

Tennessee Ag & Forestry Stats

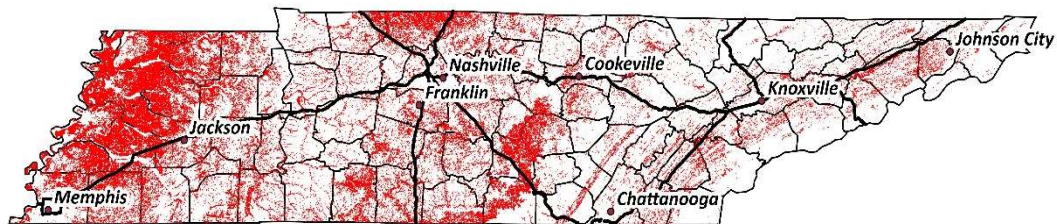
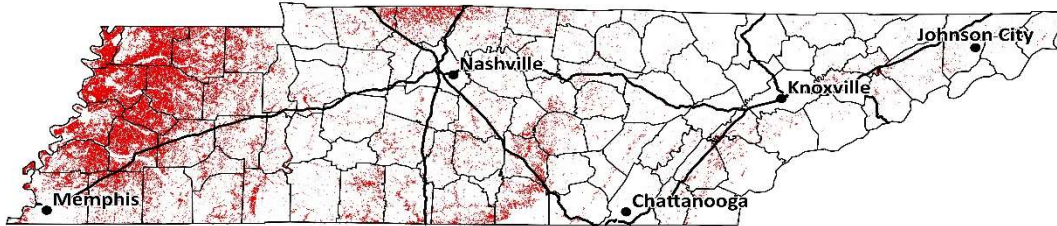
Economic Contributions of Agriculture and Forestry in Tennessee

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2023



**Jamey Menard is a Research Leader in the Department of Agricultural
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**Location of Cropland (2021) (top), Best Agricultural Land (2020) (bottom) in
Tennessee**

Sources: USDA/NASS and American Farmland Trust

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RR 23-001-A

**This work is supported by NIFA Hatch project accession number 1024362 project
number TEN00574 from the USDA National Institute of Food and Agriculture.
Any opinions, findings, conclusions, or recommendation in this publication are
those of the authors and do not necessarily reflect the view of the U.S.
Department of Agriculture.**

Executive Summary

Tennessee’s agri-forestry industrial complex includes the primary industries typically associated with agriculture and forest operations such as growing crops, breeding and feeding of livestock, along with management and logging of trees. The industrial complex also includes both input supplying industries and value-added subsectors comprised of food and beverage manufacturing, apparel and textiles, and forestry products manufacturing (see Figure 1).

