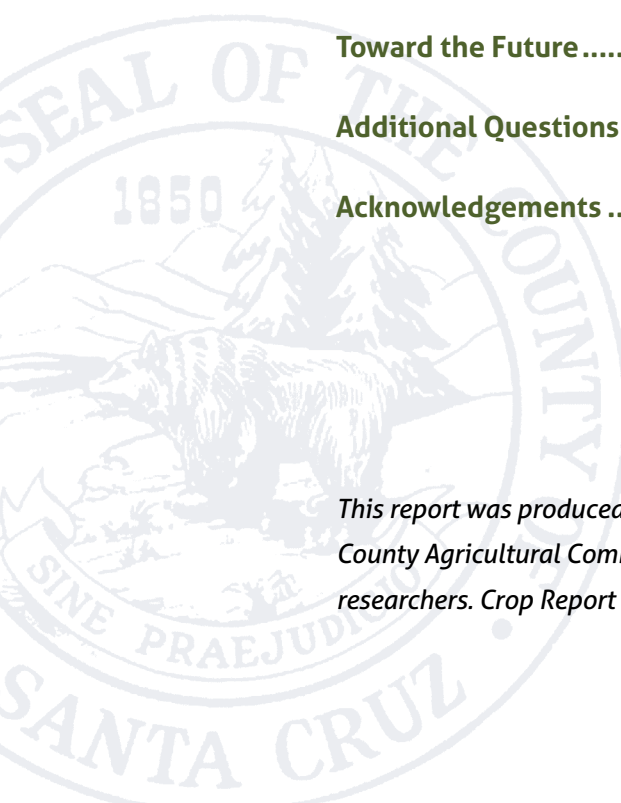


# Economic Contributions of Santa Cruz County Agriculture



# Table of Contents

<b>Overview of Santa Cruz County Agriculture</b> .....	3
<b>Introduction</b> .....	3
<b>Our Approach</b> .....	4
<b>“Direct Effects” of Santa Cruz County Farm Production</b> .....	4
Figure 1. Distribution of Santa Cruz County Agriculture by Production Value	
Figure 2. Ten Year Trends in Gross Production Values	
<b>Employment</b> .....	6
<b>“Multiplier Effects” of Santa Cruz County Farm Production</b> .....	7
Figure 3. Economic Effects of Farm Production 2011	
<b>Locally Sourced Value-Added Food Processing</b> .....	8
Figure 4. Economic Effects of Locally Sourced, Value-Added Food Processing	
<b>Total Economic Contribution of Santa Cruz County Agriculture</b> .....	9
Figure 5. Overall Economic Effects of Santa Cruz County Agriculture	
<b>The Value of Agricultural Diversity</b> .....	10
Figure 6. How Diverse is Santa Cruz County Agriculture?	
<b>Toward the Future</b> .....	11
<b>Additional Questions to Answer</b> .....	12
<b>Acknowledgements</b> .....	12



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# Economic Contributions of Santa Cruz County Agriculture

## OVERVIEW: Santa Cruz County Agriculture

...contributes a total of \$1.46 billion to the local economy, including:

- \$898 million in direct economic output, which represents 5.2% of the county's total direct economic output.
- \$563 million in additional economic output in the form of expenditures by agriculture companies and their employees.

...provides 11,085 jobs in Santa Cruz County economy, including:

- 6,151 direct employees, which is 4.5% of all jobs in the county or about 1 out of every twenty workers.
- 4,934 additional jobs made possible by expenditures by agriculture companies and their employees.

...has exceptional diversity that provides critical economic stability within agriculture and to the county economy as a whole (Diversity Index of 2.01).

## Introduction

Residents and visitors alike know and value the rural character of Santa Cruz County. Farmers markets overflow with fresh produce and community spirit. Fruits, vegetables, and nursery stock grow in fertile soils and a moderate climate. Clearly, agriculture plays a key role in sustaining a healthy local economy. What's not so clear, however, is the true size of that role. How much money does agriculture pump into the local economy? How many jobs does agriculture support? In other words, just how important is agriculture as a driver of the county's economic health?

This report sheds light on these and related questions. Using multiple data sources and advanced economic modeling techniques, it analyzes agriculture's total contribution to the Santa Cruz County economy. The report also examines agricultural diversity and its role in supporting economic resiliency, including a first-ever quantitative measure. On the whole, the findings offer important information for policy makers, the public, and anyone who values a vibrant local economy.



