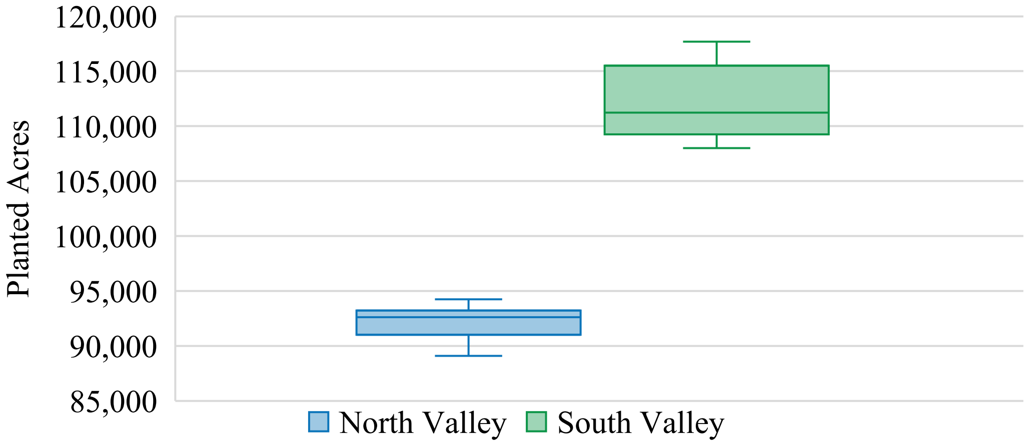
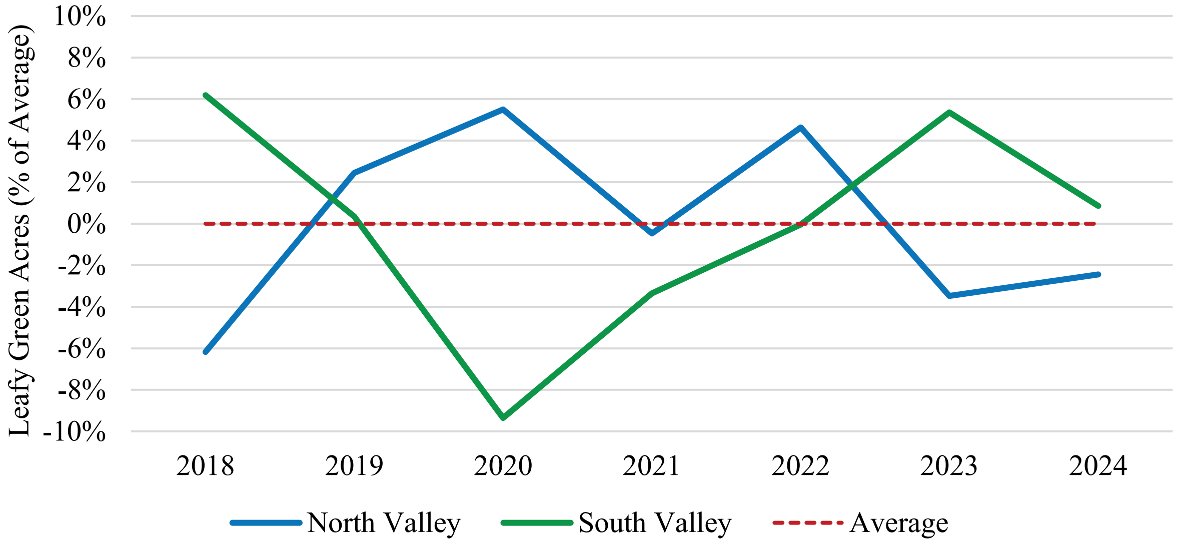


Figure 6 shows annual regional acreage compares to the regional average acreage between 2018 and 2024 for lettuce and leafy green acreage. Annual acreage relative to the regional average from 2018 through 2024 suggests an inverse relationship between the northern and southern valley. When acreage in one region is above its average, acreage in the other region tends to be below average. This pattern suggests that some crop production shifts within the Salinas Valley and in response to changing conditions, including land availability, water supply reliability, and other market conditions. The correlation does not establish causation, but it does indicate that acreage reductions in one part of the valley may be partially offset by increases elsewhere. This is consistent with expected economic adjustments.

Figure 6. Lettuce and Leafy Green Acreage Relative to Period Average, 2018 – 2024



Salinas Valley crop data confirms that irrigated agriculture in the Salinas Valley responds to market signals and production constraints. This is consistent with expected economic adjustments and an important consideration for groundwater management. If pumping limits are implemented in one area, it is reasonable to expect that some portion of irrigated production could relocate to other parts of the valley where water remains available or less constrained. The magnitude, timing, and crop-specific nature of that shift depend on a range of factors, including land access, infrastructure, agronomic land suitability, and economics.

The economic analysis of DM measures accounts for acreage responses to market changes caused by the illustrative pumping limits included in the analysis. Depending on the pumping limits, some production would shift out of the Salinas Valley and some production would shift within the valley. In short, the timing, scale, and location of DM measures affect both hydrologic outcomes and economic outcomes. This distinction is important for DM measures and the regional distribution of crop production, the economic impacts, water users, and linked industries.

4. Cost of Demand Management Measures

An economic analysis of potential DM measures as defined in the DM Framework was developed. The analysis evaluates the direct cost of selected measures to the water user (e.g., cost of water efficiency technology) and potential water savings.

The DM measures are split into two categories:

- **Agriculture**. Six (6) measures apply to agricultural groundwater users. The measures cover a range of different programs—from water efficiency programs to incentive-driven rotational fallowing and pumping limits.
- **Domestic**. Four (4) measures apply to domestic groundwater users in the SVBGSA. These measures range from water efficiency incentive programs to outreach and mandatory (ordinances) that require specific practices through, for example, discretionary and potentially ministerial permitting processes.

Each measure is additionally classified by its type that reflects economic costs. These include:

- Irrigation efficiency. Improvements in on-farm water use efficiency including technologies, changes in irrigation practices, and management.
- Water use efficiency. Domestic water use efficiency measures such as low flow appliances, reduced landscaping, and irrigation scheduling.
- Financial incentives. Price signals that disincentivize agricultural or domestic water use.
- Temporary fallowing. Rotational fallowing or fallow bank programs where lands are idled/not irrigated for a short period. For short run temporary fallowing a grower would stay in the farming business and keep farm equipment and other overhead.
- Permanent fallowing. Land repurposing programs where lands are idled/not irrigated in perpetuity. For permanent fallowing a grower would stop production on specific lands.

Table 10 lists the DM measures that were included in the DM Framework as well as the category, type, and a brief description.

Table 10. Summary of Potential Demand Management Measures

Category	Measure	Type	Description
Agriculture	On-farm Water Use Efficiency	Irrigation efficiency	Incentivize water efficiency practices through technical assistance or financial support
	Groundwater Extraction Fee	Financial incentives	Tiered pricing or per-acre-foot extraction fees to disincentivize pumping
	Rotational Fallowing / Fallow Bank	Temporary fallowing	Incentivize temporary fallowing of land
	Land Repurposing	Permanent fallowing	Develop programs to incentivize transition of land use to less water-intensive beneficial uses
	Pumping Limits / Allocation System	Temporary fallowing	Design and implement pumping limits, such as through a groundwater allocation system
	Penalty Charges	Financial incentives	Charges applied for pumping above allocated amounts, may be tied to replacement cost
Domestic	Education and Outreach	Water use efficiency	Provide resources and guidance to support household water efficiency
	Incentivized Efficiency	Water use efficiency	Rebates or incentives for indoor and outdoor efficient appliances or practices
	Mandatory Efficiency	Water use restrictions	Required efficiency standards for landscape, appliances, or plumbing
	Water Pricing Mechanisms	Financial incentives	Tiered pricing or rebate structures to encourage water efficient behavior

The following sections summarize the standardized direct economic cost of the DM measures. Direct costs are representative estimates based on available data and actual costs will vary depending on the timing, scale, and location of a specific DM measure. Direct costs are presented for domestic and agricultural measures, by type.

4.1 Domestic DM Measures

Domestic DM measures apply to domestic water uses and users in the Salinas Valley. Many larger water utilities already have water use efficiency programs. SVBGSA and other local agencies including CalAm, MPWMD, MCWRA, and Cal Water have invested in water conservation education and water use efficiency initiatives. The cities of Soledad and Gozales provide water conservation resources from larger agencies (e.g., DWR) as well as local groups like the Water Awareness Committee of Monterey County and Monterey County Waterwise Landscaping.

4.1.1 Direct Costs: Water Use Efficiency

Common water use efficiency measures for domestic users include rebate programs, education and outreach, technical assistance, and other incentives to encourage adoption of water efficiency practices. This includes water efficient appliances and turf removal programs.

A review of typical water efficiency practices, programs, and technologies was conducted. The State Water Resources Control Board (State Board) recently prepared an analysis of achieving state targets for water conservation[6]. The Pacific Institute[7] has published reviews of domestic water conservation practices. CalWEP (formerly the California Urban Water Conservation Council)[8] and its consultants have published substantial resources for domestic water use efficiency. This report provides a high-level overview with references that provide additional information.

Table 11 lists a representative set of domestic water use efficiency investments that can reduce household demand and help lower overall potable water use. The practices shown span both indoor and outdoor water conservation measures and reflect a range of investment levels, from no-cost utility-supported programs to higher-cost retrofits and landscape improvements. For each measure, the table presents an illustrative user cost, including the effect of potential/typical rebates where available, and example annual water savings. Household water savings can be achieved with a combination of fixture replacement, leak management, irrigation upgrades, and outdoor landscape conversion. In many cases, rebates substantially reduce the customer cost.

