

## The Economic Contribution of Agriculture in Northeastern California

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### Introduction

Agriculture is more than just the value of farm production; it also includes the industries that support agricultural production and various types of processing. In addition, the total economic contribution of agriculture is more than just the direct impact of these activities. To measure agriculture's total economic contribution, the indirect and induced impacts of agriculture must also be taken into account. Indirect impacts occur when agricultural sectors purchase goods and services from other related sectors of the economy. For example, agricultural production will likely have indirect impacts on related sectors like farm equipment and fertilizer sales. Induced impacts measure the effect of personal consumption expenditures by households that receive income from agriculture. Induced impacts will capture the regional benefits of spending agricultural income on a variety of other economic sectors like home improvements, medical services, retail establishments, etc.

### Methods

The total economic contribution of agriculture was modeled using the Impact Analysis for Planning (IMPLAN) System (IMPLAN Group, 2023). IMPLAN is a computer package that is used to construct regional economic input-output (I-O) models. Input-output analysis uses a mathematical modeling approach to capture the relationships between various sectors of an economy. The IMPLAN model uses 546 different sectors that are based on the Bureau of Economic Analysis's (BEA) national Input-Output study. These economic sectors are similar to those identified by the 6-digit North American Industry Classification System (NAICS). Following a similar approach that was used by English, Popp, and Miller (2013), the 546 sectors in IMPLAN were used to define an overall "Agriculture" industry that was made up of three categories of agriculture: Agricultural Production Industries, Agricultural Processing Industries, and Agricultural Related Industries. It is important to recognize that food retail (restaurants, grocery stores, etc.) is not included as a direct component of the overall "Agriculture" industry, although some of this activity will be captured in the indirect and induced effects.

The Direct Impacts for each agricultural category (Production, Processing, and Related) and the Indirect and Induced Impacts for the entire Agriculture Industry is reported in terms of Employment, Labor Income, and Value Added. Employment is presented as the number of wage and salary employees, as well as self-employed jobs. Labor Income consists of proprietary income (income received by self-employed individuals including private business owners and owner-operators) and wages (includes all worker salaries, payments, and fringe benefits paid by employers). Value Added represents all labor income plus taxes on production/imports and other property-type income, such as payments for rents, royalties, and dividends. The Total Value Added for the study area is comparable to Gross Regional Product (GRP). Economists generally prefer using value added as the measure for assessing the contribution of a given industry to a region's economy since the total value of output can be misleading (Olson and Lindall, 2009). The total value of output represents the dollar value of an industry's production and can result in double counting when production, processing, and agricultural related sectors have been included. For example, including both the total value of rice output from farm production and the total value of processed rice cakes would result in double counting of the rice output value (once as a farm output and again as a processed output). Rather we should only look at the value added by the rice producer and the value added to the rice by the processor to provide a better estimate of the total economic contribution of the activity.



Northeastern California is a diverse part of the state with large variations in terrain, weather, and land use. There are large, highly productive valleys that are near sea level and mountains that reach above 14,000 feet. Much of Northeastern California has been developed around the Sacramento River, which is the State's largest river.

For the purposes of this study, "Northeastern" California is defined as the region containing the following 13 counties: Butte, Colusa, Glenn, Lassen, Modoc, Plumas, Shasta, Sierra, Siskiyou, Sutter, Tehama, Trinity, and Yuba (Figure 1).

Figure 1: Northeastern California Study Area Map



# Results

The agricultural industry is making significant contributions to the economy in terms of employment, wages and value added (table 1). The overall agriculture industry, including indirect and induced effects, is responsible for an estimated 43,782 jobs or 13.8% of total employment in the region. Approximately, one in seven jobs in the region can be attributed to agriculture. This includes 32,912 jobs directly within agricultural production, processing, and related sectors and an additional 10,870 jobs through the indirect and induced effects. The total value of labor income as a result of the overall agriculture industry was estimated at \$2.5 billion, or 12.6% of all labor income in the region. In terms of total value added, \$4.1 billion was added to the Northeastern California economy as a result of the direct, indirect, and induced effects of the agricultural industry. This represents 12.8% of all economic value that was created by the Northeastern California economy in 2021.

Table 1: The Contribution of Agriculture to Northeastern California's Economy in 2021

	Employment		Labor Income		Value Added	
	# Jobs <sup>1</sup>	% NE CA Jobs <sup>2</sup>	Million \$	% NE CA Labor Income <sup>3</sup>	Million \$	% NE CA Value Added <sup>4</sup>
<b>Direct Impacts</b>	<b>32,912</b>	<b>10.4%</b>	<b>\$1,849</b>	<b>9.4%</b>	<b>\$3,008</b>	<b>9.3%</b>
Production Direct <sup>5</sup>	19,422	6.1%	\$989	5.0%	\$1,501	4.6%
Processing Direct <sup>5</sup>	8,259	2.6%	\$529	2.7%	\$1,095	3.4%
Ag Related Direct <sup>5</sup>	5,230	1.6%	\$350	1.8%	\$411	1.3%
<b>Indirect Impacts</b>	<b>4,343</b>	<b>1.4%</b>	<b>\$275</b>	<b>1.4%</b>	<b>\$487</b>	<b>1.5%</b>
<b>Induced Impacts</b>	<b>6,527</b>	<b>2.1%</b>	<b>\$347</b>	<b>1.8%</b>	<b>\$637</b>	<b>2.0%</b>
<b>Total Contribution of Agriculture</b>	<b>43,782</b>	<b>13.8%</b>	<b>\$2,471</b>	<b>12.6%</b>	<b>\$4,132</b>	<b>12.8%</b>

<sup>1</sup> Includes full-time and part-time jobs.

<sup>2</sup> Total number of jobs in Northeastern (NE) California estimated at 317,739.

<sup>3</sup> Total labor income in Northeastern (NE) California estimated at \$19,673 M.

<sup>4</sup> Total value added in Northeastern (NE) California estimated at \$32,299 M.

<sup>5</sup> Appendix A, Table A.1 defines economic sectors for each category.

The techniques that were used in this report to estimate the economic contribution of agriculture in Northeastern California was also applied to the State as a whole. The total contribution of agriculture to the entire State of California was estimated to approximately 1.3 million jobs (5.7% of state total), \$97.8 billion in labor income (4.6% of state total), and \$157.4 billion in total value added (4.6% of state total) in 2021. Relative to the state as a whole, this study shows that the economy of Northeastern California is more dependent upon agriculture in terms of employment, labor income, and value added.

# About CSU, Chico's Agribusiness Institute

The Agribusiness Institute is a component of the College of Agriculture.



## Mission

The institute provides agricultural business expertise in the areas of education, marketing, human resource development, management, and finance. Within this mission, there is focus on enhancing learning experiences, involving faculty in professional development activities, and serving the needs of agribusinesses in California and other Western States.

## Goals

- Providing management and economic information that will assist managers in agribusiness
- Develop educational programs for North State and regional interests
- Advising on financial management, market analysis, value-added agriculture, and e-commerce for agribusiness firms
- Through applied research, develop economic, management, and marketing information
- Support professional relationships between the College of Agriculture faculty and the agricultural community in order to improve opportunities for undergraduate students developing careers in agriculture
- Working with other groups at California State University, Chico, and other institutions to accomplish projects within the scope of the Institute

For more information about the Agribusiness Institute, please visit  
<https://www.csuchico.edu/ag/about/agribusiness-institute.shtml>  
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