## Our Approach

When it comes to economic analysis, it's important to examine the fullest possible range of economic contributions. This report does that by focusing not just on *direct* economic effects such as farm production and employment, but also on *multiplier effects*. *Multiplier effects* are ripples through the economy. These ripples include inter-industry "business to business" supplier purchases, as well as "consumption spending" by employees. The Multiplier Effects section below explains this further.

It's appropriate to calculate *multiplier effects* when analyzing what economists call a *basic industry*. A *basic industry* is one that sells most of its products beyond the local area and thus brings outside money into local communities. Agriculture is a basic industry in Santa Cruz County, so this report includes *multiplier effects* when describing agriculture's total economic contribution.

Our analysis only examines agriculture's economic contributions. To understand agriculture's full economic impact, one would also need to assess agricultural-related costs to society, for example net impacts on water and other natural resources. These impacts are important but lie beyond the scope of this study.

Our calculations draw from local and national data sources. Local sources include annual Crop Reports and industry experts. National data sources included federal government statistics and a widely used economic modeling program called IMPLAN®. Where data judgments were required, we used the most conservative (lowest) numbers and adjusted IMPLAN figures based on consultations with local experts and other sources. Except where otherwise

noted, all figures are from the year 2011, the most recent dataset available. Please contact the authors for additional details on the methods used.

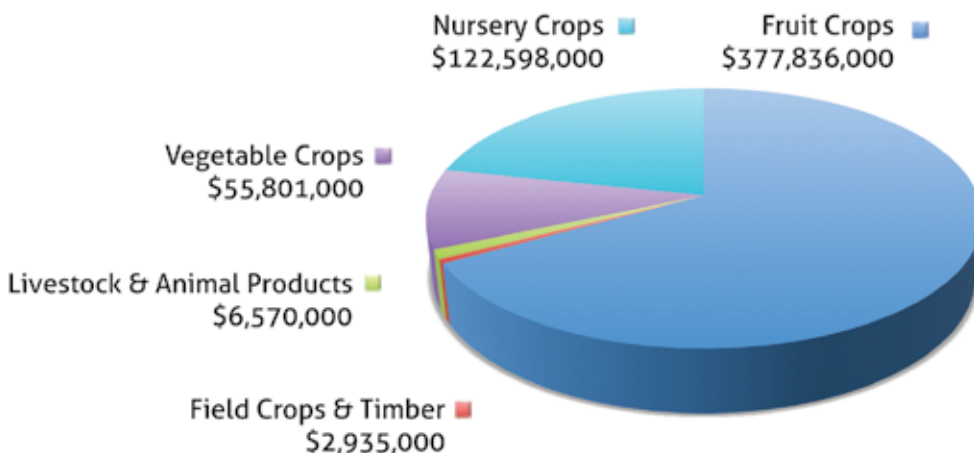


## "Direct Effects" of Santa Cruz County Farm Production

This section focuses on the simplest measures of economic output: production and employment. It describes total farm production and how production has changed over recent years, as well as the number of agriculture jobs

**Figure 1** shows the various categories that make up Santa Cruz County farm production value. Fruit Crops are the single largest production category by dollar value, comprising 67% of the county total. Berries dominate this category, especially strawberries (\$198 million), raspberries (\$132 million), and blackberries (\$29 million). Nursery Crops represent the second largest category (22%), including key crops such as cut flowers (\$67 million) and landscape plants (\$24 million). Together, these two categories account for 89% of the county's direct farm production values. Total farm production value for 2011 was \$566 million. This gross value does not reflect net profit or loss experienced by individual growers or by the industry as a whole. Interested readers are encouraged to consult the annual Crop Report for additional details.

On average, the county's agricultural crops produced \$29,181 per acre. This figure includes fruit, vegetables, and nursery crops. It does not include field crops, livestock, or timber. Berries alone were worth \$49,003 per acre.



**Figure 1. Distribution of Santa Cruz County Agriculture by Production Value**

Source: 2011 Santa Cruz County Crop Report and IMPLAN

How has farm production changed over time? **Figure 2** shows ten-year production trends. It specifies not just the production trend for a given category, but also growth rates. It also adjusts for inflation using a standard measure called the Consumer Price Index (CPI).