Table 11. Selected Domestic Water Conservation Practice Costs

Practice / Technology	Representative User Cost	Example water savings
High-efficiency toilet	$319 before rebate, $159 after rebate	7,356 gal/toilet/year
High-efficiency clothes washer	$909 before rebate, $749 after rebate	7,714 gal/washer/year
Leak detection and alerts	$0 (free, typically covered by district)	256 gal/home/year
Landscape irrigation technology	$250 before rebate, $150 after rebate	29 gal/sq ft/year
Hot water recirculation pumps	$400 before rebate, $150 after rebate	11,000 gal/year/home
Rainwater capture	$2.50/gal (small system) before rebate, $1.50/gal after rebate	0.049 AF/year/home
Turf conversion	$4-6/sq ft before rebate, $2-4/sq ft after rebate	70+ gal/sq ft/year

Domestic water savings vary considerably by measure. Indoor fixture upgrades such as high-efficiency toilets and clothes washers provide some annual savings and can be implemented as older equipment is replaced. Leak detection and alert systems tend to have relatively modest average annual savings per household, but they can be cost-effective because there is little or no

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[6] State Water Resources Control Board. Water Conservation as a Way of Life. Standardized Regulatory Impact Analysis.

[7] Gleick et al. 2003. Waste Not, Want Not: The Potential for Urban Water Conservation in California. Pacific Institute

[8] A Guide to Data and Methods for Cost-Effectiveness Analysis of Urban Water Conservation Best Management Practices March 2005 Prepared for The California Urban Water Conservation Council (now CalWEP).

direct cost to the customer. Other measures, such as hot water recirculation pumps, can provide substantial savings by reducing the amount of water wasted while waiting for hot water to reach fixtures.

The lifecycle costs of domestic water conservation practices include the incremental (additional) capital cost of the high efficiency appliance/technology relative to a traditional appliance/technology, and replacement costs. Costs would also include any additional operation and maintenance costs (which are generally minor for these investments), and savings on water and other utility bills[9].

Table 12 summarizes typical unit costs for domestic water use efficiency measures. Presenting costs on a $/AF basis allows direct comparison across very different types of conservation investments, ranging from fixture retrofits to more capital-intensive outdoor landscape conversions. The values are planning-level ranges compiled from published California conservation studies and are intended to illustrate relative costs, not define program-specific costs for any one agency or service area. Actual costs will vary depending on local program design, rebate levels, customer participation rates, baseline water use, and other factors.

Table 12. Domestic Water Conservation Cost Summary

Conservation Practice	Typical $/AF Range
Leak detection and repairs	$100 – $500
Faucet aerators / showerheads	$200 – $700
High-efficiency toilets	$300 – $800
High-efficiency clothes washers	$400 – $1,000
Smart metering / billing improvements	$500 – $1,500
Public outreach and education	$300 – $1,500
Smart irrigation controllers	$800 – $1,800
Irrigation system upgrades (drip, etc.)	$1,000 – $2,500
Turf replacement / landscape conversion	$1,500 – $3,500+

Sources: CalWEP/CUWCC (2007), CalWEP (2010), M.Cubed (2017), M.Cubed (2020)

Customer rebates are commonly offered for water use efficiency / conservation measures. For example, Bay Area Water Supply and Conservation Agency [10] programs show two representative conservation rebate programs. The “Lawn Be Gone” landscape rebate program paid $240,307 in rebates, plus $2,420 in administration, to convert 141,393 square feet of turf, yielding an estimated 8.11 acre-feet of annual water savings at a reported cost of $1,527 per acre-foot. Smart irrigation controller rebates, spending $22,361 in rebates and $1,000 in administration for 272 controllers, with estimated annual savings of 6.3 acre-feet, or about 0.023 acre-feet per controller per year, at a cost of $3,734 per acre-foot.

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[9] CalWater. The Economic Value of Efficiency for California Water Service: Lower Water Bills. 2024.

[10] Bay Area Water Supply and Conservation Agency (BAWSCA). Annual Water Conservation Reports.

Agencies also incur costs to administer the program. Basic efforts—such as maintaining a water use efficiency website, distributing materials, or partnering with local agencies—require modest staff time and limited funding. More intensive efforts that include direct services (e.g., household water audits) and media campaigns involve higher ongoing administrative costs.

A review of selected coastal California water utilities was conducted to evaluate program outlays for administration (e.g., when agency/utility also carries in-house staff, inspections, enforcement, permitting, outreach, and reporting). At Marina Coast Water District (MCWD[11]), the 2020 Urban Water Management Plan (UWMP) shows ~ $60,000-$150,000 per year of indoor-oriented conservation spending and about $17,000-$42,000 per year of outdoor conservation (FY 2015/16 – FY 2019/20). The MCWD UWMP states that there are approximately 2 full time conservation positions plus one intern as of FY 2020/21.

Bay Area Water Supply and Conservation Agency[12] costs for its conservation programs were $242,727 for "Lawn Be Gone" ($2,420 administration + $240,307 rebates), $23,361 for smart irrigation controllers ($1,000 administration + $22,361 rebates), and $364,934 for home water-use reports ($1,050 administration + $363,884 program/vendor cost).

Monterey Peninsula Water Management District[13] issued $272,142 in water efficiency rebates in FY2023-24, but its FY2024-25 Water Demand Division budget totals $1.99 million, including $1.17 million in personnel and $0.77 million in project expenditures.

The State Board estimates[14] district administrative costs of about $3,300-$8,100 per supplier per year for program creation, $2,600-$8,400 per year for reporting, and $50,000-$350,000 every five years for ratemaking.

4.1.2 Direct Costs: Financial Incentives

Water pricing mechanisms are measures designed to disincentivize excess water use though financial penalties/incentives. Many domestic water users already pay for the cost of water service through water rates. Large water service providers including Cal Am, Cal Water, the City of Greenfield, and the City of Soledad have water rates that modestly increase with use.

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[11] Marina Coast Water District, *2020 Urban Water Management Plan* (published 2021).

[12] Bay Area Water Supply & Conservation Agency, *Annual Conservation Programs Report FY2023-24* (published 2025).

[13] Monterey Peninsula Water Management District, *Annual Comprehensive Financial Report* for FY ended June 30, 2024, and *Fiscal Year 2024-2025 Budget*

[14] California State Water Resources Control Board, *Standardized Regulatory Impact Assessment of Proposed Making Conservation a California Way of Life Regulation* (2024).

Table 13 summarizes current water rates for the seven largest water utilities in the Salinas Valley. All districts have a base rate and then an increasing-block tiered structure for increasing use.

Table 13. Single Family Home Water Rate Structure, Selected Districts/Utilities

Water Purveyor	Connections	5/8 Meter Monthly	Fixed Rate	Tiered Rates			
Alco Water Service	8,610						
CalAm - Monterey District	1,224	$46.7		$0.79	$1.58	$2.38	$3.30
(gcl)				*29.9*	*59.8*	*114.3*	*greater*
Cal Water - King City	2,789	$35.5		$1.17	$4.67	$5.84	$8.76
Cal Water - Oak Hills	1,090	$35.5		$1.17	$4.67	$5.84	$8.76
Cal Water - Salinas	21,818	$35.5		$1.17	$4.67	$5.84	$8.76
Cal Water - Salinas Hills	2,831	$35.5		$1.17	$4.67	$5.84	$8.76
(ccf)				*6*	*12*	*17*	*greater*
Castroville Water District	1,280	$20.8	$0.02				
(cf)							
City of Gonzales	1,275	$23.1	$2.41				
(ccf)							
Greenfield - City Of	3,492	$13.4		$1.17	$1.75	$3.35	
(gal)				*8,000*	*15,000*	*greater*	
Soledad - City Of	4,155	$18.3		$1.60	$3.10	$4.84	
(ccf)				*9*	*23*	*greater*	

Sources: Water Purveyor Web Pages. Accessed 2025. CalAm, Cal Water Service, Castroville Water District, City of Gonzales, City of Greenfield, City of Soledad

Public utilities and cities must structure rates to comply with state law and cost-of-service requirements, while private utilities are regulated by the California Public Utilities Commission. Conservation pricing approaches are more feasible where meters are already in place and billing systems can accommodate tiered or variable rates. Political viability means customers should view pricing structures as fair and justified, particularly for low-income households that may have reduced payment capacity

Domestic conservation pricing conceptually seeks to set customer price equal to the short-run marginal cost (i.e., variable costs) or long-run marginal cost (i.e., including system capital/expansion) to reflect the true cost of water usage. Recent studies estimate that domestic water conservation pricing practices have resulted in a reduction in use of about 2.6 percent[15]. Most Salinas Valley water utilities already have increasing block rate structures that incentivize conservation, so potential savings may be more modest than suggested by statewide data. In

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[15] Juhee Lee, Mehdi Nemati, Maura Allaire, Ariel Dinar. The impact of pricing structure change on residential water consumption: A long-term analysis of water utilities in California, Water Resources and Economics, Volume 46, 2024,100240, ISSN 2212-4284, https://doi.org/10.1016/j.wre.2024.100240

addition, domestic conservation for indoor use has a modest effect on consumptive water use because indoor water use is treated and reused. Outdoor landscaping conservation can reduce consumptive water use.

The costs of implementing water pricing mechanisms depend on the complexity of the rate structure, the size of the provider, and if measurement/metering is already in place. Agency costs include program development, financial analysis to set fees, legal review, billing system, and administration. It is not possible to estimate a lifecycle cost for domestic water conservation pricing measures. These would need to be developed for a specific program in a specific district.

4.1.3 Direct Costs: Water Use Restrictions

Domestic water restrictions include mandatory limits on water use, or mandatory investments in water use efficiency. For example, Executive Order B-29-15 mandated domestic water conservation in response to ongoing drought conditions. Households respond by reducing irrigation, shortening showers, and limited investments in water use efficiency. This is equivalent to a domestic water shortage.

The economic impact of water shortage to domestic users principally consists of: (i) fiscal costs associated with net revenue reductions to domestic water districts that eventually have to be recovered from ratepayers; and (ii) lost economic welfare or benefits from forgone value associated with an inability use or purchase water supplies households would have otherwise used. The latter impact is known as “consumer surplus loss,” where consumer surplus represents the extra value that consumers derive from a product or service beyond what they have to pay for it. That is, domestic DM measures essentially restrict water use, which (potentially) deprives districts of water sales revenue and consumers (households) of a commodity they value. Fiscal impacts represent real financial costs to districts, consumer surplus measures potential welfare loss by water users in the Salinas Valley. Both costs ultimately would be borne by domestic water users in the Salinas Valley.

