

# GROWING CALIFORNIA'S AGRICULTURE

**Towards a More Vibrant and Productive Agricultural Sector**

By Amy Kaleita, Ph.D.





## Growing California's Agriculture

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## EXECUTIVE SUMMARY

California's agricultural sector is a strong and important component not only of the state's economy but also of national and global food production. Protecting and enhancing this important sector, and encouraging innovation in water conservation, labor use, and development of consumer markets, provides benefits not only to farmers, but to the population as a whole. In order to help California's nationally and internationally important agricultural industry grow and strengthen, local, state, and federal governments should reevaluate counterproductive policies and strategies. The following recommendations address those issues:

- ***Adjust water policy and pricing to provide an incentive for conservation.*** Conservation becomes economically advantageous when users pay the real price of water.
- ***Phase out direct federal agricultural subsidies.*** Federal cash subsidies of commodity crops provide little benefit to California agriculture, and distort pricing in the food markets.
- ***Streamline and standardize regulations.*** Reduced costs and overhead for complying with environmental regulations would free up money for farm innovations, and reduce barriers to growth.

In order to help California's nationally and internationally important agricultural industry grow and strengthen, local, state, and federal governments should reevaluate counterproductive policies and strategies.

# INTRODUCTION

California's agricultural sector is a strong and important component not only of the state's economy but also of national and global food production. Protecting and enhancing this important sector, and encouraging innovation in water conservation, labor use, and development of consumer markets, provides benefits not only to farmers, but to the population as a whole. But agriculture in California is under some unique and increasing pressures, and key state and federal policies and regulatory frameworks are counterproductive. In this issue brief, the state of California's agricultural production, barriers that are impeding California's agricultural economy, and opportunities for agriculture-related policy reforms that will spur additional growth are explored.

## Overview of California Agriculture

Agriculture and its immediate support industries directly generate only about 1.5 percent of California's gross state product (GSP). This may seem like a small amount on its face, but GSP is only part of the picture. When the economic ripple effects from this sector are also considered – each dollar earned in the agricultural sector stimulates additional activity in terms of further production, job creation, and value addition – then agricultural production and processing account for 6 to 7 percent of the state's economy. Farming and closely related industries employ 7.3 percent of the state's private sector workforce.<sup>1</sup> Agriculture is also a significant land use category in the state. In 2002, agriculture (pasture & crops) represented 27 percent of the land area of California, and 37 percent of non-federal land.<sup>2</sup>

Regionally, the influence of agriculture varies with the diversity of the region's economy (see Appendix A for a map of agricultural regions in the state). The Central Valley (including the San Joaquin Valley and the Sacramento Valley) accounts for 43 percent of the state's total agricultural production and processing and has a strongly agricultural economy. In this area, 15.6 percent of the total regional economic output, and 12.6 percent of employment, is directly attributable to agriculture. The employment contribution rises to 24 percent when indirect effects are considered. The Central Coast accounts for 14 percent of the state's agricultural production, but has a large and diversified economy – 22 percent of the state total. Agriculture in this region represents only 2.8 percent of economic output and 3 percent of employment (5 percent when indirect effects are also considered).<sup>3</sup>

Even if the net contribution to the state's economy seems small, California's role as a food producer, even on a national scale, is significant. California is responsible for 11 percent of total agricultural sales in the United States,

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the largest share of any state. For comparison, the second and third most productive states in the country are Texas and Iowa, each accounting for approximately 7 percent of the nation's total agricultural value.<sup>4</sup>

California's production of various fruits, tree nuts, and vegetables is nearly unparalleled, and the state produces more than 90 percent of the nation's output of 18 commodities.