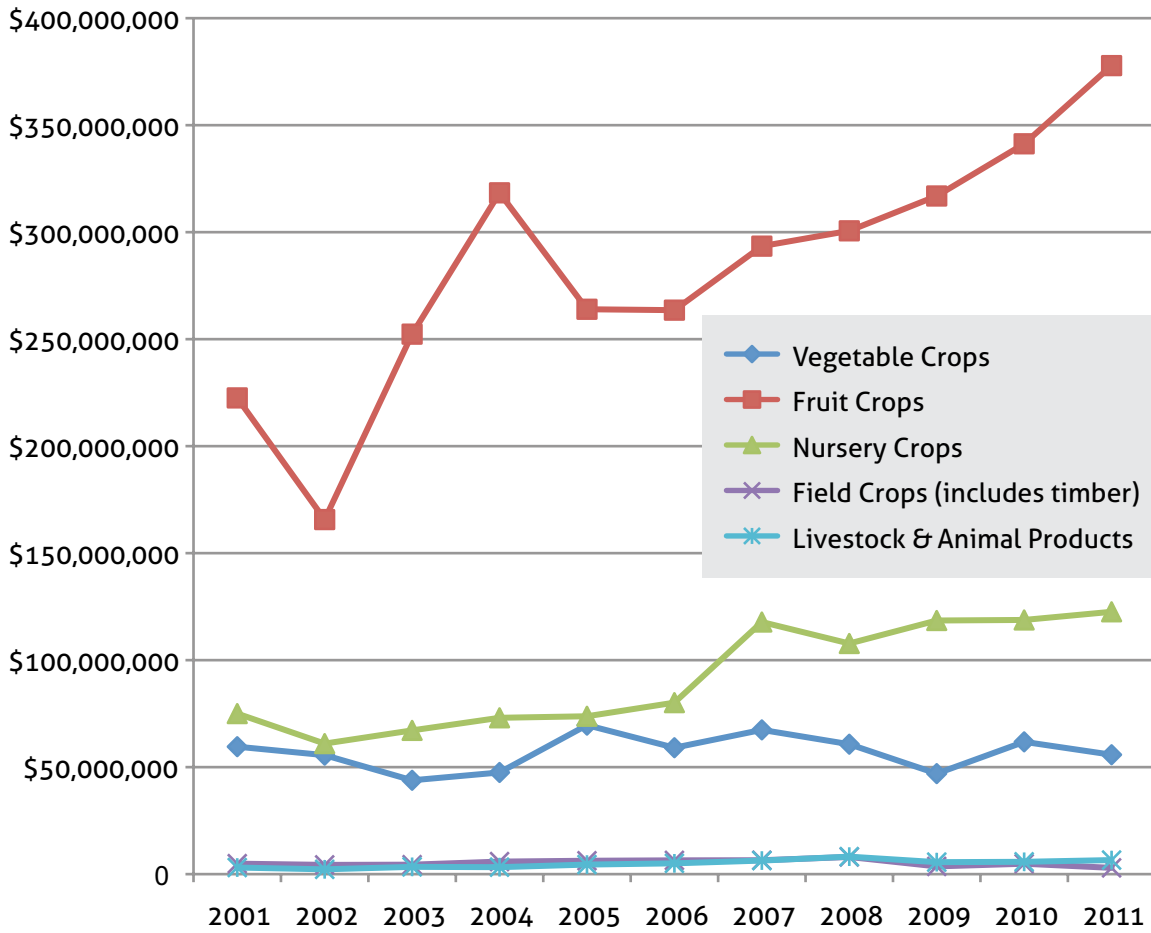
For example, the cumulative growth in agricultural production for ten years following 2001 was 55%, from \$365.1 million to \$566.7 million. Such growth is especially impressive given that two economic recessions occurred during this time. Based on the Consumer Price Index, inflation totaled 27% over the decade. This means that the “real” (inflation adjusted) production increase was 28%, or about half the original figure. Growers made more revenues than ever in 2011, but they also paid 27% more for production costs such as hoop houses, transplants, labor, fuel, and everything else compared to a decade prior. **Figure 2** shows inflation-adjusted effects on specific production categories. Vegetable Crops and Field Crops & Timber, for example, were both negative for the decade.