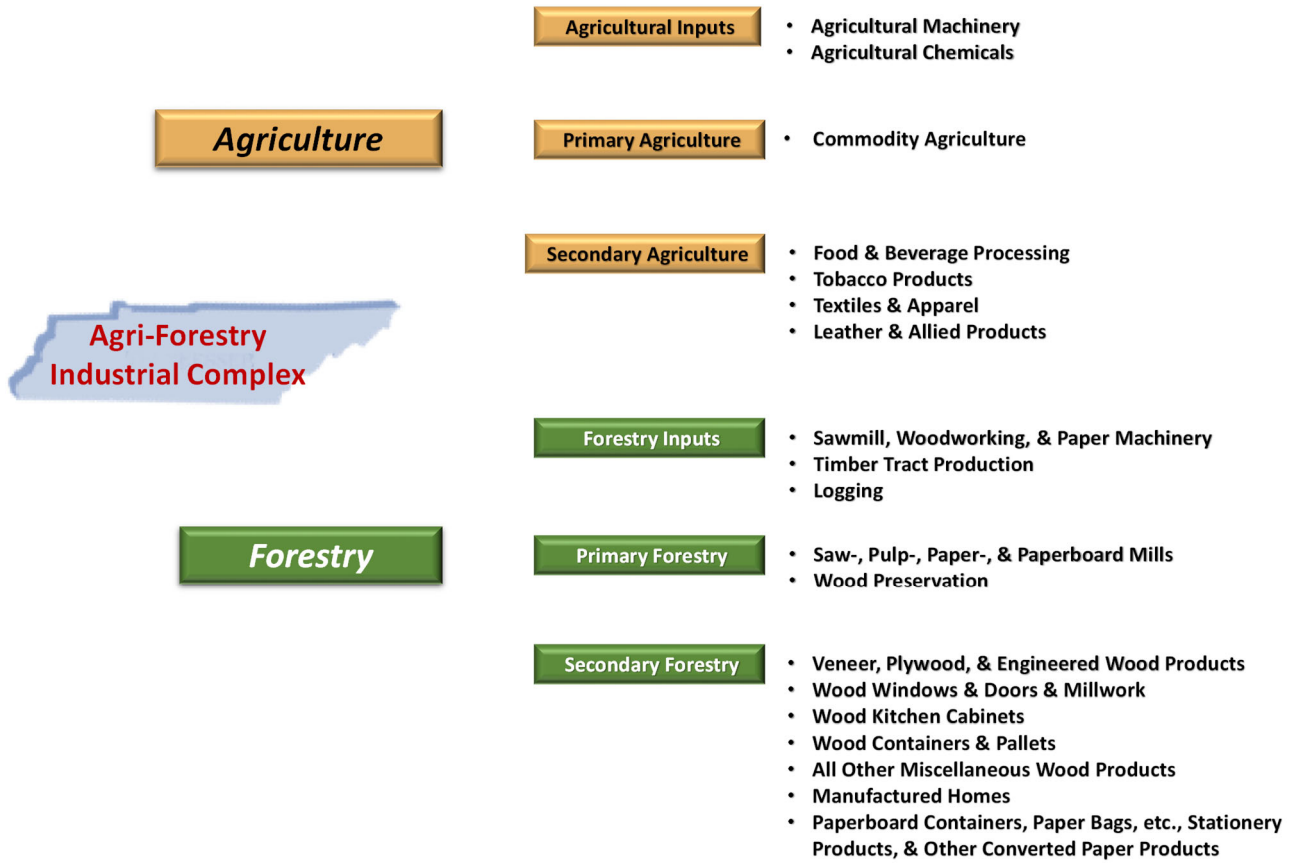


Figure 1. Graphic of Tennessee Agri-Forestry Industrial Complex used in this Analysis

In 2021, the agri-forestry industrial complex directly and indirectly (i.e., including multiplier effects) contributed \$89.0 billion to Tennessee’s economy. In terms of gross output this value was 10.9 percent of the economic activity conducted in the state. An estimated 366,154 individuals work in industries either part of or supported by the complex, or 8.9 percent of total employment in Tennessee. Agriculture generated \$65.6 billion in output or 8.0 percent of the economic activity in Tennessee and supported 281,794 jobs, with 92,889 (both full- and part-time) jobs in agricultural production. Forestry included the management and logging of trees; sawmills (primary forestry products), including pulp and paper mills, plus forestry products manufacturing (secondary forestry products). Forestry accounted for 2.9 percent of the state’s economy, supported 84,360 Tennessee jobs, and generated \$23.4 billion in output.

The 2021 output and employment multipliers for agricultural commodities and forestry activities (i.e., logging, sawmills, and pulp-, paper-, and paperboard-mills) ranged from 1.030 to 1.909 for total industrial output (economic activity) and 1.004 to 3.889 for employment. Dairy cattle and milk production farming’s output multiplier of 1.70 indicates that for every dollar invested in dairy farming, an additional \$0.70 of economic activity is generated. The employment multiplier of 1.607 indicates that for every job created in dairy farming, an estimated 0.61 additional jobs are supported in other industries.

For purposes of comparison, in 2021 Tennessee’s economy totaled \$820.0 billion in output and had over 4.1 million jobs. Industry sectors with larger magnitudes of **direct** economic activity other than the agri-forestry industrial complex were services (\$266.8 billion), manufacturing (\$133.3 billion), real estate (\$68.9 billion), and then agri-forestry (\$58.0 billion) (Figure 2). Industry sectors with larger magnitudes for **direct** employment than the agri-forestry industrial complex were services (1,906.3 thousand), followed by government (473.0 thousand), retail trade (369.2 thousand), manufacturing (257.7 thousand), construction (247.7 thousand), and then agri-forestry (188.7 thousand) (Figure 3). For direct value-added (or contribution