The fiscal cost of potential domestic DM measures to districts is not evaluated in this analysis. This would require an assessment of district rate structures and specific DM measures that have not been developed at this time. Therefore, this is a potential future extension of the current analysis.

The consumer economic cost of domestic DM measures is the avoided cost of water shortages to households. A shortage cost represents the loss in value (also called consumer surplus or welfare) that occurs when households are forced to reduce water use below a current/preferred level because water supplies are limited.

A domestic water demand function can be applied to characterize the relationship between water use and the value of that water. The value of additional water is highest at low levels of use, when it supports essential indoor needs, and declines as use expands to less essential purposes such as outdoor irrigation and other discretionary activities. When a pumping limit or other conservation requirement effectively reduces available water below household baseline use, the resulting economic impact can be estimated using the economic demand function. This measures the value households place on the water they can no longer use, above what they would have paid for it, and therefore provides an estimate of the economic welfare loss associated with the shortage.

Table 14 summarizes the estimated economic cost of domestic mandatory water use restrictions under illustrative reductions of 10 percent and 20 percent in household water use across the Salinas Valley[16]. As shown, the estimated costs increase as the level of shortage increases, reflecting the rising value of water as households are forced to curtail more essential or higher-value uses. At a 10 percent reduction level, the economic cost ranges from $135 to $675 per AF. At a 20 percent reduction level, the cost ranges from $202 to $1,013 per AF. The economic cost of domestic DM shortage measures depends on the magnitude of the reduction.

Table 14. Water Shortage Costs for Domestic Use

Subbasin	10% Shortage ($/AF)	20% Shortage ($/AF)
180/400 Foot Aquifer	$250 – $505	$380 – $760
Eastside	$250 – $500	$375 – $750
Forebay	$135 – $270	$200 – $405
Upper Valley	$180 – $360	$270 – $540
Langley	$340 – $675	$505 – $1,015

4.2 Agricultural DM Measures

Agricultural DM measures apply to agricultural water users. This includes irrigation efficiency measures, permanent and temporary land idling/fallowing, and financial incentives. Growers incur costs to implement these measures. The following sections summarize each type of measure.

4.2.1 Direct Costs: Irrigation Efficiency

Most Salinas Valley acreage is already irrigated with drip or other low-volume systems—about 85 percent of the reported acreage footprint, excluding sprinkler use for germination/crop establishment. Opportunities for substantial water savings are generally not from converting irrigation systems, but from improving how existing systems are managed and field-specific practices such as establishment methods, irrigation scheduling, distribution uniformity testing and improvements, and day-to-day management.

Irrigation efficiency improvements will change the gross amount of groundwater pumped and applied to the land. These practices typically have a smaller effect on net water use (consumptive

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[16] See additional description of the domestic economic demand function in Appendix A: ERA Economics. Brackish Groundwater Restoration Project and Alternative Water Supply Project Economic and Financial Analysis. March 2026.

use by the crop). In some situations, improving water use efficiency can result in an increase in crop water use by more effectively applying water for plant needs. In areas where groundwater return flows are recoverable agricultural irrigation efficiency measures should focus on reducing net groundwater use.

Table 15 summarizes selected practices, showing the approximate capital (up-front) cost, ongoing O&M costs, potential water savings, and cost per AF. Estimates are based on studies and presented as a representative range. Actual costs will vary for each operation.

Table 15. Example Irrigation Efficiency Improvement Costs

Example Practice or Technology	Example Capital Cost	Example O&M Cost	Potential AW Savings	Annualized $/AF saved
Convert sprinkler / furrow to drip	$500–$1,200+ per acre for pumps/mains/filters (plus drip tape)	Drip tape $300+/ac per crop; filtration	20–50%	$500–$1,100+
Drip germination / establishment on drip	Typically small additional investment (e.g., tape/lines)	Tape and field operations (~$300/ac)	20–30% in trials	$200–$500+
ET-based irrigation scheduling (e.g., CropManage / CIMIS workflows)	Software typically provided free	Labor/training/data entry	Broccoli 27%, lettuce 15–30%, up to 35–50% in other applications	-
Soil-moisture sensor scheduling (e.g., wireless tensiometers and software)	Equipment $600+ per ac	Service costs vary, ~$150 - $250/ac	Lettuce studies showing 20–40%	$100 - $2,100+
Plastic (or biodegradable) mulch with drip	Materials $300-$500 per acre	Labor and management costs	10–30% in lettuce trials	$300 - $500
Tailwater return / recovery system (where runoff is material)	Varies	Modest O&M	Tailwater volume can be 15–25% of applied water	Data gaps
Flow meters and field-scale monitoring	Small lateral flow meters $75–$100 each (≈ $15–$20/ac)	Periodic maintenance / recalibration; labor	Savings depend on operational changes	Data gaps
Various vineyard practices (deficit irrigation, soil moisture or ET scheduling, mulch, cover crops, and canopy management)	Capital cost varies depending on existing practice and site	Additional O&M	Irrigation savings varies depending on existing practice and site	$700 - $1,700+
Cover cropping / soil-health practices for infiltration and runoff reduction	$200+ per acre for seed / planting / termination	Labor costs	Runoff reduction	$100 - $300+

Sources: Devasirvatham (2008), Cahn et al (2022), Abdelmoneim et al. (2025), Helmy et al. (2025), Kresage and Mamen (2009), Smith et al. (2015).

Because low volume systems are already prevalent, incremental water savings from "upgrades" depend on the exact current configuration (pressure regulation, emitter condition, filtration, uniformity) and on crop-phase practices (e.g., sprinkler establishment). Other common practices such as forgoing irrigation during wind events and land leveling also help limit evaporation losses and runoff. Regulatory drivers such as Ag Order 4.0 require improved irrigation and nutrient management and can drive investments in water efficiency practices independent of changes driven by SGMA.

4.2.2 Direct Costs: Temporary Fallowing

Fallowing reduces groundwater pumping (applied water) and net groundwater pumping (crop consumptive use) by taking land out of irrigated production. A key distinction is between short-run idling and long-run land retirement or repurposing. For short run temporary idling the grower gives up the annual net return from production while many fixed costs are not fully avoidable and are thus viewed as sunk costs. Some lease obligations, as well as management overhead, equipment ownership, full time labor, taxes, and compliance costs continue even when a field is not planted for one or more season. The forgone value of production can be especially high on prime ground that supports multiple crop cycles per year.

Temporary fallowing DM measures include rotational fallowing (fallow banks) and annual pumping limits. The cost of temporary fallowing increases with the magnitude of the pumping cutback, as larger cutbacks require idling greater areas of higher-value agricultural land. Costs vary by region depending on what is grown and the returns to water in those areas.

Table 16 summarizes the estimated direct economic cost of annual land fallowing under illustrative 10 percent and 20 percent reductions in applied water use. The cuts are applied to the entire Salinas Valley, which mutes the effect of changes in crop prices and production in other regions. A range was developed by varying crop prices based on observed historical variation, with the lower end of the range reflecting These values represent short-run direct costs associated with fallow banking and pumping limits. At lower reduction levels, water savings may be achieved by idling lower-value acreage. As reduction targets increase, however, progressively more productive and higher-value land would be fallowed, resulting in higher direct costs and greater effects on farm income, land values, and the regional agricultural economy.

Table 16. Direct Cost Temporary Land Fallowing ($ per AF of Applied Water)

Subbasin	10% Reduction Range		20% Reduction Range	
180/400-Foot Aquifer	$1,750	$2,100	$2,150	$2,600
Eastside	$1,500	$1,800	$1,800	$2,150
Forebay	$1,500	$1,750	$1,800	$2,050
Upper Valley	$1,400	$2,150	$1,550	$2,400
Langley	$1,350	$1,550	$1,650	$1,850

Note: values rounded to $50 increments

4.2.3 Direct Costs: Permanent Fallowing

Permanent fallowing includes the land repurposing DM measure and can also be a result of pumping limits. Land repurposing can include market-driven changes (e.g., land conversion from agriculture to development or other uses) and incentive-driven programs (e.g., the Department of Conservation Multibenefit Land Repurposing Program grants).

The direct cost of reducing water use through permanent retirement or land repurposing is lower than temporary fallowing. A longer-run adjustment horizon allows for restructuring leases, labor, equipment, and other overhead, so some of these costs can be avoided and are no longer sunk. The cost depends on the scale of fallowing, with smaller programs more likely to encourage more marginal ground (lower value) to participate. Permanent removal of high-quality irrigated land from production can impose substantial direct economic costs as well as regional economic effects. Agricultural land in the Salinas Valley generally commands higher values than in other parts of the state due to its production potential and established infrastructure and markets for high-value vegetables, berries, leafy greens, and grapes.

Table 17 summarizes recent land sales for agricultural parcels (no residence/structures) for a representative sample of average land sale price; however, prices vary with specific parcel conditions. Land values are driven by factors including soil quality, water supply, urban proximity, slope, elevation, temperature, and property amenities. The highest-value land is located around the City of Salinas, reflecting both its prime agricultural potential and the premium associated with parcels near urban boundaries due to development pressure. Land sales in the Castroville area have occurred at a significant discount, influenced by higher fees including MCWRA's Zone 2B assessment[17], CSIP water costs, and the risk of seawater intrusion. Trends for vineyards follow a similar pattern, with the highest recent sales on lands east of Gonzales.

Table 17. Selected Average Land Sales 2014 – 2025 in the Salinas Valley (2024)

Region	($/Acre)	
	Cropland	**Vineyard**
Castroville	$38,000	
Gonzales	$54,000	$54,000
Greenfield	$43,000	$46,000
Salinas	$64,000	
Soledad	$36,000	$55,000
King City	Limited Data	$35,000

Source: Monterey County Land Sales Reports; inflation-adjusted.

The economic cost of land repurposing depends on water savings, value, and the alternative land use. If the land is repurposed into commercial development or homes the average water use of

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[17] MCWRA's Zone 2B covers 195 parcels near the City of Castroville. The charge for 2024-2025 was $355.44 per acre.

these would be subtracted from the avoided irrigation. If it is repurposed into other crops or native vegetation the water use of those alternatives would be considered.