**Figure 2. Ten-Year Trends in Gross Production Values**

Selected Farm Production Sectors	Production Value		Total Change	Inflation-Adjusted
	2001	2011		
Fruit Crops	\$222,548,000	\$377,836,000	69.8%	42.8%
Nursery Crops	\$75,025,000	\$122,598,000	63.4%	36.4%
Vegetable Crops	\$59,554,000	\$55,801,000	-6.3%	-33.3%
Livestock & Animal Products	\$3,086,000	\$6,570,000	112.9%	85.9%
Field Crops & Timber	\$4,897,000	\$2,935,000	-40.1%	-67.1%



Figure 2 (continued)



## Employment

How many people work in agricultural production? Agricultural production directly employed 5,378 people in Santa Cruz County. The figure encompasses a wide range of production-related jobs, including not just cultivating and harvesting tasks, but also field activities (equipment operation and pest control among others) and office activities (such as sales and administration). It is clear that employment in agriculture includes a variety of occupations with a wide range of skill levels.

It does not include food processing jobs, which we discuss below. The total also includes timber-related jobs, but does not include employment attributable to the county's commercial fishing sector. Unfortunately, employment data for prior years are incomplete and poor quality, making historical comparisons impractical.

Additional contributions of agriculture to local employment are discussed later in this report. Many workers are employed in value added food processing businesses. There are also jobs (referred to as "indirect" in this report) in businesses that provide service to agriculture, such as companies that sell or repair farm equipment, provide packaging, etc.

Agriculture is related to many other employment opportunities in the county that are not included in the direct or indirect agricultural employment figure because they are not paid by an agricultural firm or their suppliers. Santa Cruz is home to numerous public and private institutions that employ researchers and scientists to work on pest, soil and water management, disease resistance, and sustainable agriculture. There are also jobs created in agricultural education and communication, agricultural regulation, agricultural engineering, and food safety. Some of the institutions in our county include University of California-Santa Cruz, Cabrillo College, LifeLab, Farm Bureau, California Certified Organic Farmers (CCOF), to name but a few.

## "Multiplier Effects" of Santa Cruz County Farm Production

This section quantifies the economic "ripples" that farm production creates in the local economy. These ripples take two forms: *indirect effects* and *induced effects*. The first consist of "business to business" supplier purchases. For example, when a grower buys farm equipment, fertilizer, seed, insurance, banking services, and other inputs, the grower creates *indirect effects*. The second ripple type, *induced effects*, consist of "consumption spending" by agriculture business owners and employees. They buy housing, healthcare, leisure activities, and other things for their households. All of this spending creates ripples in the economy.

**Figure 3** shows agriculture's direct, indirect, and induced economic effects within the county, for major production categories. The numbers use IMPLAN multipliers for each sector, which are rooted in U.S. Bureau of Economic Analysis production data and other sources. Including multiplier effects, the direct production value mentioned above for fruit, vegetables, and nursery crops (\$29,181 per acre) rises to \$50,621. For berries (\$49,003), it rises to \$85,006 per acre.

**Agriculture produced 566 million in direct output. Multiplier effects bring the total value to \$979.8. Indirect and induced spending supported an additional 3,700 jobs within the county, bringing agriculture-related production's total employment to 9,078.**

Figure 3. Economic Effects of Farm Production

Farm Production Sectors	Output Effect (\$ Millions)			TOTAL
	Direct	Indirect	Induced	
Fruit Crops	\$377.8	\$90.2	\$178.8	\$646.8
Nursery Crops	\$122.6	\$13.7	\$88.8	\$225.1
Vegetable Crops	\$55.8	\$14.1	\$23.1	\$93.0
Livestock & Animal Products	\$6.6	\$1.4	\$1.9	\$9.9
Field Crops & Timber	\$2.9	\$1.2	\$0.9	\$5.0
TOTAL ECONOMIC OUTPUT	\$565.7	\$120.6	\$293.5	\$979.8
	Employment Effect (# Jobs)			
	Direct	Indirect	Induced	
TOTAL EMPLOYMENT	5,378	1,154	2,546	9,078

*Dollar values are in \$ millions. Figures are for 2011 and come from IMPLAN, Crop Reports, and U.S. Bureau of Economic Analysis.*



## Locally Sourced, Value-Added Food Processing

Farm production tells only part of the story. Santa Cruz County is home to several food processors that play a key role in the local economy. Some of these local processors – for example in berries and apples – are household names not just in California, but across the U.S. and even overseas. This section captures the economic value of local food processing. It is neither an exact science nor a full assessment, but rather gives the reader a basic overview of the topic.