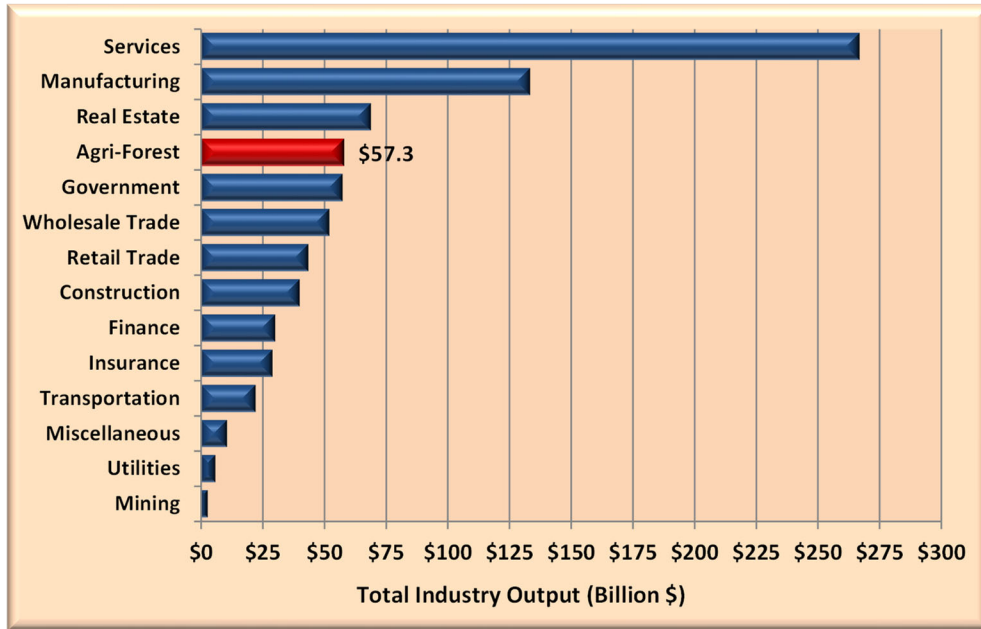


Figure 2. Direct Total Industry Output by Sector, Tennessee Total Economy, 2021
 (Source: IMPLAN Group, LLC, 2021 Data)

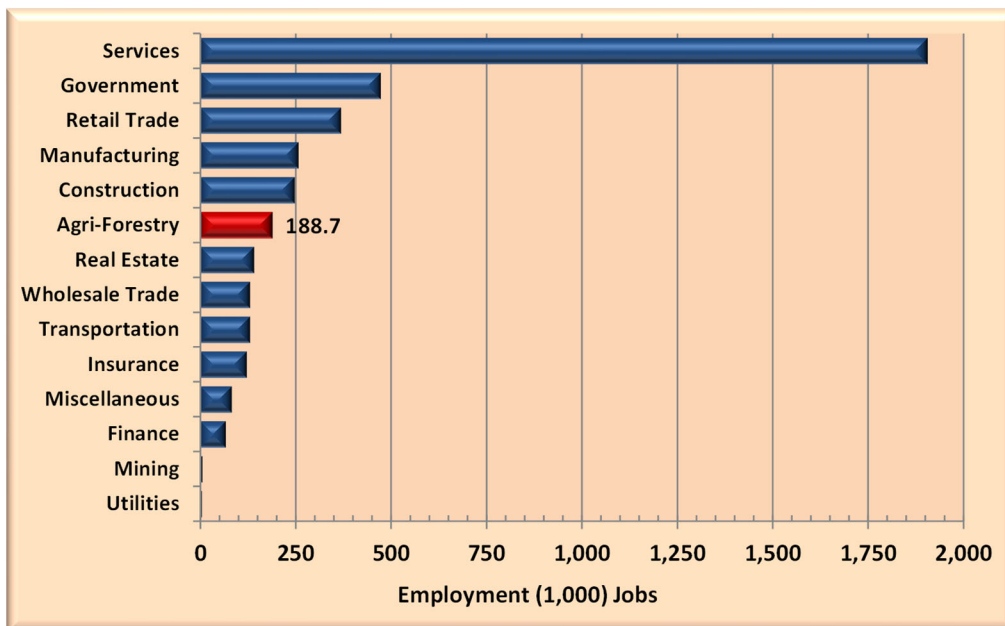


Figure 3. Direct Employment by Sector, Tennessee Total Economy, 2021
 (Source: IMPLAN Group, LLC, 2021 Data)

to gross state product), the agri-forestry industrial complex ranked seventh at \$21.5 billion behind retail trade (\$26.9 billion), wholesale trade (\$29.5 billion), manufacturing (\$40.4 billion), government (\$44.5 billion), real estate (\$46.2 billion), and services (\$161.9 billion) (Figure 4).