Table 18 summarizes example costs for permanent fallowing assuming land is idled (no applied irrigation water). The table shows the annualized cost of water conservation through a land repurposing program. The analysis assumes that alternative land use applies no irrigation water. Water savings is measured as AW, not ET, and therefore reflect gross savings. Values are shown as a range based on the range of land values and average applied water per acre.

Table 18. Direct Cost Permanent Land Fallowing ($ per AF of Applied Water)

Subbasin	Land Value ($/ac)		Applied Water (AF)		Direct Cost $ per AF	
	Range		Range		Range	
180/400-Foot Aquifer	$38,000	$64,000	1.92	2.06	$645	$1,010
Eastside Aquifer	$43,000	$55,000	2.08	2.36	$670	$760
Forebay	$36,000	$55,000	2.36	3.06	$500	$585
Upper Valley	$35,000	$55,000	2.52	3.6	$450	$500

4.2.4 Direct Costs: Financial Incentives

Financial incentives are price signals to discourage agricultural water use. Increasing the cost of water through higher volumetric rates, seasonal pricing, drought surcharges, or other scarcity-based charges can disincentivize use. In principle, this promotes more efficient resource use by encouraging growers to reduce lower-value uses, improve irrigation, shift to less water-intensive practices, or reconsider production on the least profitable acreage. Price-based measures can in some cases achieve conservation efficiently by allowing responses to vary according to crop value, irrigation technology, and farm-specific operating conditions.

Agricultural water demand is only modestly responsive to price, especially in the short run. Water is a critical input to crop production, and for many perennial crops or high-value specialty crops, growers may have limited ability to reduce use without incurring substantial losses in yield, quality, or long-term plant health. The ability to adjust also depends on factors such as irrigation efficiency, soil conditions, and contract obligations. These are largely fixed in the Salinas Valley, particularly in the short term. As a result, financial incentives alone may not generate large immediate reductions in agricultural groundwater use, but they can still play an important role in revealing scarcity costs, encouraging more efficient water management, and supporting longer-term funding strategies when combined with other conservation measures.

Financial incentives could include:

- **Acreage based charge**. The simplest concept of an acreage fee is to charge an annual amount to each landowner/grower based on the acres irrigated with groundwater that can be tailored to water source and location. Charging a flat DM Fee on all land even if not irrigated is not considered or recommended here – it does not serve the purpose of incentivizing demand reduction because reducing irrigation would not change the amount of fee paid.

- **Acreage DM fees that vary by crop.** This fee structure incorporates elements of an acreage-based an volumetric charge. It is charged per acre, but the rate is based on a characteristic of land use that is directly related to water use, i.e., the crop grown. However, if pumping is already measured and reported, this approach would have no advantage, so it is not recommended.
- **Acreage DM fees that vary by location.** DM fees can be designed to provide incentives according to spatial characteristics. For example, lands in or near a seawater intruded area, or lands adjacent to streams or GDEs may warrant a more persuasive incentive (higher fee). Spatial differences in fees would require strong justification. State law requires that differences in fees charged to different individuals or categories of users must be related to costs imposed or benefits received by the different users.
- **DM fees assessed on volume of groundwater used.** A more direct and arguably equitable fee structure would be to charge a DM fee per acre-foot of water pumped. There are two different ways to approach setting a DM fee this way: direct measurement of pumping and indirect estimates (remote sensing). Pumping calculations may vary by location to reflect differences in the recoverability of percolation from applied groundwater.

A preliminary analysis was developed to investigate how agricultural groundwater use in the Salinas Valley could respond to additional charges (DM fee). An example analysis was developed for the 180/400-Foot and Eastside Subbasins with an additional cost per AF DM fee assessed on pumping volume. The economic analysis estimated how producers could adjust by fallowing land when pumping became more expensive. Three illustrative fee levels were evaluated—\$300, \$400, and \$500 per acre-foot—to show the general magnitude of acreage response under increasing price pressure. The analysis is illustrative and results are sensitive to changes in the level of the fee and crop market conditions.

Table 19 summarizes the results of the analysis. Agricultural water use is price responsive, but the response is moderate at the fee levels evaluated. In the 180/400-Foot Subbasin, the modeled acreage fallowed is between 600 and 1,540 acres. In the Eastside Subbasin, the corresponding fallowing response is smaller in absolute terms but follows the same upward trend, increasing from 300 acres to1,570 acres. Expressed as a share of subbasin acreage, the modeled response rises from about 1 percent at the \$300 fee level to about 3 percent at the \$500 fee level in both subbasins.

Table 19. Acreage Response to Volumetric Fees

Illustrative Fee Level ($/AF)	Acres Fallowed		Share of Subbasin Acreage	
	180/400-foot	Eastside	180/400-foot	Eastside
$300	600	300	1%	1%
$400	1,540	900	2%	2%
$500	2,580	1,570	3%	3%

The preliminary analysis illustrates that volumetric groundwater fees can induce reductions in agricultural water use, but relatively high fee levels may be required to generate substantial acreage reductions. The preliminary analysis was limited to two subbasins. The results also show that the direction and scale of response are consistent with economic expectations: as the marginal cost of groundwater pumping increases, more land becomes uneconomic to irrigate and is therefore fallowed. The relatively modest response indicates that price-based DM is most practical if it is combined with other projects and management actions.

5. Demand Management Economic Impact Analysis

An economic impact analysis of demand management was developed. The analysis evaluates agricultural pumping limits and does not consider changes in domestic groundwater pumping. Two groundwater modeling scenarios were developed to illustrate the range of potential groundwater pumping limits (cuts) based on groundwater modeling of groundwater-level UR. The economic analysis translates those modeled pumping reductions into direct, indirect, and induced economic impacts to agriculture and related industries in the Salinas Valley.

The economic analysis estimates the direct cost of agricultural demand management using economic data, grounded in industry outreach and expert feedback, and an economic model of Salinas Valley agriculture[18]. DM is represented as pumping limits, and grower responses are modeled as they would occur in response to those limits. The analysis does not differentiate or impose seasonal limits. Instead, it imposes an annual pumping limit and allows adjustment flexibly across operations through a combination of (very limited) on-farm conservation and fallowing. The economic analysis includes price response (i.e., market effects) as production changes in response to pumping limits.

The economic analysis evaluates the direct costs associated with reduced pumping, including limited on-farm adjustments and reductions in irrigated acreage through fallowing. The economic analysis does not account for the offsetting benefit of (slightly) higher groundwater levels, which reduce pumping lift and associated energy costs. Regional economic impacts (indirect and induced effects) are also evaluated.

No specific DM measures have been defined. The scenarios and economic impacts are structured around illustrative pumping limits rather than particular policies. All economic impacts are shown as a potential range. Realized outcomes will depend on how DM measures are ultimately defined.

5.1 DM Scenarios

Two scenarios were developed to illustrate the direct and indirect economic impact of DM in the Salinas Valley. The scenarios—a low and a high pumping reduction/cut case—are used to illustrate a reasonable range of potential outcomes.

M&A prepared an analysis to establish a potential range of pumping cuts (demand management) by subbasin to avoid UR for groundwater levels. The analysis applied the Salinas Valley Operational Model (SVOM) to estimate how much agricultural groundwater pumping would need to be reduced in each subbasin to avoid groundwater-level URs by about 2040/2041 if DM measures were implemented. The analysis is explicitly limited to groundwater levels because earlier SWIM modeling showed that demand management provides only minimal improvement

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[18] See Brackish Groundwater Restoration Project and Alternative Water Supply Project Economic and Financial Analysis. SVBGSA. Prepared by ERA Economics. March 2026.

to the 500 mg/L chloride isocontour. That is, DM is not an effective approach implemented in isolation for managing seawater intrusion.

To isolate the effect of DM, the groundwater modeling developed by M&A changes only agricultural pumping in the target subbasin, leaves municipal and rural domestic pumping at baseline levels, and applies incremental reductions beginning in 2030 under a repeating historical-climate baseline with no added PMAs. Importantly, groundwater modeling evaluates the effect of DM in each subbasin individually. The groundwater modeling shows that subbasins are interconnected. If DM were to be implemented in multiple subbasins simultaneously then the pumping reduction in any individual subbasin would be less.

The purpose of groundwater modeling and economic analysis is not to identify a specific policy, but to estimate the approximate pumping-reduction range for each subbasin and provide a basis for later analysis of combined PMAs.

Table 20 summarizes the pumping cuts by subbasin. The economic analysis applies the range to establish a low and high scenario. Agricultural pumping in Monterey is modeled as part of the 180/400-Foot Aquifer Subbasin. No cuts are applied in Langley, but agricultural pumping is not allowed to increase further. The economic analysis applies the pumping cuts listed below to each subbasin individually, and the cuts are evaluated as occurring simultaneously.

Table 20. DM Summary by Subbasin and Aquifer

Subbasin	Low Pumping Cut Scenario	High Pumping Cut Scenario
180/400 Subbasin – 180-Foot Aquifer	18%	27%
180/400 Subbasin – 400-Foot Aquifer	27%	36%
180/400 Subbasin – Deep Aquifers	30%	45%
Eastside Subbasin	17%	25%
Forebay Subbasin	4.5%	9%
Upper Valley Subbasin	Not currently needed	Not currently needed
Monterey	Included with 180/400	Included with 180/400
Langley	Not applied	Not applied

Economic impacts are evaluated as the change from current acreage for the high and low scenarios. Results are shown as annual direct economic losses, and associated annual secondary effects (indirect and induced impacts). The pumping limit is imposed as an annual limit on applied water, rather than on net pumping, and the analysis does not distinguish among usable return flows across subbasins or aquifers. The pumping limits are applied by subbasin and aquifer as defined in the M&A modeling, which identifies the approximate reduction in pumping (as a range) needed to stabilize groundwater levels at the defined thresholds. No other supply projects are assumed; this analysis isolates the impacts of DM pumping limits alone.