To avoid overstating the numbers, we only included food manufacturers and sectors that fit two strict criteria: 1) they use mostly local agricultural inputs; and 2) they are unlikely to exist here without the presence of the associated agricultural sector. Many processing facilities would not exist in Santa Cruz County were it not for the abundant supply of vegetables, berries, apples, and other raw agricultural products.

On the other hand, we did not include the county’s \$35.1 million per year bread and bakery product manufacturing sector because the sector sources much of its flour, yeast, and other raw products elsewhere. Similarly, we excluded the county’s \$16.5 million beer brewing industry because local breweries get most of their barley, hops, and other key ingredients from the Pacific Northwest and Germany. The same applies to the county’s \$12.5 million/year seasoning and dressing manufacturing sector, with most spice ingredients sourced outside the county.

We also took precautions to avoid double counting. For example, we did not factor wine grape production into this section because the Farm Production section above already captures the dollar value of wine grapes. We only calculated the dollar value that wineries add to wine grapes by producing wine. The same applies to apples and apple products, berries and berry products, and other crops linked to local processing.

**Figure 4** shows the economic effects of locally sourced, value-added food processing. Note that category names follow a standard classification system used nationwide, called the North American Industrial Classification System (NAICS). Each NAICS category has an explicit definition. For example, the NAICS category “All other food manufacturing” includes processed leafy greens, peeled or cut vegetables, and other perishable prepared foods. We selected and validated the categories and numbers in consultation with local experts.

**Local food processing produced an estimated \$332 million in direct output. Multiplier effects bring the total value to \$481 million. The sector directly employed 773 workers. These workers and their employers spent enough money in the local economy to support an additional 1,234 jobs, bringing Santa Cruz County’s total food processing employment effect to 2,007.**

**Figure 4. Economic Effects of Locally Sourced, Value-added Food Processing**

Selected Food Processing Sectors	Output Effect (\$ Millions)			TOTAL
	Direct	Indirect	Induced	
Frozen Food Manufacturing	\$66.1	\$20.8	\$11.0	\$97.9
Fruit & Vegetable Canning, Pickling, and Drying	\$207.9	\$60.7	\$27.9	\$296.5
All other Food Manufacturing	\$6.0	\$2.1	\$1.0	\$9.1
Wineries	\$52.4	\$17.3	\$7.7	\$77.4
<b>TOTAL ECONOMIC OUTPUT</b>	<b>\$332.4</b>	<b>\$100.9</b>	<b>\$47.6</b>	<b>\$480.9</b>
	Employment Effect (# Jobs)			
	Direct	Indirect	Induced	
<b>TOTAL EMPLOYMENT</b>	<b>773</b>	<b>828</b>	<b>406</b>	<b>2,007</b>

Sources: IMPLAN, U.S. Bureau of Economic Analysis, and local industry experts. All figures are for 2011.



## Total Economic Contribution of Santa Cruz County Agriculture

The previous sections have provided key pieces to an economic puzzle. This section combines those puzzle pieces into a final picture showing the overall economic effect of Santa Cruz County agriculture.

As **Figure 5** shows, the total economic contribution of Santa Cruz County agriculture is \$1.46 billion. This consists of \$898 million in direct output from production and processing, plus \$563 million in multiplier effects. Total employment is 11,085. This includes 6,151 jobs directly in agriculture, which represents 4.5% of the county's total jobs or about 1 out of every 20 workers. Agriculture companies paid \$7.7 million in indirect business taxes for 2011. This included excise taxes, property taxes, fees, licenses, and sales taxes. It did not include taxes on profit or income.



**Figure 5. Overall Economic Effects of Santa Cruz County Agriculture**

Type of Effect	Direct	Indirect	Induced	TOTAL
<b>FARM PRODUCTION SECTOR</b>				
Output Effect (\$ Millions)	\$565.7	\$120.6	\$293.5	\$979.8
Employment Effect (# Jobs)	5,378	1,154	2,546	9,078
<b>LOCALLY SOURCED, VALUE-ADDED FOOD PROCESSING SECTOR</b>				
Output Effect (\$ Millions)	\$332.4	\$100.9	\$47.6	\$480.9
Employment Effect (# Jobs)	773	828	406	2,007
<b>TOTAL VALUE OF AGRICULTURAL SECTOR</b>				
Output Effect (\$ Millions)	\$898.1	\$221.5	\$341.1	\$1,460.7
Employment Effect (# Jobs)	6,151	1,982	2,952	11,085