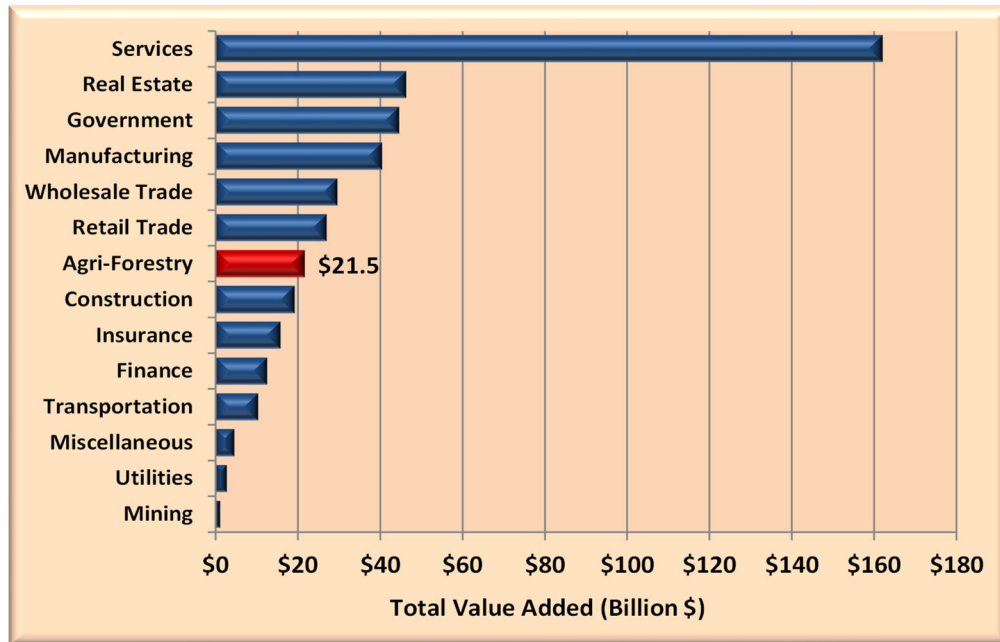


Figure 4. Direct Total Value Added by Sector, Tennessee Total Economy, 2021
 (Source: IMPLAN Group, LLC, 2021 Data)

Compared to the 2019 Tennessee agri-forestry economic contributions report, the state’s overall economy grew by a nominal value of \$74.0 billion with the direct agri-forestry industrial complex (without multiplier effects) increasing by \$5.4 billion. Comparing recent *direct* growth for total industry output (economic activity) in agriculture and forestry as a percentage of Tennessee’s total economy indicates relatively stagnant or slow upward growth for the years depicted in Figure 5. The average growth from 2006 through 2021 for *direct* agriculture and forestry were 6.6 percent and -0.4 percent, respectively. For agriculture, the years 2009, 2013, and 2021 had the largest gains; for forestry, the years 2013, 2015, and 2021. Figure 6 compares the **total (with multiplier effects)** output for agriculture and forestry to Tennessee’s total economy.

When comparing a county’s *direct* (without multiplier effects) agriculture and forestry economic activity to its total economic activity (all industries) for each of Tennessee’s 95 counties, Lake County had the highest share of economic activity for commodity agriculture (crop and livestock breeding and feeding) at 18.9 percent. For all agriculture (*includes direct agriculture, plus agricultural input supplying and agriculture-based manufacturing sectors*), Moore County had the highest share of economic activity at 59.9 percent). For direct forestry (i.e., the management and logging of forests), Wayne County had the highest level of direct economic activity at 1.9 percent). For all forestry (*includes direct forestry, plus input supplying industries and forestry manufacturing*), Grainger County had the highest share at 24.2 percent). Combining both agriculture and forestry economic activity, Moore and Weakley Counties had the largest shares of local economic activity at 60.1 percent and 34.4 percent, respectively (see Table 22, page 34).