**90 percent or more of the US product of these comes from California<sup>5</sup>:**

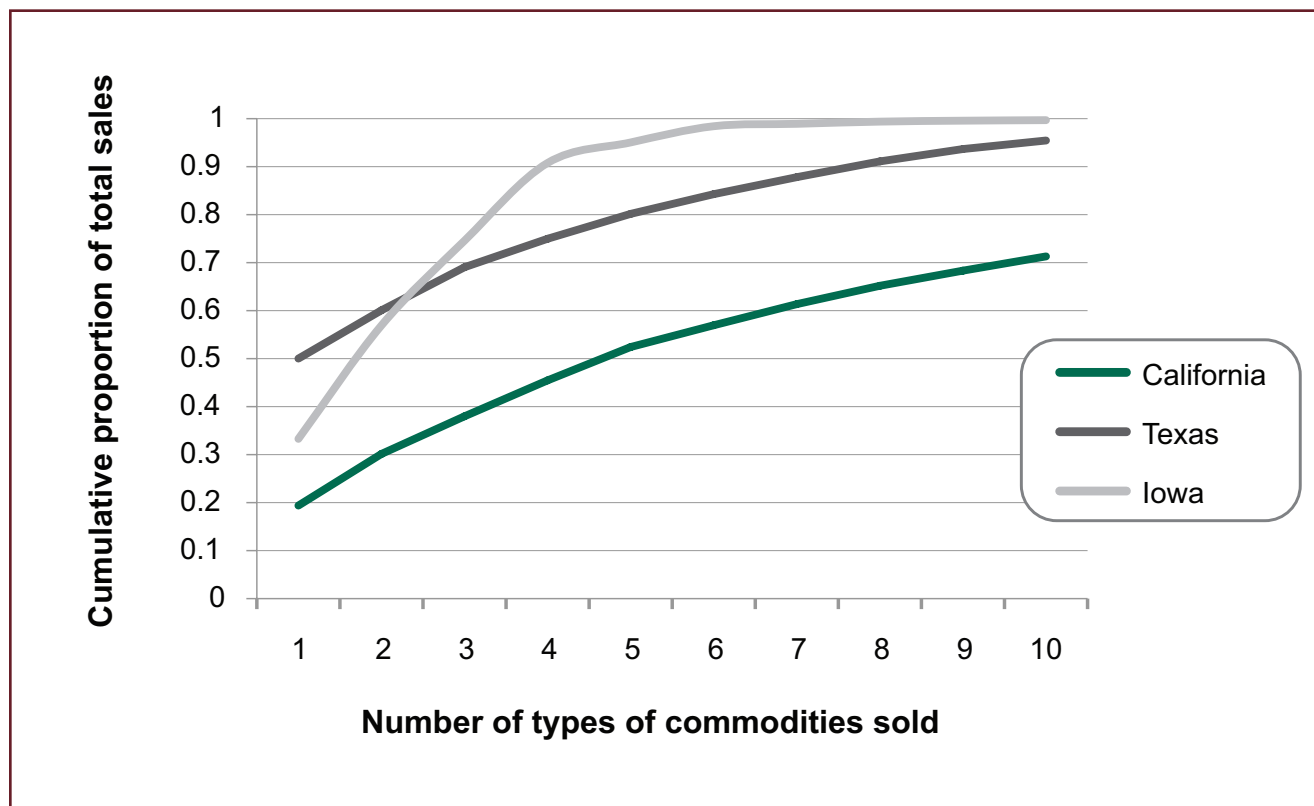
Shelled almonds	Olives	Broccoli
Apricots	Pistachios	Celery
Avocados	Plums	Garlic
Grapes	Dried Plums	Kiwifruit
Figs	Walnuts	Lemons
Processed strawberries	Artichokes	Nectarines

On a global scale, depending on the ranking methodology, California ranks somewhere from 5<sup>th</sup> to 9<sup>th</sup> in the world in terms of agricultural production. That production benefits not only the state and the country, but the rest of the world as well. In 2010, California exported more than 24 percent of its agricultural production, with exports reaching \$14.72 billion, a 125 percent increase over the preceding 11 years.<sup>6</sup> The top five exports are almonds, dairy & dairy products, wine, walnuts, and rice.