## The Value of Agricultural Diversity

It is widely accepted by economists that a diverse economy is a resilient economy. Any region that depends on a large number of economic sectors will generally be less vulnerable to catastrophic shocks. This important economic principle applies to agricultural diversity, too. For example, a county with just one or two main crops faces higher vulnerability to shocks in the form of price drops, disease outbreaks, new regulations, and other unpleasant surprises. Meanwhile, a county with a diverse agricultural industry can withstand shocks to certain crops without unraveling the entire agricultural economy. Bottom line: having “all your eggs in a single basket” is never a good idea, especially when it comes to something as economically important as agriculture. Agricultural diversity is like a valuable insurance policy against economic calamity.



People see assorted crops growing in well-tended fields. They see farmers markets overflowing with different kinds of food. But no one has attempted to quantify that diversity or its economic value. Part of the reason is that measuring diversity is a complex job. It requires more than just counting the different things for sale at the farmers market or listed in the annual Crop Report. Measuring diversity includes the number of different crops grown as well as the assessing their economic abundance or evenness.

For example, imagine two California counties where the annual farm production value is \$100 million each. Both counties grow ten different kinds of crops. In County “A,” a single crop contributes 91% of the revenue and the nine other crops make up 1% each. In County “B” the ten crop types all contribute equally, at 10% each. Both counties have the same number of crops and total revenues, but County “B” is much more diverse. Thus, we could expect County “B” to be much more resilient to economic shocks than County “A”.

To measure agricultural diversity in Santa Cruz County, we started by creating a list of specific crops mentioned in Crop Reports. We only used crops for which production values were provided, even though the total number of commercial crops grown in the county is certainly much larger. For example, blackberries had \$29.4 million in revenues for 2011 and Brussels sprouts had \$9.9 million. Careful lumping and splitting resulted in 18 different crop categories consistently reported over the past decade. Next, we applied the list of crops and production values to the formula above. The analysis, as described above, resulted in a 2011 Diversity Index score (called the Shannon-Weaver index) of 2.01, or just over 48% of the maximum possible of 4.17 (if all 18 crops were grown in the same proportions).

It must be noted that many more than 18 crops are grown in the county. The Crop Reports bundle together over 30 crops under the “miscellaneous vegetables” category. These include commonly known vegetables like cucumbers, chard and fennel, as well as celery root, bok choy, arugula, rutabaga, and a multitude of herbs. The wide range of crops, including fresh herbs, grown in the county benefits restaurants that purchase them to provide fresh local fare. It also attracts tourists, who come to attend farm tours and dinners, go to farmers markets, or pick their own produce. All this enhances the economic diversity of Santa Cruz county, but a quantitative assessment of those benefits exceed the scope of this report.

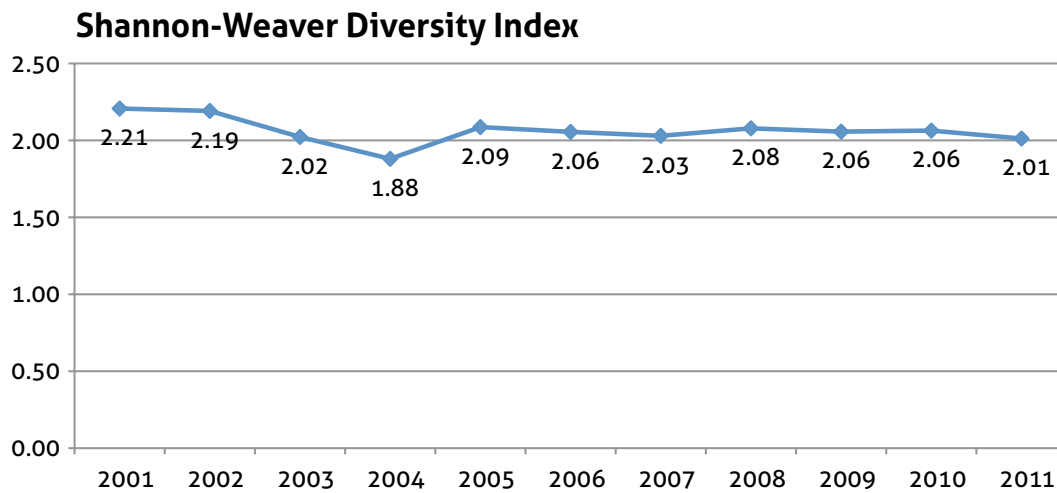
**Figure 6** shows how the Diversity Index has fluctuated over the past decade. Note that the diversity index was 2.21 in 2002. It dropped through 2004, climbed a bit the next year, then trended slightly downward for the rest of the decade, with a total net drop of 9%. This does not mean that fewer crop types are being grown in the county. It means that a small number of crops have grown to represent larger pieces of the economic pie, for example strawberries and raspberries.