5.2 Economic Analysis Methods Overview

An economic model of Salinas Valley agriculture was applied. The model represents agricultural production across the Salinas Valley subbasins, with crops represented by field and season, and aggregated into categories that reflect differences in water use, production practices, and market conditions. The response to pumping limits is represented through economic supply (production cost) and demand (buyer) relationships calibrated to current conditions in the Salinas Valley. The model evaluates adjustments in factors including applied water, acreage, crop choice, production, and price in response to the pumping limits. These relationships allow the model to estimate adjustments to pumping limits while also capturing resulting market effects, including crop price changes.

Pumping limits were analyzed at the subbasin and water balance area (WBA) level, meaning the constraint applies to a grouping of parcels rather than to individual parcels, and is managed on an annual basis. The analysis assumes that pumping limits apply annually, with no carryover across years and no seasonal administration of limits. As a result, the economic analysis estimates the least-cost within-year adjustments across seasons needed to comply with the annual restriction. The economic analysis allows for a moderate improvement in on-farm efficiency and the cost of achieving those efficiency gains is included in the reported impact measures.

Pumping limits are applied simultaneously. Because these subbasins are connected, simultaneous implementation would likely require a smaller overall pumping reduction than would be needed if each subbasin were considered independently. As a result, the “high” scenario economic impacts presented here likely overstate actual impacts if there was coordinated implementation of DM measures across multiple subbasins. Additional refinement of these demand management assumptions and implementation approaches will continue as the analysis advances.

Direct economic impacts are reported as annual losses and the present value of the stream of annual losses. Direct economic impact measures include but are not limited to:

- **Groundwater pumping**. Pumping limits are an input to the economic analysis. As crop prices and production adjusts in response to pumping limits this can affect production and groundwater pumping in other areas. The net effect on total groundwater pumping can be reported.
- **Fallowing**. Changes in total irrigated acreage by crop and region.
- **Crop acreage and production**. Shifts in the location of farmed acreage and crop production in the Salinas Valley.
- **Gross farm output (revenue)**. The gross value of crops produced at the field, accounting for changes in crop price and production (yield).
- **Net farm revenue**. Gross farm revenue minus appropriately defined farming costs. This can also be adjusted and expressed as a capitalized land value.

As farming contracts in response to DM in the Salinas Valley this impacts other agricultural industries. These are called regional economic impacts. Other regional economic impacts of DM include the impact of reduced farm production to supplier industries, processors, services, and local households.

Regional economic impacts were evaluated using an input-output model called IMPLAN. The model reflects regional economic linkages in spending between industries and is used to represent the total economic impact of pumping limits. The total economic impact includes direct effects plus indirect and induced effects. This captures the reduced economic output in agricultural support industries and in postharvest, storage, and other supply chain businesses, as well as local employee expenditures. Regional economic effects include direct, indirect, and induced components (the sum of these components is the total effect):

- **Direct Effects**: The immediate economic activity generated by the affected industry (irrigated agriculture in Monterey County), including the gross value of the crops produced, farm employment, and grower spending on inputs such as labor, water, seed, fertilizer, and services.
- **Indirect Effects**: The secondary economic activity created when agricultural producers purchase goods and services from local suppliers, such as equipment dealers, input retailers, processors, and service providers. These operations are indirectly affected by farm-level spending. These effects capture the supply-chain linkages that support additional business activity across the region. Indirect effects can include both downstream and upstream industries. The default IMPLAN model applied for this evaluation does not capture downstream supply chain linkages.
- **Induced Effects**: The household spending impacts that occur when workers employed in both direct and indirect industries spend their earnings on goods and services in the Monterey County economy. Examples include housing, healthcare, food, and retail. These effects capture how income generated by the directly and indirectly affected industries circulates through communities in the county.

The economic model was used to estimate how agricultural pumping limits would affect Salinas Valley farming under current conditions, including changes in applied water, acreage, crop mix, production, prices, and farm revenue. The analysis evaluates annual pumping limits on agriculture only, applied at the subbasin and WBA level, with limited on-farm efficiency and adjustments across seasons with land fallowing. Regional economic effects are then estimated with IMPLAN to capture how changes in farm production ripple through suppliers, service industries, and household spending in Monterey County.

5.3 Direct Economic Impacts

Direct economic impacts of DM occur as growers adjust to pumping limits through changes in applied water, irrigated acreage, crop mix, and production timing. Under the modeled scenarios, these adjustments reduce total irrigated acreage with corresponding declines in gross farm revenue. The direct losses are not uniform across the Salinas Valley: the largest impacts occur in the more constrained 180/400-Foot and Eastside subbasins, while some production shifts to less constrained areas such as Upper Valley.

5.3.1 Groundwater Pumping

The high and low scenario pumping limits are inputs into the economic analysis. Acreage, production, price, market conditions, and groundwater pumping adjust in response to the pumping limits.

Table 21 summarizes the modeled change in groundwater pumping by subbasin. Pumping limits reduce water use most substantially in the 180/400-Foot and Eastside subbasins, with smaller reductions in Forebay and a modest offsetting increase in Upper Valley. In the 180/400-Foot Subbasin, total water use declines from 111,700 AF to 88,100 AF in the low scenario (-21%) and 78,700 AF in the high scenario (-30%); in Eastside, it declines from 78,400 AF to 60,100 AF (-23%) and 51,100 AF (-35%); and in Forebay, it declines from 133,700 AF to 128,100 AF (-4%) and 122,500 AF (-8%). These largely reflect the pumping limits. Upper Valley increases from 121,000 AF to 127,500 AF (+5%) and 131,900 AF (+9%) between the high and low scenarios. The increase in Upper Valley is in response to market changes – as production decreases this has a modest price effect which leads to an increase production in areas that are not constrained. Within the affected subbasins, the largest percentage reductions occur in the deep aquifer sources, while supplemental supplies such as CSIP, SRDF, and Clark Colony remain unchanged.

Table 21. Change in Groundwater Pumping by Subbasin

Subbasin	Water Sources											
180/400-Foot	180-foot		400-foot		Deep Aquifer		CSIP		SRDF		Total	
	AF	% diff.	AF	% diff.	AF	% diff.	AF	% diff.	AF	% diff.	AF	% diff.
Baseline	28,200		53,100		13,100		10,500		5,500		111,700	
High	20,600	-27%	34,000	-36%	7,200	-45%	10,500	0%	5,500	0%	78,700	-30%
Low	23,100	-18%	38,800	-27%	9,200	-30%	10,500	0%	5,500	0%	88,100	-21%
Eastside Aquifer	Basin Fill		Deep Aquifer								Total	
	AF	% diff.	AF	% diff.							AF	% diff.
Baseline	38,100		40,400								78,400	
High	27,600	-28%	22,200	-45%							51,100	-35%
Low	30,600	-20%	28,300	-30%							60,100	-23%
Forebay	Basin Fill		Clark Colony								Total	
	AF	% diff.	AF	% diff.							AF	% diff.
Baseline	124,300		9,400								133,700	
High	113,100	-9%	9,400	0%							122,500	-8%
Low	118,700	-5%	9,400	0%							128,100	-4%
Upper Valley	Basin Fill										Total	
	AF	% diff.									AF	% diff.
Baseline	121,000										121,000	
High	131,900	9%									131,900	9%
Low	127,500	5%									127,500	5%
Langley	Basin Fill										Total	
	AF	% diff.									AF	% diff.
Baseline	3,500										3,500	
High	3,500	0%									3,500	0%
Low	3,500	0%									3,500	0%
Monterey	180-foot		400-foot								Total	
	AF	% diff.	AF	% diff.							AF	% diff.
Baseline	800		400								1,200	
High	600	-27%	300	-36%							900	-25%
Low	700	-18%	300	-27%							1,000	-17%

5.3.2 Irrigated Acreage

Irrigated acreage adjusts in response to pumping limits as land is fallow/idled, and the mix of crops planted changes over seasons.

Table 22 summarizes total irrigated acreage change in response to pumping limits. Under the low scenario, total irrigated acreage declines from 323,600 acres to 286,900 acres, an 11 percent reduction; under the high scenario, acreage falls to 269,900 acres, a 17 percent reduction. The largest losses occur in the 180/400-Foot and Eastside , where acreage declines by 22 to 31 percent and 27 to 39 percent. Forebay shows smaller reductions proportional to pumping limits. Upper Valley increases by ~5 to 9 percent, indicating that some production is reallocated rather than eliminated entirely. Even with this shift, however, acreage gains in Upper Valley do not offset losses in other subbasins.

Table 22. Change in Total Irrigated Acreage by Subbasin

Subbasin	Baseline	Low Pumping Cut Scenario		High Pumping Cut Scenario	
	acres	acres	% diff.	acres	% diff.
180/400-Foot	99,000	77,400	-22%	68,600	-31%
Eastside	56,700	41,400	-27%	34,300	-39%
Forebay	89,400	85,700	-4%	81,900	-8%
Upper Valley	75,500	79,700	6%	82,500	9%
Langley	2,000	1,900	-4%	1,900	-4%
Monterey	1,000	800	-24%	700	-30%
Total	323,600	286,900	-11%	269,900	-17%

Table 23 summarizes irrigated acreage and crop mix adjustments. The largest reductions occur in misc. field crops (-35% to -44%), other leafy greens (-36% to -46%), head lettuce (-19% to -29%), and broccoli (-10% to -14%). By contrast, permanent crops are relatively stable, with nurseries unchanged and orchards and vineyards declining 2% to 5%, consistent with the location of DM pumping limits and protecting longer-lived capital assets.

Table 23. Change in Total Irrigated Acreage by Crop

Crop Type		Baseline	Low Pumping Cut Scenario		High Pumping Cut Scenario	
		acres	acres	% diff.	acres	% diff.
Leafy Greens	Head Lettuce	57,000	46,400	-19%	40,700	-29%
	Leaf Lettuce	89,300	78,500	-12%	73,600	-18%
	Other Leafy Greens	2,800	1,800	-36%	1,500	-46%
Strawberries	Strawberries	16,000	14,300	-11%	14,100	-12%
Other Vegetables	Artichoke	400	300	-25%	300	-25%
	Broccoli	64,500	58,100	-10%	55,200	-14%
	Cauliflower	23,000	21,100	-8%	20,600	-10%
	Celery	9,500	9,100	-4%	9,000	-5%
	Carrots	900	900	0%	800	-11%
	Onion and Garlic	1,900	2,000	5%	1,900	0%
Field Crops	Field Crops	8,400	5,500	-35%	4,700	-44%
Permanent Crops	Nurseries	800	800	0%	800	0%
	Orchards	1,900	1,800	-5%	1,800	-5%
	Vineyards	47,300	46,200	-2%	45,100	-5%
Total		323,600	286,900	-11%	269,900	-17%

DM measures reduce total irrigated acreage while also shifting production toward higher value uses per unit water. Acreage may shift across the Salinas Valley in response to price adjustments and DM measures in selected subbasins. Crop shifts are limited by physical capacity of the land, contracts, microclimate, and economic factors.