California is the sole U.S. exporter of 12 commodities (like almonds, olives, and raisins) and the exporter of 90 percent or more of 4 more (including processed tomatoes and wine). A majority of the exports goes to Canada (lettuce, strawberries, wine), followed by the European Union (almonds, wine, pistachios), China (almonds, pistachios, walnuts), Japan (rice, almonds, hay), and Mexico (dairy, seeds, processed tomatoes).<sup>7</sup>

California has a striking amount of agricultural diversity: the variety in the types of crops sold by the state is considerably higher than it is in states with similarly large agricultural economies. Here, the next two most productive states in the country, Texas and Iowa, provide illustrative examples. In Iowa, five commodities account for 90 percent of the economic value. In Texas, it's eight commodities. But in California, it's twenty-two.<sup>8</sup> The curves below indicate the diversity of California's agricultural economy, especially compared to other states with a highly productive agricultural sector – other states' agricultural production are dominated by two or three commodities.

## California has a diverse agriculture sector



California farms are diverse, and so too are the farmers themselves. California has higher percentages of female and minority operators (mainly Asian/Pacific Islander and Hispanic) than the United States as a whole.<sup>9</sup>

But California's agriculture has some unique pressures. Water for irrigation purposes and livestock is crucial, but California's strongest agricultural regions are water-limited even under relatively wet conditions; the situation is even more contentious under dry conditions that the state has experienced for a number of years in the last decade. Competing uses—urban and suburban residential and industrial uses, not to mention water withdrawal limits for environmental preservation—mean that agricultural production is under significant pressure to reduce or limit water use. Furthermore, the fruits, vegetables, and nuts that California produces abundantly are labor-intensive crops. While field crops like corn, soybeans, wheat, and cotton are routinely managed with increasingly automated machine systems, management and harvest of specialty crops remains reliant on manual labor, which has economic and social costs unique among commodity production.

To address these issues, California agriculture will need continued innovation, conservation, and progress. Agricultural water conservation, reduction in production costs, and continued growth in a market for their products are all things that California's farmers will have to undertake. Unfortunately, several significant barriers stand in the way.



# BARRIERS TO PROGRESS

## Water Policy and Pricing

Because the most agriculturally productive areas of the state are also among the driest regions, irrigation and water use are important components of farming and livestock production in the state. But water allocations and policy in California are nearly unparalleled in their complexity.

In California, all surface water supplies are owned by the state, with individuals and groups having rights to use the water (the majority of groundwater in California remains unregulated). But those water rights are a hodgepodge of various approaches: the *riparian system*, based on English common law, in which owners of land adjacent to a body of water have equal rights to use the water; the *prior appropriation* system, in which the first person or group to use the water establishes rights to the water for future use, and all subsequent users have junior rights; and *pueblo rights*, derived from Spanish law involving municipal use of water that flows through a city. This combined system of plural water rights, known as the California Doctrine, continues to be defined and refined by the courts. Even the California Supreme Court finds itself challenged to sort out the morass of issues involved, noting that “[t]he scope and technical complexity of issues concerning water resource management are unequalled by virtually any other type of activity presented to the courts.”<sup>10</sup> Although there have been modifications to the doctrine’s “use it or lose it” approach to water allocation that is governed by prior appropriation, the system remains largely a disincentive for users to conserve, lest they lose their rights to the water in the future.

Water pricing strategies also typically provide little incentive to invest in water conservation innovations. The rate structures for pricing water are locally specific and vary from region to region and from provider to provider. Rate structures generally fall into four general categories, though many water providers use a combination of rate structures. With *flat rates*, users pay a single fee for access to water, and the total charge does not vary with the amount of water used. This type of pricing structure was until recently still common in the Central Valley, for example. But California’s Water Conservation Act of 2009 required agricultural water users to adopt a pricing structure based “at least in part on quantity delivered.” This also meant requiring water suppliers to actually measure the amount of water delivered to farms.

Alternatives to the flat rate include uniform and increasing block structures, both of which are already in use in various places around the state. With *uniform pricing structures*, users are charged the same amount for every gallon

“The scope and technical complexity of issues concerning water resource management are unequalled by virtually any other type of activity presented to the courts.”

—California Supreme Court



of water used. *Increasing block structures* mean that per-gallon charges increase at higher usage rates. Seasonal pricing, where water prices vary by time of year, is rare.