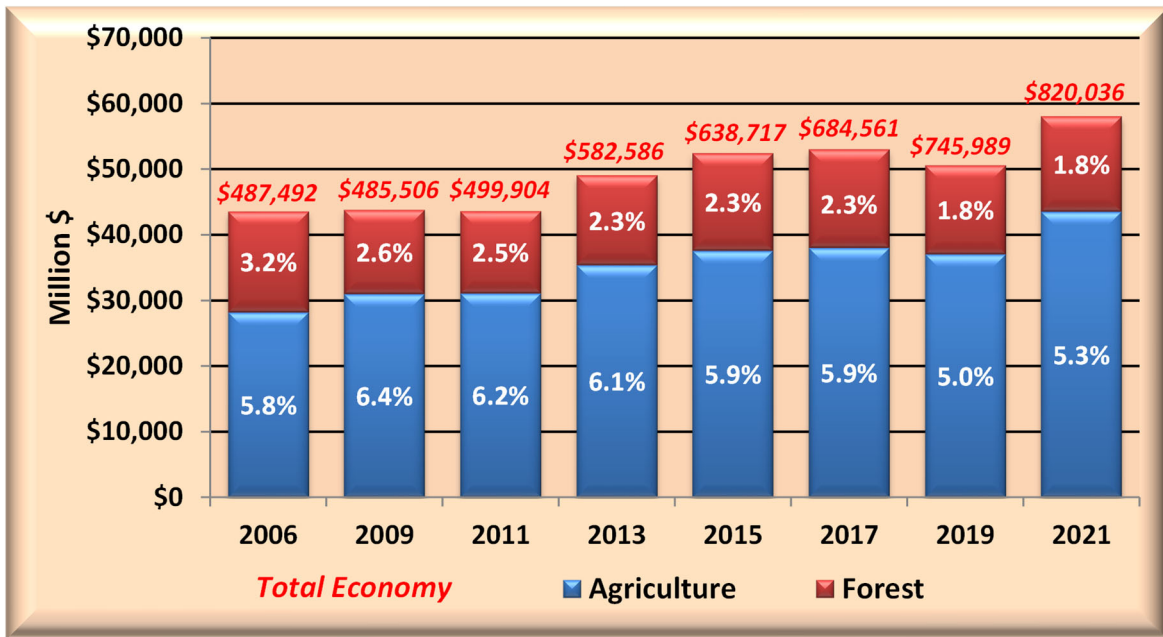


Figure 5. Nominal Change in Direct Output for Agriculture and Forestry as a Percentage of Tennessee's Total Economy

(Source: IMPLAN Group, LLC, 2006-2021 Data)