An analysis of existing land use and physical potential to shift acreage was developed to validate the modeled results.

An initial analysis reviewed land use data, existing zoning, and land suitability. Parcels were analyzed to determine acreage zoned for agricultural use, currently undeveloped, used for grazing, soils that are suitable for agriculture, and land slope does not exceed (very steep) 25%. Table 24 summarizes the results of the screening analysis. Most farmable land is already farmed, with less than 150 acres valley-wide that are not currently developed/operated. There is modest potential to expand irrigated acres.

Table 24. Potential Suitable Acres Not Previously Operated

Subbasin	Acres
180/400-Foot Aquifer	35
Eastside	50
Forebay	30
Upper Valley	25
Total	140

An initial analysis was developed to evaluate the potential for shifting/expanding acreage in different subbasins for row crops. This applied the criteria above and evaluated currently farmed areas as well as idle ground. Around 5,000 acre in Forebay and 8,000 acres in Upper Valley could (potentially) convert to row crops. Vineyards, however, are frequently grown on uneven land and higher elevations that may not be suitable for conversion to row crops. An analysis of field slope, roughness, and elevation of row crops and vineyards in the Upper Valley showed that of the 26,205 vineyard acres, 7,500 acres or 28% had field characteristics that were similar to fields currently in row crop production. A similar analysis on idle and other cropland was performed showing an additional 1,600 acres that shared characteristics with row crop acreage.

Table 25. Potential Suitable Acres Previously Operated Forebay and Upper Valley

Current Crop	Forebay		Upper Valley	
	Acres	Count	Acres	Count
Alfalfa & alfalfa mixtures	197	20	26	1
Beans (dry)	852	44	13	1
Grapes	25,643	1,116	26,205	678
Idle	2,201	92	3,372	116
Misc. Grain and Hay	484	37	764	39
Misc. grasses	5	2		
Mixed Pasture	52	3	88	4
Unclassified	854	73	3,250	124
Walnuts	12	2	333	16
Total Excluding Vines	4,657	273	7,846	301
Total	30,300	1,389	34,051	979

The analysis of potentially developable agricultural lands is consistent with the economic modeling. There are a few thousand acres that could convert to row crops, and fewer acres that are currently undeveloped but could be developed into irrigated uses. This is also consistent with feedback from growers and industry experts conducted to support the study.

5.3.3 Market Effects

Salinas producers compete with producers in other regions around California, other states, and with imports from other countries (e.g., Mexico) depending on the crop and season. Many grower-shippers have operations in multiple markets to provide seasonal produce to meet consumer demand. Seasonal transitions also manage risk where weather, disease pressure, and planting/harvest disruptions can create short-term supply gaps and abrupt price movement. Seasons are generally spring, summer, and fall with shoulder season/transition periods in March/April and October/November.

As production changes in the Salinas Valley this can affect the price of commodities produced in the valley. For example, head lettuce 24-head, 42-pound carton production decreases if pumping limits reduce production. As fewer cartons are offered into that market the spot price would increase. However, the increase is usually modest rather than one-for-one with the production loss because buyers can shift some purchases across origins and harvest windows. Lettuce production rotates seasonally between Salinas/Central Coast in the warmer months and Yuma/western Arizona in winter, with the San Joaquin Valley and other California districts supplementing supply during transition periods. That regional competition is especially important in the shoulder seasons, when Salinas is not the only source available, so a Salinas-specific cut in head lettuce output does not translate into a large, isolated price spike.

There is an eventual price response to decreased production, which is evaluated in the economic analysis. The short-run price response is partially dampened because leafy greens are sold largely through contracts rather than cash (spot market) sales. Around 10 percent of leafy-greens volume moves through spot markets, while most volume is sold through contracts or vertical coordination, and those contracts are often either fixed-price or tied to trigger formulas/clauses. The spot market adjusts immediately, but many contract growers see only muted short-run price effects; over time, as contracts are reset or trigger provisions are activated, part of the decrease in production would be transmitted into longer-run contract pricing. In the longer-run, which would apply for the DM pumping limit impacts, both contracts and spot prices adjust.

Imports compete with Salinas Valley and other domestic production. Table 27 summarizes the typical importing regions and seasons for example commodities. Seasons are roughly grouped into spring, summer, and fall for illustrative purposes, with actual planting and harvest windows varying by commodity.

Table 26. Seasonal Imports and Competition

Crop	Season	Selected Notes on Competing Production Regions
Lettuces, Spring Mixes	Spring	Desert valleys (e.g., Imperial, Yuma), plus CA shoulder production (e.g., Central Valley), and imports
	Summer	Other coastal regions and limited domestic producers
	Fall	Imports and early desert production
Spinach	Spring	Arizona and imports
	Summer	Other coastal regions
	Fall	Imports and early desert production
Cauliflower/Broccoli	Spring	Arizona and desert areas
	Summer	Other CA producers
	Fall	Imports and early desert production
Berries	Spring	Other coastal areas, Mexico imports, other states (e.g., FL)
	Summer	California producers and local domestic markets
	Fall	Mexico and other imports
Celery	Summer	Other California producers, other states (e.g., MI)
	Fall	Desert valleys, other states (e.g., FL), imports
Wine grapes	Fall	Other California regions, states, and imports

DM costs and water cuts would increase crop prices by raising growers' irrigation costs and, in drier periods, reducing planted acreage or yields. Depending on how pumping restrictions are established, limits on pumping (or higher water charges) would hit hardest in spring, summer, and early fall, when irrigation demand and peak-month needs are highest.

Table 28 summarizes the modeled effect of pumping cuts on crop prices by crop type under the low and high pumping reduction scenarios. Across all crop categories, prices increase modestly, generally less than 3 percent depending on the crop and scenario. Under the low pumping cut scenario, price increases are typically less than 2 percent, while under the high pumping cut scenario, increases reach up to about 3 percent for selected crops such as other leafy greens and carrots. The price effects consider competition from other regions/sources that buyers may switch to, particularly during shoulder seasons, and adjustments within the Salinas Valley. The ability to shift production out of the Salinas Valley generally limits (reduces) the price effect, whereas more rigid buyer requirements would increase the estimated effects.

Table 27. Crop Price Effect Summary

Crop Type		**Difference Relative to Baseline**	
		Low Condition	**High Condition**
Leafy Greens	Head Lettuce	1.3%	2.3%
	Leaf Lettuce	0.8%	1.3%
	Other Leafy Greens	2.2%	2.9%
Strawberries	Strawberries	1.8%	2.1%
Other Vegetables	Artichoke	0.9%	1.1%
	Broccoli	0.9%	1.4%
	Cauliflower	0.7%	1.0%
	Celery	0.3%	0.4%
	Carrots	0.9%	2.3%
	Onion and Garlic	0.6%	1.6%
Permanent Crops	Orchards	1.2%	1.8%
	Vineyards	0.2%	0.4%

In summary, Salinas Valley growers have limited ability to pass through higher costs to consumers. Production competes with other markets during different times of the year. However, there is a modest price effect within seasons as production changes. As the supply-induced changes cause price increases this affects the returns to farming in other areas that are less affected (or not affected at all) by pumping restrictions. Crop prices increase, net returns increase, and capitalized land values change in areas without pumping restrictions.

5.3.4 Gross Farm Revenue

Gross farm revenue adjusts in response to pumping limits as land is fallow/idled, production (yield) changes, and crop prices change.

Table 26 shows how pumping limits affect gross farm revenue by subbasin, reflecting both changes in irrigated acreage and crop mix and the resulting market price response. Revenue losses are concentrated in the subbasins with greater pumping cuts: gross revenue in the 180/400-Foot Aquifer declines from $1,941 million to $1,603 million (-17%) in the low scenario and $1,485 million (-23%) in the high scenario; Eastside declines from $1,318 million to $1,121 million (-15%) and $1,029 million (-22%); and Forebay declines from $1,083 million to $1,050 million (-3%) and $1,012 million (-7%). Gross revenue increases modestly in Upper Valley, from $862 million to $920 million (+7%) and $958 million (+11%), and in Langley, reflecting some shift in production to less constrained areas. Total gross farm revenue falls from $5,340 million under baseline conditions to $4,831 million (-10%) in the low scenario and $4,623 million (-13%) in the high scenario.

Table 28. Change in Gross Farm Revenue by Subbasin

Subbasin	Baseline	Low Pumping Cut Scenario		High Pumping Cut Scenario	
	(millions)	(millions)	% diff.	(millions)	% diff.
180/400-Foot	$1,941	$1,603	-17%	$1,485	-23%
Eastside	$1,318	$1,121	-15%	$1,029	-22%
Forebay	$1,083	$1,050	-3%	$1,012	-7%
Upper Valley	$862	$920	7%	$958	11%
Langley	$111	$117	5%	$118	6%
Monterey	$26	$21	-19%	$20	-22%
Total	$5,340	$4,831	-10%	$4,623	-13%

5.3.5 Other Considerations

The value of agricultural land is, in simple terms, the present value of the stream of income that can be generated from that land. DM measures affect the stream of income that can be generated from an acre of land by increasing water costs, changing crop yield, and changing crop price. Even modest increases in crop price can substantially increase net revenue, and the resulting value of agricultural land. Similarly, pumping limits can substantially decrease the value of agricultural land.