The score can allow useful comparisons between Santa Cruz County agriculture and other counties in California and beyond. Because Santa Cruz is an innovator when it comes to measuring agricultural economic diversity, the number of external comparisons remains limited at this time. Potential comparisons will no doubt grow over time as more counties follow Santa Cruz’s example. In the meantime, Santa Cruz residents can take pride in having one of the most economically diverse agricultural industries anywhere, with numbers to prove it.

The Diversity Index built for this report is an “economic” measure of diversity and it does not include other measures of biodiversity. The county has a diversity of agricultural systems, from conventional and organic farms, to large and small farms, from single crop production to farms that grow a multitude of crops. The benefits of diversified systems are being explored by the UC Santa Cruz Center for Agroecology and

Sustainable Farming. This 30-acre research, teaching, and training facility grows (and sells) 40 – 60 different varieties of crops. Nutrient management, crop rotation, cover cropping, pest and disease control, and guided farm tours are among the elements of this valuable resource in our county. The center trains 45 apprentices and hundreds of undergraduate students per year while also conducting federally funded research on a wide variety of fruit and vegetable crops.

Figure 6. How Economically Diverse is Santa Cruz County Agriculture?



## Toward the Future

This report has documented the powerful role that Santa Cruz County agriculture plays as a local economic driver. Agriculture contributes \$1.46 billion to the county economy. This far exceeds direct production values reported in Crop Reports, for example the \$566 million figure reported for 2011. Agriculture also plays a key role in county employment, directly or indirectly supporting 11,085 jobs. Finally, agriculture’s impressive diversity provides critical economic stability to the county. The economic value of this stability is certainly high, albeit hard to quantify.

Agriculture is an important pillar of the Santa Cruz County economy and represents a vital link to both the county’s cultural past and competitive future. Although this report has presented many facts and figures, it has barely begun to fill key information gaps about agriculture’s role. The process of developing this report has raised several additional questions (see next page) that lie beyond the scope of this report but may warrant future research. In the meantime, the findings herein provide the clearest picture yet of Santa Cruz County agriculture’s important economic role.



## Additional Questions to Answer

- How does the impressive agricultural diversity compare *internally* to diversity of other economic sectors in the county such as real estate, construction, and manufacturing? How does it compare *externally* to agricultural diversity in other counties? What options exist for reversing the ongoing decline of agricultural economic diversity.
- By 2011, the county's organic production grew to 90 growers and over 3,500 acres. What are the overall trends with respect to production type (organic or conventional) and size (small, medium, large)? What implications might such trends have for future economic diversity, stability, and growth?
- What is the annual dollar value of wildlife habitat, open space, scenic beauty, carbon sequestration, pollination, and more than 20 other "ecosystem services" that the county's agricultural lands provide to society? This report covered three different ways Santa Cruz agriculture contributes to the county economy: direct economic output and employment, large economic multiplier effects, and diversity that helps insure the county against economic calamity. "Ecosystem services" are a fourth way agriculture contributes economically. Economists now possess robust tools for quantifying the dollar value of these services. Such analysis would be an eye-opening and important thing to do.
- What is the "net" economic impact of Santa Cruz County agriculture after subtracting natural resource impacts and other costs to society? (This study has examined just one side of the coin).
- How would "shocks" affect agriculture's economic results, for example significant new regulations, labor policies, farm land annexations, or changes in the price of key inputs?
- To what extent does Santa Cruz County agriculture contribute to economic prosperity and food security of the Greater Bay Area as part of its "foodshed"?
- What is the economic relationship between agriculture and the county's large tourism and restaurant industries? Many tourists enjoy visiting farms and dining on locally grown produce.

## Acknowledgments

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This report is available on the Agricultural Commissioner website: [www.agdept.com](http://www.agdept.com).