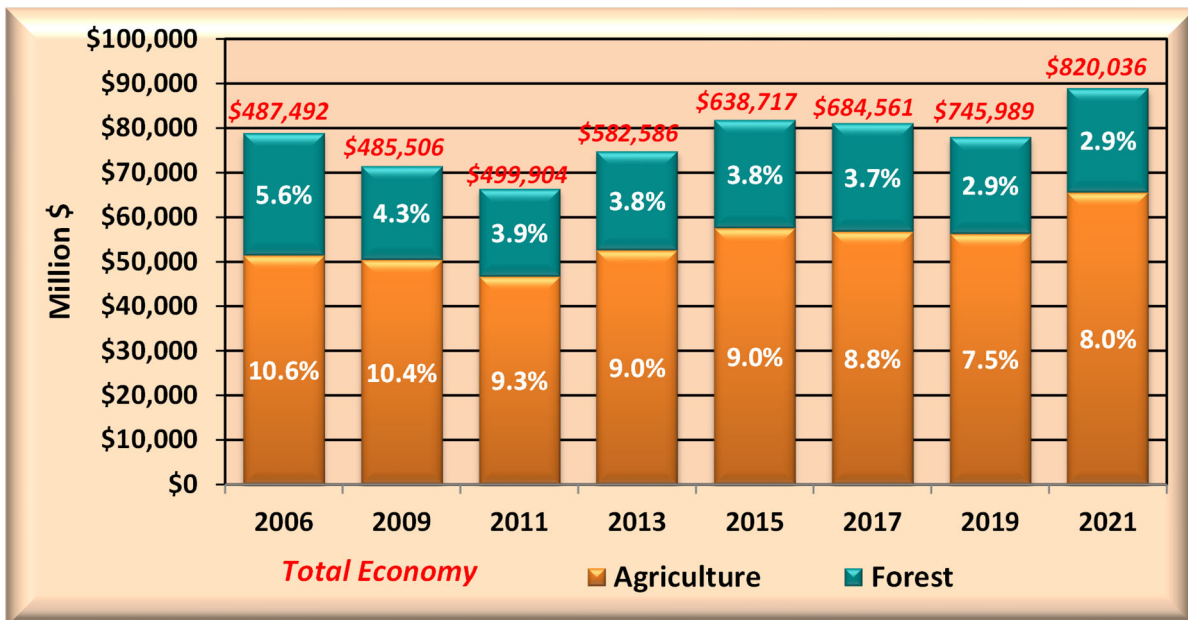


Figure 6. Nominal Change in Total Output (with Multiplier Effects) for Agriculture and Forestry as a Percentage of Tennessee's Total Economy

(Source: IMPLAN Group, LLC, 2006-2021 Data)

Other study highlights:

- Compared to the 2019 Tennessee agri-forestry economic contributions report, the state's overall economy grew by a nominal value of \$74.0 billion (9.9 percent) and the agri-forestry industrial complex increased by \$5.4 billion (10.3 percent) (Figure 5).

- Agriculture input supplying industries – agricultural machinery and chemical products – generated \$2.1 billion in cash receipts.
- In 2021, Tennessee farmers earned the majority of their cash receipts from corn, soybeans, broilers, beef cattle and calves, miscellaneous crops, cotton, hay, wheat, hogs, and dairy products.
- Tennessee’s average annual sawtimber removals on timberland were estimated at close to 1.3 billion board feet, with the majority of the removals (80.2 percent) from private landowners. The predominant species removed from private owned lands were yellow poplar, white and red oaks, loblolly and shortleaf pines and hickory.
- Estimated international exports for Tennessee’s wood products (NAICS code 321) and furniture and related products (NAICS 337) outside the United States totaled \$250.0 million. Wood products had the highest export value at \$166.0 million, followed by furniture and related products (\$84.0 million).
- Major importing countries of Tennessee’s forestry products (NAICS 113) totaled \$49.0 million with the top five major markets consisting of Canada (\$23.0 million), China (\$12.0 million), Hong Kong (\$3.0 million), Mexico (\$3.0 million), and Japan (\$1.0 million). The top five forest products exports are for sawn oak and ash lumber, wooden casks, non-coniferous lumber, and builders’ joinery and carpentry wood.
- Secondary agriculture manufacturing contributed a total of \$54.6 billion to the state’s economy, of which 84.4 percent came from food (\$39.0 billion) and beverages (\$7.0 billion) manufacturing.
- In 2021, agriculture and forestry manufacturing shipped \$46.6 billion dollars of goods and close to 80,000 Tennesseans were employed with a payroll of over \$3.8 billion.
- In 2021, estimated international exports for Tennessee’s farm products totaled close to \$1.9 billion. Major markets for Tennessee’s exports of agricultural crop products included China, Turkey, Pakistan, Vietnam, and Bangladesh; for agricultural livestock products, China, Mexico, Brazil, Canada, and Vietnam.
- Research efforts by The American Farmland Trust (AFT) and Conservation Science Partners (CSP) indicate that Tennessee ranks fourth in the top twelve most threatened states for agricultural land converted to urban and highly developed land and low-density residential land use. States preceding Tennessee were Texas, North Carolina, and New Jersey. Per AFT and CSP, low density residential land conversion predisposes land to be further converted to urban and highly developed land.

This analysis results presented in the “Tennessee Agricultural Economic Impact Results” were estimated using IMPLAN’s most recent 2021 data set. IMPLAN (IMpact Analysis for PLANing), an input-output model, traces backward linked transactions conducted in the economy and attempts to quantify the economic interdependencies for a given point in time. Through these interdependencies, one can evaluate the indirect and induced economic contributions that economic activity has on the entire state economy. IMPLAN’s Cloud platform offers an industry contribution analyses option, which was used to generate the estimated economic impacts for this analysis (see more detailed definitions and methodology discussion in the “Input-Output Analysis: Date and Methods Used” section).