Agricultural users are typically charged lower rates than other users, thanks to a combination of federal subsidies, many in the form of reduced repayments for construction of major federal infrastructure such as the Central Valley Project. For example, according to a study from the Environmental Working Group, the average price for irrigation water from the Central Valley Project in 2002 was less than 2 percent the price for residential drinking water in Los Angeles, and one-tenth the estimated cost of producing replacement water supplies from proposed new dams and reservoirs.<sup>11</sup> This difference, though, reflects not only the effect of subsidies, but also the greater costs of conveyance over longer distances, and higher levels of treatment for drinking water supplies versus irrigation water supplies. Even so, a 2000 survey of water rates for agricultural users illustrates the huge variation in prices across the state.<sup>12</sup> In the very dry Colorado River hydrologic region, irrigation water costs \$7 to \$17 per acre-foot (a-f; equivalent to one foot of water depth over one acre of land). In the Central Coast region, irrigation water costs \$392 to \$607 per a-f, and in the Central Valley irrigation water costs \$2 to \$80 per a-f.

Overall, the “use it or lose it” nature of California’s water policy, combined with comparatively low water prices that don’t always differentiate between low and high water use, means that agricultural producers have little reason beyond public pressure (often through increased regulation, or at least, increased clamoring for increased regulation) to invest in conservation advances, of which there are many (more efficient irrigation systems and techniques, more site-specific monitoring of crop water demand, etc.<sup>13</sup>).

Currently, producers of high-value specialty crops are the most likely to have adopted high-efficiency irrigation systems. Producers of lower-value crops like alfalfa, cotton, corn, and rice, which represent less than 10 percent of California’s production value, use the highest amount of irrigation water (over 60 percent of net agricultural crop water use in 2005<sup>14</sup>). A shift away from these crops would also help to address agricultural water consumption. But corn, cotton, and rice are incentivized through direct federal subsidies.

## Federal Subsidies

California agriculture produces a high volume of products with very little subsidy from the federal government. Ninety percent of subsidies in the U.S. go to wheat, corn, soybeans, rice, and cotton<sup>15</sup>, crops that don’t even crack the top ten in terms of California’s production value. The types of agricultural products sold in California are produced largely without the benefit of agricultural subsidies. This is in stark contrast to Texas and Iowa, and many of the other top-producing states, like Nebraska and Illinois, for example.

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Western Dairy News (a service of a collaboration of university dairy extension specialists) tells the following example of “real environmental regulation stories in California”

*“One very young producer was just beginning his dairy herd in spring 2005 at a leased facility. The number of cows he had in October 2005 wasn’t his build-out herd size; in 2005 he had around 200 cows and in 2007/2008 he had 300 cows. This was a startup herd. Unfortunately, since the cows weren’t on the facility in October 2005 the producer has limited options.*

*Option 1: Figure out how many cows the previous lessee had at the dairy and potentially modify the existing herd conditions with the Regional Water Quality Control Board.*

*Option 2: Seek coverage under individual waste discharge requirements.*

*Option 3: Find another dairy to lease that had more cows in October 2005.*

*Option 1 is unlikely to occur since the previous renter and the landlord didn’t part on good circumstances. Option 2 is very expensive – probably two years and more than \$200,000. So, the operator really only has Option 3.”*

Compare the top five production sectors in California, Texas, and Iowa, shown in the following table. All of the top five production categories in Texas and Iowa benefit from direct subsidies. In California, it’s only two (dairy and cattle), and the subsidies in those sectors are considerably smaller than in corn, cotton, and soybeans. Despite its number 1 ranking in agricultural production value, California ranks 10<sup>th</sup> in subsidy receipts (meanwhile, Texas ranks 1<sup>st</sup> in subsidy receipts, and Iowa 2<sup>nd</sup>).<sup>16</sup>

## Top 5 Commodity Categories

shading indicates direct subsidy eligible

Rank	California	Texas	Iowa
1	Fruits, tree nuts, and berries	Cattle and calves	Corn
2	Milk and other dairy products from cows	Poultry and eggs	Hogs and pigs
3	Vegetables, melons, potatoes, and sweet potatoes	Cotton and cotton-seed	Cattle and calves
4	Nursery, greenhouse, floriculture, and sod	Milk and other dairy products from cows	Soybeans
5	Cattle and calves	Corn	Poultry and eggs

As a result, 91 percent of California farms do not collect subsidy payments (compared to 81 percent in Texas, and a paltry 19 percent in Iowa).<sup>17</sup>