The economic analysis of the direct cost of DM does not consider downstream supply chain industries and support industries. A minimum industry is needed to support contracts for growing specialty commodities. At some point higher costs are not manageable and production will decrease (fewer crops per year and more fallow land). Other production depends on a local web of packing sheds, pre-cooling/hydrocooling and cold storage, food-safety and QA services, labor contractors and farm-labor management, input/transplant suppliers, and high-frequency refrigerated trucking, among other industries. There is a minimum throughput (acreage/tons/firms) needed for each segment to remain viable, with exact minimum throughput not known at this time (but could be analyzed). These other businesses have high fixed costs and require high utilization to keep unit charges competitive.

A tipping point occurs if enough acreage/production leaves that support industries and logistics run under-capacity: per-unit charges rise, service frequency degrades, smaller operations close, and the resulting higher delivered costs accelerate additional acreage exit. For example, processed lettuce requires highly specialized equipment and facilities co-located with production, and these processing lines are sanitized, disassembled, and transported between Western Arizona and Salinas–Watsonville in a matter of days[19]. In short, higher costs in Salinas Valley can re-

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[19] University of Arizona Cooperative Extension. 2023.

route processing and skilled labor pools to other regions. DM measures, particularly large-scale pumping cuts, risk cascading losses that are discontinuous rather than incremental once local capacity falls below economically viable levels.

These and other factors could be evaluated as specific DM measures are defined.

5.3.6 Direct Economic Impacts Summary

Direct economic impacts of DM occur as growers adjust to pumping limits through changes in applied water, irrigated acreage, crop mix, and production timing. Under the modeled scenarios, these adjustments reduce total irrigated acreage by about 11 percent in the low and 17 percent in the high scenario, with corresponding declines in gross farm revenue of about 10 percent and 13 percent. The direct losses are not uniform across the Salinas Valley: the largest impacts occur in the more constrained 180/400-Foot and Eastside subbasins, while some production shifts to less constrained areas such as Upper Valley.

These economic analysis illustrates that DM affects not only the total amount of land farmed, but also what is grown and where it is grown. These changes reduce both gross and net farm revenue, and because agricultural land values are tied to expected future earnings, they also imply declines in land values, particularly for land that depends on groundwater in the most affected subbasins. The Salinas Valley farming industries are economically connected through these market effects.

These direct economic impacts are the starting point for broader regional economic effects. As pumping limits reduce irrigated acreage, shift crop production, and lower farm revenue, growers purchase fewer inputs and services, which in turn affects suppliers, processors, storage and handling firms, farm labor, and other support industries in the Salinas Valley and Monterey County economy. Changes in crop mix and the geographic distribution of production can also shift where economic activity occurs within the region. The next section evaluates these broader ripple effects by tracing how direct agricultural losses translate into indirect and induced impacts in Monterey County.

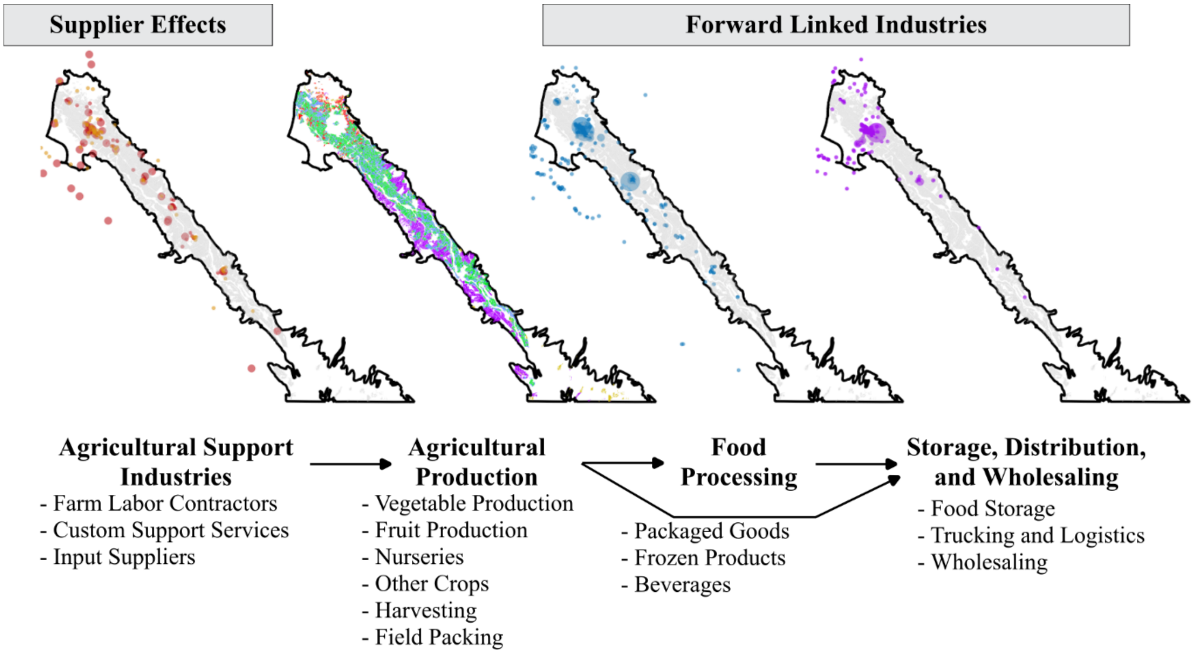
5.4 Regional Economic Impacts

Regional economic impacts measure how direct losses to irrigated agriculture extend into the broader Monterey County economy. These regional impacts are measured using the IMPLAN input-output model, which traces how changes in agricultural production affect related industries and household spending. The economic impact analysis reports direct effects on farming, indirect effects on businesses that supply or support agriculture, and induced effects from changes in employee and household expenditures. Together, these measures provide an estimate of the total regional economic impact of pumping limits in the Salinas Valley.

The default IMPLAN model analysis is designed to capture so-called “backward-linked” or supplier effects, and it does not represent so-called “forward-linked” industries that depend on agricultural output as an input. In the Salinas Valley, these downstream activities include postharvest handling, cold storage, shipping, and processing, among others, all of which can be affected when pumping limits reduce farm production. To address this limitation, an additional analysis was developed to provide an initial estimate of these forward-linked effects and better reflect the broader regional economic consequences of demand management.

Figure 7 illustrates the local supply chain captured in the regional economic impact analysis. Agricultural production changes in response to pumping limits. This affects purchases (agricultural support industries in the illustration) by farming operations. This also affects processing, storage, distribution, and other forward linked industries show in the illustration. The economic analysis estimates impacts across this entire supply chain.

Figure 7. Salinas Valley Ag Supply Chain Illustration



Impacts to agricultural support industries are estimated using gross revenue impacts by crop type from the direct economic impact analysis, and cost of production data to inform where spending is taking place. A regional purchase coefficient is also used to estimate the share of input purchases occurring within Monterey County (the area of interest for regional impacts_.

Impacts to downstream industries are sometimes omitted from regional economic impact analyses because many forward linked industries can source inputs from other locations. Many of the agricultural products produced in Monterey County have a relatively short shelf life, making additional transit and storage time costly. Based on local industry outreach, it is unlikely that processing, storage, and wholesaling industries would be able to fully backfill all production from a different region and is therefore appropriate to include in the regional economic impacts.

The effects on downstream industries were estimated using industry data. Monterey County Agricultural Commissioner and USDA data were applied to estimate the share of crop production going directly to the fresh market and the share of production being used for packaged and processed food products. Unlike fresh fruit and vegetables, a substantial share of locally produced grapes are being transported and utilized by wineries outside of Monterey County. Estimates of Monterey County winery output and product markups were applied to estimate the share for local wineries. IMPLAN model data and the 2022 Economic Census were used to estimate the production relationships of the local food processing industry, local storage and wholesaling, and local wineries[20].

Downstream IMPLAN model sectors were customized to represent the local food processing, storage, and wholesaling industries. Local purchases made by processors, wholesalers, and wineries of locally produced food products are zeroed out to prevent double counting of impacts at the farm level while still capturing the labor income, value added, and other local purchases made by these downstream industries. The customized IMPLAN model was run to generate the total indirect and induced effects of reduced output from local farms, food processors, wineries, food storage, and food wholesalers.

IMPLAN reports economic impacts in four major categories: Employment, Labor Income, Value Added, and Output.

- **Employment** totals are reported as Full Time Equivalent (FTE). Many of the jobs impacted by reduced agricultural production are seasonal or part time, meaning that the total number of individuals with lost income is significantly greater that the FTE amount reported in the impact tables.
- **Labor income** represents the impact to wages. This excludes any owner income or company profits.
- **Value added** represents the difference between an industry's intermediate expenditures (materials and services purchased by an industry) and its output (the value of the goods and services it produces). Labor income is included in an industries value added, as well as owner income, company profits, and taxes on production and imports.
- **Output value** represents the value of the goods and services produced by an industry. The total change in output summarized by IMPLAN is representative of the total reduction in sales of goods and services within the region. This differs from the Gross Regional Product (GRP), similar to Gross Domestic Product or GDP, which represents the market value of only final goods and services produced within a particular region. Output and Value Added are used as metrics to assess regional impacts because they more accurately describe contribution of an industry to the local economy, compared to GRP which can overweight the impact of industries with large intermediate expenditures. To better illustrate the magnitude of impacts, total effects are also reported as a share of region totals.

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[20] Future analyses could include additional downstream industries / sectors. This economic analysis captures the key downstream industries.

Regional economic impacts were evaluated for the low and high pumping cut scenarios.

Table 29 summarizes the results of the low scenario. This would result in substantial economic effects across Monterey County, underscoring the central role of agriculture in supporting regional employment, business activity, and income generation. The total reduction in output within the county is around $1.3 billion, representing 3.0% of total output. An estimated 5,835 FTE jobs would be lost representing around 2.4% of total county employment. The largest share of these impacts occurs at the farm, where reduced agricultural production directly decreases employment, earnings, and output. These direct losses affect upstream and downstream industries, particularly food processing and wholesaling, and further affect the local economy through reduced household spending.