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2021 Economic Contributions of Agriculture and Forestry in Tennessee

Introduction

This study provides measures of the economic contributions and importance of the agricultural and forestry industrial complex on Tennessee’s economy in 2021.¹ An input-output model reflecting the state’s 2021 economy is used to determine direct economic contributions on related input industries and economic contributions through resulting expenditures by households at the state level. Economic contributions are provided for four major metrics: total industry output (a measure of economic activity), employment, labor income, and value-added (gross regional product (GRP)). For the purpose of this analysis, agriculture² and forestry includes the production and processing of agricultural and forest products and the input suppliers of these products.

The structure of this document corresponds with the objectives of this analysis, which are to:

1. Provide an overview of Tennessee’s agriculture and forestry resources including crop and livestock cash receipts, Tennessee’s rank in the United States based on the production of agricultural products, exports for both agricultural and forestry products, plus agricultural and forestry manufacturing statistics (*pages 1-12*).
2. Compare state level changes in livestock and crop statistics for 2019 and 2021 including changes in livestock inventory, crop acreages, and prices (*page 13-14*).
3. Assess the economic contributions and importance of the agricultural and forestry industrial complex for the state with an input-output model (*pages 16-36*).
4. Analyze agriculture and forestry’s tax contributions to the state (*page 37*).

Overview of Agriculture and Forestry in Tennessee

Agricultural Overview

In 2021, 69,500 Tennessee farms³ used 10.7 million acres (Figure 7),⁴ or 39.7 percent of the state’s land base. For the ten-year period from 2011 to 2021, the numbers of farms in the state remained relatively fixed, decreasing an average of 0.1 percent annually. For that same timeframe, land in farms also decreased an

¹This study continues the series of previous reports where the economic contributions and importance of the agricultural and forestry industrial complex on Tennessee’s economy were examined using 1997, 2000, 2003, 2006, 2009, 2011, 2013, 2015, 2017, and 2019 IMPLAN data, respectively (previous report, Menard et al., 2021). For additional details on the previous studies and the IMPLAN version used, see Appendix A.

²In this report, forestry and the production of forest products were incorporated into agriculture and agribusiness, respectively.

³Defined as an establishment with \$1,000 or more of agricultural products sold or would normally be sold during the year (USDA/ERS, 2022).

⁴Raster image is based on USDA/NASS’s cropland data layer—a raster, geo-referenced, crop-specific land cover data layer with a ground resolution is 30 square meters (USDA/NASS, 2023c). Map includes all row, specialty, and truck crops, plus fruit production.

average of 0.1 percent annually, while the average farm size increased an average of 0.1 percent annually. In 2021, Tennessee’s average farm size was 154 acres compared to 445 acres for the United States. Other southeastern states with similar average farm sizes as Tennessee include Kentucky at 176 acres, followed by North Carolina at 184 acres and South Carolina at 195. Arkansas, Mississippi, and Missouri have average farm sizes of 334, 302, and 289 acres, respectively. Approximately 62.0 percent of all Tennessee farms had sales in the \$1,000-\$9,999 range, 31.5 percent in the \$10,000-\$99,999 range, and 6.5 percent had sales of \$100,000 or more (USDA/NASS, 2023c).

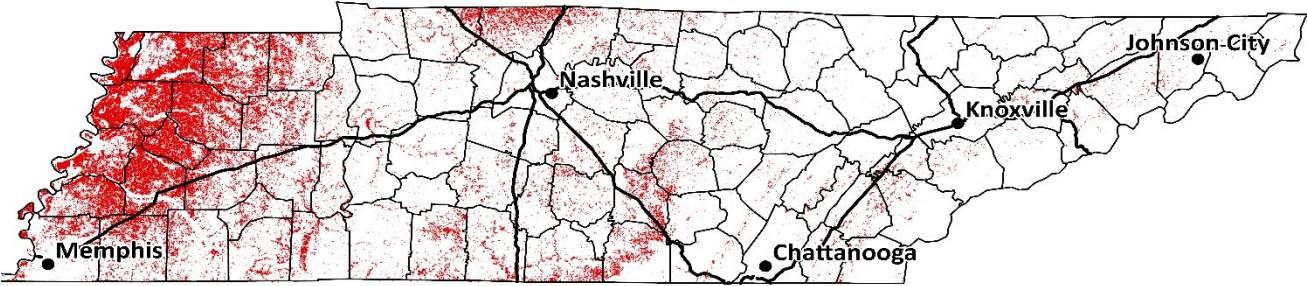


Figure 7. Location of Cropland in Tennessee, 2021
(Source: USDA/NASS, 2023b)