In California, agriculture payments from the federal government are much smaller than the sales volume. Sales dwarf subsidies at a rate of 25:1. That is not the case in Texas and Iowa, where the subsidies are substantial in comparison to sales; in both states, sales outpace subsidies at a rate of only 6:1. In California, the primary recipients of direct subsidy payments are cotton and rice growers. Cotton and rice represent only about 3 percent of the state’s total agricultural output, but those growers receive about 44 percent of California’s share of federal crop subsidies.<sup>18</sup>

Specialty crop support is a very small proportion of Farm Bill spending (about 10 percent of the total commodity support, and even less when you include insurance programs). Specialty crops include fruits, vegetables, tree nuts, nursery crops, and floriculture – exactly the types of crops that California produces most abundantly. In California, 67 percent of the federal specialty crop

spending is support for fruits and vegetables in school lunches. Specialty crop producers get almost no direct support.

The upside to this lack of subsidy support in California is that farmers have had to be more market-oriented. There is a robust entrepreneurial spirit in California, and the state's successful agricultural economy is largely self-sufficient. California leads the country in direct to consumer sales, indicating responsiveness to consumer demand; 13.4 percent of all U.S. direct sales happened in the state. California farmers are also taking advantage of consumer interest in organic foods: 38.4 percent of all U.S. organic sales happened in California.

The downside, aside from taxpayer money subsidizing production largely in other states, is that the subsidized commodities are cheaper than they would otherwise be. The resulting ubiquity, for example, of corn-enhanced processed food offers a cheap alternative to fruits and vegetables. The subsidized crops are thus indirectly in competition with the specialty food crops that California produces so well.

## Regulation

Another significant barrier to innovation in California agriculture is the confusing montage of regulations. Anecdotal reports suggest that a lack of communication and coordination between agencies, or even within the same agency, makes for an inconsistent application of policies<sup>19</sup>.

There are also a large number of regional agencies, each implementing different policies in response to the same state or federal regulation. Nine "California Regional Boards" regulate the quality of water discharge including from agriculture; 35 local air districts monitor air quality and regulate air pollution; individual counties have permitting agencies which may affect various aspects of agricultural production that are also regulated by the other agencies.

Take, for example, the California Regional Boards' regulation of non-point discharge, generally surface runoff, from agriculture. Prior to 2003, state law used to effectively exempt the non-point source discharge from irrigated agriculture from regulation (at the federal level, the Clean Water Act basically exempts agricultural non-point discharge). After 2003, the "conditional waivers" agriculture was previously granted are still used, but with more stringent requirements in order to obtain a waiver.

Because the requirements for conditional waivers are set and applied by the regional boards, they vary from region to region. In the Central Coast region, requirements for a waiver include on-farm water quality plans including implementation of best management practices, water quality monitoring or participation in a monitoring group, and "other compliance points."<sup>20</sup> In the

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Slightly different terminology at the local, state, and federal levels creates additional confusion about what regulations apply to which facilities.

Central Valley, farmers can join a “coalition” and pay membership fees that support monitoring and reporting. Similarly in the Los Angeles region, farmers can join the Farm Bureau’s Ventura County Agricultural Irrigated Lands Group (VCAILG)<sup>21</sup>, members pay a fee that supports consultants and monitoring and reporting. Membership cost varies by watershed.

The dairy industry sees a particularly confusing combination of various and overlapping regulations on manure management, water quality, and air pollution, adopted at different times in different regions.<sup>22</sup> Slightly different terminology at the local, state, and federal levels creates additional confusion about what regulations apply to which facilities.

Dairy wastewater is also regulated differently by the various regional boards. In 2003, the Central Valley region began attempts to establish a permit system. In 2005 this region started requiring individual Waste Discharge permits for any facility that increased cow numbers more than 15 percent above the October 2005 reported herd size at that facility. The Los Angeles region had already been regulating dairy wastewater for over a decade. Prior to 1994, the region issued Waste Discharge Requirements for each large dairy individually. By 1994, this individual system had become too resource-intensive to manage, and the board changed to a general permit. In 1999 (in response to some violations of federal water quality guidelines), the region started managing dairies through National Pollutant Discharge Elimination System (NPDES) permits, which are typically applied for point sources such as industrial discharge, and added additional regulation, including a prohibition against new construction of confined animal feeding operations.