Table 29. Monterey County Economic Impacts, Low Pumping Cut Scenario

Impact Type	**Employment (FTE)**	**Labor Income ($M)**	**Value Added ($M)**	**Output ($M)**
Farm Gate Impacts	-1,873	-$257	-$397	-$509
Food Processing	-352	-$28	-$35	-$88
Wholesaling and Wineries	-786	-$112	-$198	-$302
Total Direct Effect	-3,011	-$397	-$630	-$899
Indirect Effect	-1,376	-$91	-$134	-$214
Induced Effect	-1,448	-$83	-$151	-$244
Total Effect	**-5,835**	**-$571**	**-$915**	**-$1,358**

Table 30 summarizes the results of the high scenario. The total reduction in output within the county equals $1.9 billion, representing about 4.3% of total output. An estimated 8,228 FTE jobs would be lost representing 3.4% of total county employment. Similar to the low pumping cut scenario, the direct losses affect upstream and downstream industries, particularly food processing and wholesaling, and further affect the local economy through reduced household spending.

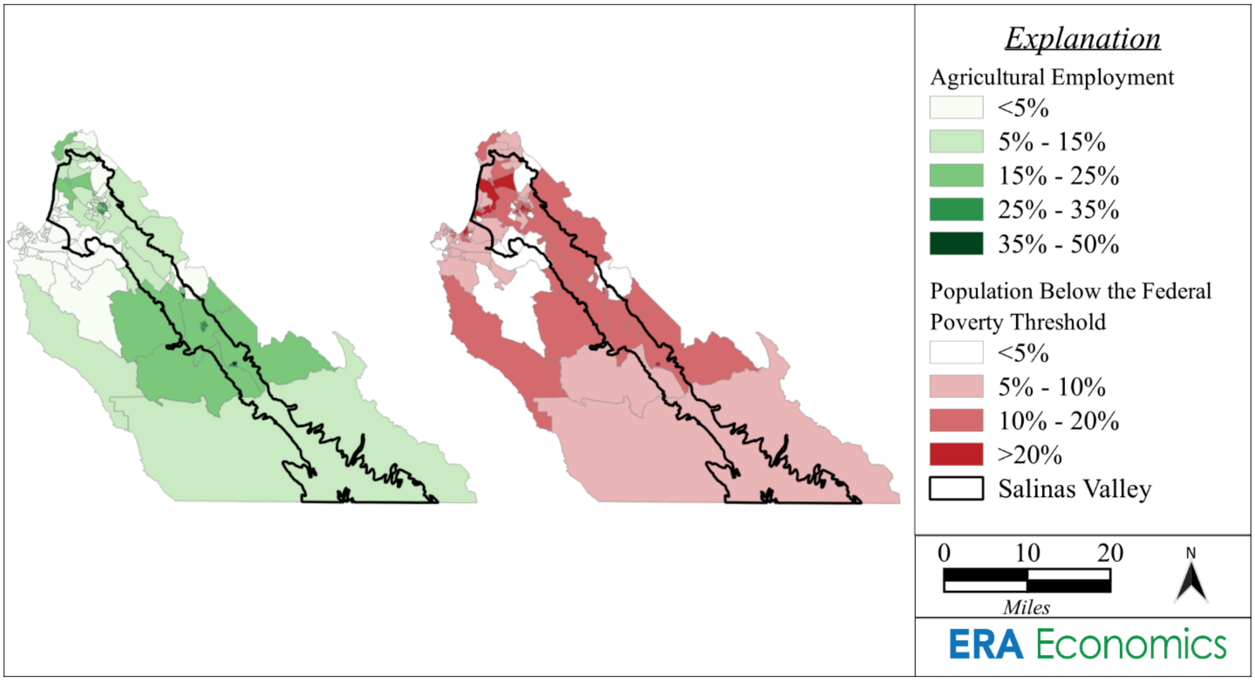
Table 30. Monterey County Economic Impacts, High Pumping Cut Scenario

Impact Type	**Employment (FTE)**	**Labor Income ($M)**	**Value Added ($M)**	**Output ($M)**
Farm Gate Impacts	-2,537	-$361	-$560	-$717
Food Processing	-573	-$37	-$45	-$134
Wholesaling and Wineries	-1,122	-$159	-$282	-$430
Total Direct Effect	-4,232	-$556	-$886	-$1,281
Indirect Effect	-1,961	-$130	-$192	-$308
Induced Effect	-2,035	-$116	-$212	-$343
Total Effect	**-8,228**	**-$803**	**-$1,291**	**-$1,932**

The economic impacts of DM extend across all of Monterey County and are not confined to on-farm operations. Reductions in agricultural production ripple through the regional economy and effects extend to farmworkers, service providers, and communities that depend on agriculture for employment and income. The spatial distribution of these impacts is uneven.

Figure 8 illustrates the distribution of jobs and income. Areas with the highest concentrations of agricultural employment—particularly in and around Salinas, Soledad, Greenfield, and King City—also tend to have higher shares of the population living below the federal poverty threshold. This overlap indicates that the economic effects of demand management are likely to fall disproportionately on communities that are less able to absorb economic shocks. Workers in these areas are more dependent on agricultural employment, which can be seasonal and sensitive to changes in acreage and production. Reductions in irrigated agriculture therefore translate directly into reduced job opportunities, lower household income, and broader community-level impacts. DM, even if it is implemented across the entire valley, has economic consequences that are concentrated in vulnerable populations, raising important considerations for equity, workforce stability, and regional economic resilience.

Figure 8. Agricultural Employment and Household Income Monterey County



This initial analysis may be refined as part of continued evaluation. Additional model refinements could include increasing the evaluation of employment effects. Farm labor positions are often seasonal, and the number of individuals affected may be much larger than the values reported as FTE equivalent impacts. Model refinements may also include disaggregating impacts to the local level. Despite being reported at the county level, impacts caused by reductions in agricultural production disproportionately impact small and unincorporated communities.

6. Summary and Extensions

DM has important market effects. The timing, scale, and structure of demand management (pumping cuts) can substantially change the direct economic cost. Limits imposed in one area can affect crop prices, shift where crops are grown, affect groundwater use in other regions, and ultimately affect land values.

The economic effects of DM also depend on the rules applied to reduce pumping. For example, for pumping limits factors such as spatial and temporal rules, ramp-down schedules, incentives, and enforcement provisions can materially change outcomes. These implementation details were not defined in the economic analysis because they would need to be developed through future public processes. The economic analysis is intended to provide an understanding of the range of potential direct and indirect economic impacts and may be refined as additional data are developed, and additional details for potential demand management measures are proposed.

The economic impacts illustrate the effect of agricultural demand management. Other factors are held constant. Other regulatory compliance costs, including requirements such as Ag Order 4.0, can further increase costs for producers and resulting economic impacts. These cumulative economic costs were beyond the scope of this assessment but could be considered for future analyses.

Table 31 summarizes the overall magnitude of the modeled economic impacts associated with the two illustrative DM (pumping cut) scenarios. Under the low pumping cut scenario, annual groundwater reductions total about 41,000 AF and are associated with approximately 37,000 acres of fallowing, $509 million in gross farm revenue losses, and broader regional losses of about 5,835 full-time-equivalent jobs, $571 million in labor income, $915 million in value added, and $1.358 billion in total output. Under the high pumping cut scenario, the effects increase substantially, with pumping reductions of about 61,000 AF, roughly 54,000 acres fallowed, $717 million in gross farm revenue losses, and total regional impacts of approximately 8,230 jobs, $803 million in labor income, $1.291 billion in value added, and $1.932 billion in output. The economic effects of DM increase nonlinearly as pumping reductions become more severe.

Table 31. Economic Impact Summary

Measure	Low Pumping Cut Scenario	High Pumping Cut Scenario
Net pumping cut / reduction (AF)	41,000	61,000
Acres fallow (acres)	37,000	54,000
Gross revenue loss ($M)	$509	$717
Jobs lost (FTE)	5,835	8,230
Income lost ($M)	$571	$803
Value added loss ($M)	$915	$1,291
Output value loss ($M)	$1,358	$1,932

Ther direct and regional economic effects of demand management are particularly important in Monterey County where a substantial share of local economic activity is linked to agricultural industries. Effects would extend beyond on-farm operations to upstream and downstream industries, and could have meaningful implications for local communities that depend on agricultural production and related economic activity. Key findings include:

- Market effects matter: the timing, scale, and design of demand management affect direct economic costs and subbasin groundwater conditions.
- Pumping limits in one area can affect crop prices, production, crop location decisions, and water use across the Salinas Valley. Economic impacts can be expressed as annual losses or reported as capitalized changes in land values across the region.
- The economic analysis does not specify demand management implementation details because they would be determined through later public processes.
- Additional regulatory requirements and cost pressures, such as Ag Order 4.0, pest pressure, labor costs, fuel and other input costs, could interact with demand management and affect overall economic impacts.
- Regional impacts in Monterey County could be significant, including effects on downstream industries and local communities.

The economic analysis is based on the available data and groundwater modeling at this time. A range of potential economic outcomes are shown. As the demand management measures and overall approach are refined the economic framework can be updated applied to expanded evaluation of how costs/impacts may be distributed. M&A groundwater modeling and this economic analysis illustrates that Salinas Valley Subbasins are both economically and hydrologically connected – changes in one area implications for other areas, but the magnitude and importance of this linkage varies. Subsequent work can help inform future decision-making, stakeholder engagement, and the integrated implementation planning effort. This can also support discussion of cost allocation, including how program costs, compliance obligations, and economic burdens may be distributed among beneficiaries, regulated parties, Monterey County communities, and other affected sectors.

Potential extensions of the current analysis include:

Refine groundwater modeling assumptions, including coordinated multi-subbasin implementation effects rather than independent subbasin cuts.

Refine the demand management measures, including the timing, scale, and implementation steps, and then revise economic impacts to reflect those specific measures.

Expand the analysis to evaluate distributional impacts across geographies, agricultural operations, and other affected stakeholders. Expand analysis of intra-valley and inter-regional production shifts to support understanding of the effect of spatially targeted DM measures.

Assess lower-cost measures, including water use efficiency, as well as other PMAs, and evaluate how those measures could be applied to reduce overall costs and economic impacts as part of an integrated implementation strategy.

Support discussion of cost allocation, including how DM and other PMA costs, compliance obligations, and economic burdens may be distributed among beneficiaries, regulated/affected parties, and other indirectly affected sectors across the county.

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