Air quality associated with animal operations is governed by the regional air quality/air pollution control districts. Beginning in 2005, the South Coast Air Quality Management District regulates how often manure must be removed from corrals. The San Joaquin Air Pollution Control District limits particulate matter emissions. Beginning in 2004 the district required permits for emissions of more than 12.5 tons of volatile organic compounds (VOCs); large confined animal facilities (more 1,000 milking cows) in a non-attainment area for the 1-hr ozone national ambient air quality standard have to have a VOC emissions plan.

The San Joaquin Air Pollution Control District and Sacramento Municipal Air Quality Management District were the first to set emissions limits for dairy methane digesters (the emissions standards technically apply to the engines fueled by the biogas generated by the digesters), which provide a method for making electricity from captured methane emitted from manure lagoons. Emissions limits have been a challenge for some dairies because these digesters are difficult to standardize and control, due to the biological variability of the processes involved.

The regulatory complexity has spun off an industry of regulatory compliance consultants, monitors, and record-keepers. The University of California at Davis also offers agricultural regulatory compliance classes for dairy operators. Arguably, this is not the kind of “job creation” that spurs economic development – quite the opposite. The costs of compliance are high, both in time and money. This makes it difficult for smaller operations to survive (see sidebar on page 10, for example).<sup>23</sup> One study analyzed the trends in the number of dairies by region, in comparison to the level of regulation, and came to the unsurprising conclusion that as regulations in a region became more numerous and stringent, dairies in the region began to disappear.<sup>24</sup> Furthermore, because complying with these regulations is cumbersome and complicated, farmers are less likely to try to rock the boat by trying a new idea or technique.

## HELPING CALIFORNIA AGRICULTURE ADVANCE

In order to help California’s nationally and internationally important agricultural industry grow and strengthen in the face of those pressures, local, state, and federal governments should reevaluate counterproductive policies and strategies. The following recommendations address those issues.

### Recommendation 1: Adjust water policy and pricing to provide an incentive for conservation

A major barrier to adoption of conservation strategies is, of course, cost. The cost of implementing these strategies may actually be lower than the true cost of wasting water, but most users, and particularly agricultural users, never see the true cost of wasting water. The economic benefits of conservation, therefore, are obscured. More accurate water pricing will certainly not be painless—but neither is the current situation of below-cost pricing in times of drought, where overconsumption exacerbates supply problems and results in mandatory cutbacks and regulation. Phased elimination of price supports and subsidies for agricultural water is also necessary. Farmers are businesspeople, so when water is cheap, infrastructure to conserve is not worth the investment. Where the price reflects the actual cost, conservation strategies become more cost-effective.

Also, in order for farmers not to risk losing rights to water if they move towards more conservative approaches, water transfers must be allowed and relatively easy to accomplish. Currently, a major impediment to water transfers from one user or user group to another is the significant amount of

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Federal cash subsidies of commodity crops provide little benefit to California agriculture, and distort pricing in the food markets.

bureaucratic red tape involved in arranging a transfer. Cutting through this red tape would decrease the disincentive to conserve that is embedded in current water allocation policy.

## Recommendation 2: Phase out direct federal agricultural subsidies

Federal cash subsidies of commodity crops provide little benefit to California agriculture, and distort pricing in the food markets. They also are contributing to high agricultural water use, by incentivizing some of the most water-demanding crops.

There is a role for government assistance in agriculture. Low-interest loans for efforts to enhance water quality and conservation, and some involvement in ensuring access to insurance programs to help manage the unique and inherent risks in agriculture from weather and climate, may be appropriate. Government support of research into agricultural innovations that are ‘disembodied’ – meaning, are innovations in techniques and management, rather than in products and tools that can be bought and sold – will also benefit both farmers and the public. But direct subsidies of a handful of crops are neither necessary nor beneficial on the whole, and especially in California.

Of course, those California farmers who currently do benefit from federal subsidies would be challenged by a phase-out of these supports. A study projecting economic impacts in California with the removal of direct subsidies pointed out that rice producers would be especially hard hit, because the types of soils that are good for rice production are often not good for other crops. For example, they projected that in Colusa County, elimination of federal subsidies would decrease the county economy by \$73.5 million, noting that “[d]ue to limited crop alternatives for land used for rice production, and the significant investment in equipment required for rice production that has limited or no alternative uses, the model predicts that producers will choose to reduce planted acreage and farm the remaining acreage more intensively rather than switching from rice to other crops.”<sup>25</sup> In Tulare County, elimination of subsidies would tend to cause a shift in cotton acres to alfalfa acres, so that the economic impact was minimal. In this particular case, however, because alfalfa requires more water, unless conservation incentives were also in place, increases in water use would likely follow.



Eliminating agricultural subsidies that have become deeply entrenched in American agriculture at large is generally viewed as a threat to agriculture by the farmers receiving these benefits. But the example of New Zealand, that phased out its agricultural subsidies almost two decades ago, illustrates otherwise. Since the subsidies were lifted, New Zealand's agricultural economy has grown at quadruple the rate of expansion before the reforms, the agricultural sector has expanded as a percentage of GDP, and farmers have developed robust national and especially international markets.<sup>26</sup>

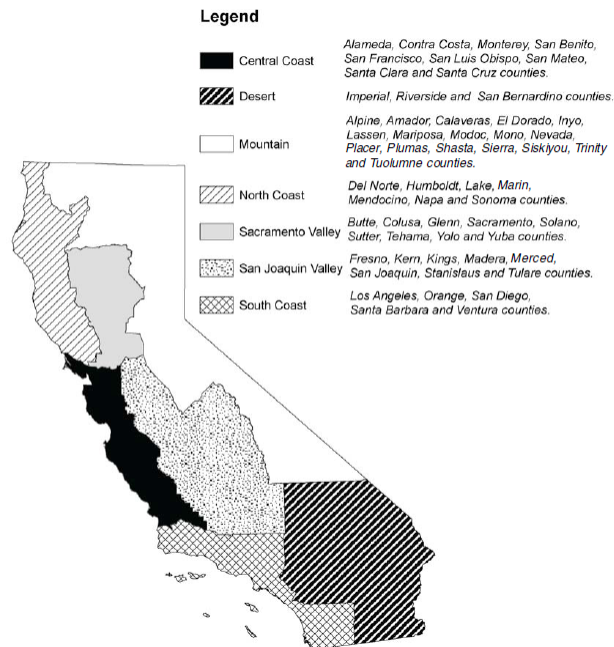
### **Recommendation 3: Streamline and standardize regulations**

California has numerous and overlapping environmental regulation of various facets of agricultural production. California has an opportunity to be a leader in effectively addressing non-point source pollution, air quality, and environmental quality, but it is not going to happen through a morass of conflicting, confusing, and needlessly onerous regulation. Reduced costs and overhead for complying with environmental regulations would free up money for farm innovations, and reduce barriers to growth.

Reduced costs and overhead for complying with environmental regulations would free up money for farm innovations, and reduce barriers to growth.

## Appendix A

# CALIFORNIA PRODUCTION REGIONS AND THEIR LAND USE<sup>27</sup>:



University of California Agricultural Issues Center, The Measure of California Agriculture. 2009.  
Available at <http://aic.ucdavis.edu>

# ENDNOTES

1. University of California Agricultural Issues Center, *The Measure of California Agriculture*. 2009. Available at <http://aic.ucdavis.edu>
2. USDA National Agricultural Statistics Service, Census of Agriculture, 2002., [www.nass.usda.gov/Census\\_of\\_Agriculture/index.asp](http://www.nass.usda.gov/Census_of_Agriculture/index.asp)
3. University of California Agricultural Issues Center, *The Measure of California Agriculture*. 2009. Available at <http://aic.ucdavis.edu>
4. USDA National Agricultural Statistics Service, Census of Agriculture, 2007.
5. University of California Agricultural Issues Center, *The Measure of California Agriculture*. 2009. Available at <http://aic.ucdavis.edu>
6. California Agricultural Statistics Review 2011-2012
7. California Agricultural Statistics Review 2011-2012
8. Based on data from the USDA National Agricultural Statistics Service, Census of Agriculture, 2007, with fruit/nut/veg proportions from Summary of California County Agricultural Commissioners' Reports, 2009-2010.
9. [http://rural.assembly.ca.gov/documents/OPR\\_report.doc](http://rural.assembly.ca.gov/documents/OPR_report.doc)
10. 33 Cal.3d 419. National Audubon Society v. Superior Court February 17, 1983. S.F. No. 24368. Available at <http://www.monobasinresearch.org/legal/83nassupct.html>
11. Renee Sharp, California Water Subsidies (Oakland: Environmental Working Group, 2004).
12. <http://www.waterplan.water.ca.gov/docs/cwpu2005/vol4/vol4-background-selectedwaterprices.pdf>
13. Kaleita, Amy. 2008. *Go with the Flow: Why water markets can solve California's water crisis*. Pacific Research Institute. Available at [http://www.pacificresearch.org/docLib/20081208\\_Go\\_With\\_The\\_Flow.pdf](http://www.pacificresearch.org/docLib/20081208_Go_With_The_Flow.pdf)
14. Hanak, Ellen, Jay Lund, Ariel Dinar, Brian Gray, Richard Howitt, Jeffrey Mount, Peter Moyle, and Barton "Buzz" Thompson. 2011. *Managing California's Water: From Conflict to Reconciliation*. Public Policy Institute of California. Available at <http://www.ppic.org/main/publication.asp?i=944>
15. Edwards, Chris. 2009. *Agricultural Subsidies*. CATO Institute. Available at <http://www.downsizinggovernment.org/agriculture/subsidies>
16. Based on data from Environmental Working Group Farm Subsidy Database, <http://farm.ewg.org/>
17. Based on data from Environmental Working Group Farm Subsidy Database, <http://farm.ewg.org/>
18. <http://farm.ewg.org/pdf/california-farm.pdf>
19. Thomas Harter, Extension Hydrologist at UC Davis, <http://grundwasser.blogspot.com/2011/02/too-much-regulation-in-california.html>



20. [http:// www.waterboards.ca.gov/centralcoast/water\\_issues/programs/ag\\_waivers](http://www.waterboards.ca.gov/centralcoast/water_issues/programs/ag_waivers)
21. [http://www.farmbureauvc.com/water\\_quality.html#vcailg\\_faqs](http://www.farmbureauvc.com/water_quality.html#vcailg_faqs)
22. Sneeringer, S. and R. Hogle. 2008. Variation in environmental regulations in California and effects on dairy location. *Agricultural and Resource Economics Review* 37(2): 133-146.
23. Meyer, D. 2008. Public policy drives herd sizes up and up. Western Dairy News 8(5). Available at [http://www.cvmb.colostate.edu/ilm/proinfo/wdn/2008/July per cent20WDN per cent20\(revised\).pdf](http://www.cvmb.colostate.edu/ilm/proinfo/wdn/2008/July%20WDN%20(revised).pdf)
24. Sneeringer, S. and R. Hogle. 2008. Variation in environmental regulations in California and effects on dairy location. *Agricultural and Resource Economics Review* 37(2): 133-146.
25. Gonzalez, Sandra, Rachael E. Goodhue, Peter Berck, and Richard E. Howitt. 2005. What would happen if federal farm subsidies were eliminated? Evidence for Colusa and Tulare Counties. *Agricultural and Resource Economic Update* 8(5) 9-11. Available at [http://www.agmrc.org/media/cms/federalfarm\\_policies\\_FCE5CA194A302.pdf](http://www.agmrc.org/media/cms/federalfarm_policies_FCE5CA194A302.pdf)
26. Lambie, Thomas. "Miracle Down Under: How New Zealand Farmers Prosper without Subsidies or Protection." The Cato Institute. February 7, 2005. 14 Sep 2012 <<http://www.cato.org/publications/free-trade-bulletin/miracle-down-under-how-new-zealand-farmers-prosper-without-subsidies-or-protection>>
27. University of California Agricultural Issues Center, 2009. *The Measure of California Agriculture*.

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