Cash receipts for all commodities in Tennessee totaled close to \$4.4 billion in 2021.⁵ Of that total, \$2.8 billion (64.6 percent) was from crops and \$1.6 billion (35.4 percent) was from all livestock and livestock products. Based on harvested acreage, Tennessee was ranked in the upper half of the nation for most major crops (Table 1). Approximately 35.5 percent of Tennessee’s total harvested cropland acreage (roughly 4.8 million acres) was in hay (all types), followed by soybeans (31.7 percent), corn for grain (20.0 percent), wheat (6.9 percent), and cotton (5.6 percent). For available crop data, corn for grain had the largest cash receipts,

Table 1. Crops Harvested, Acreage, Tennessee Ranking, and Cash Receipts, 2021					
Crops	Harvested Acreage	Tennessee Ranking	Leading State	Cash Receipts^a	% of State Crop Total^b
	(Thousand Acres)			(Thousand \$)	
Hay (all types)	1,705	10 ^c	Texas	\$192,858	6.8
Soybeans	1,520	17	Illinois	\$781,936	27.5
Corn for grain	960	17	Iowa	\$864,751	30.4
Winter wheat	330	19	Kansas	\$141,092	5.0
Cotton, lint	270	9	Texas	\$250,295	8.8
Corn for silage	35	30	Wisconsin	--	--
All tobacco	12.9	4	N. Carolina	\$78,912	2.8

^{a,b}For 2021, cash receipts for all commodities grown in Tennessee were \$4.4 billion (\$2.8 billion for crops).

^cFor 2021, Tennessee was also ranked 32nd for alfalfa hay.

Source: USDA/ERS, 2023b; USDA/NASS, 2023a, 2023d

⁵Cash receipt sales may not reflect the total values of commodities produced and used. For instance, a vertically integrated agribusiness may use hay or corn it produced to feed its own livestock.

followed by soybeans, cotton, hay, wheat, and tobacco. Tennessee’s top crop counties based on harvested acreage were Gibson County for both corn and wheat, Haywood County for cotton, and Dyer County for soybeans (USDA/ERS, 2023b; USDA/NASS, 2023a, 2023d).

Based on the number of head, broilers, chickens (excluding broilers), cattle and calves, hogs, equine, and milk cows were the predominant livestock in the state (Table 2). According to the USDA’s ERS for 2021, cash receipts from farm marketing for these livestock products totaled close to \$1.6 billion. Of that total, broilers contributed 38.7 percent, cattle and calves 37.4 percent, hogs 7.8 percent, dairy 6.2 percent, and all other chickens 4.4 percent. Tennessee is ranked 12th in the United States for the number of beef cows on farms, 15th for broilers, 16th for cattle and calves, 19th for hogs, 32nd for milk cows, and 27th for all other chickens. Tennessee’s top cattle counties based on numbers are Greene for beef cattle and Monroe for dairy cattle (USDA/ERS, 2023b; USDA/NASS, 2022a, 2022b, 2022c, 2022d, 2023e, 2022f, and 2022g).

Table 2. Livestock Numbers, Tennessee Ranking, and Cash Receipts, 2021

Livestock	Inventory (Number)	Tennessee Ranking	Leading State	Production ^a	Cash Receipts ^b (Thousand \$)	% of State Livestock Total ^c
Broilers ^d	195,300,000	15	Georgia	1,132,700	\$602,596	38.7
All other chickens ^e	3,103,000	27	Iowa		\$69,242 ^j	4.4
Cattle & calves ^f	1,790,000	16	Texas	634,501	\$582,781 ^k	37.4
Beef cows ^f	900,000	12	Texas		--	--
Hogs ^g	305,000	19	Iowa	184,901	\$121,525 ^k	7.8
Equine ^h	104,827	9 ⁱ	Texas	--	--	--
Milk cows ^f	28,000	32	California	508.0	\$97,079 ^l	6.2

^aThousand pounds for broilers, cattle and calves, and hogs; million pounds of milk for milk cows

^{b,c}For 2021, cash receipts for all commodities were \$4.4 billion (\$1.6 billion for livestock & products)

^dPeriod December 1 previous year through November 30, 2021

^eDecember 1, 2020-2021; excludes commercial broilers

^fAs of January 1, 2021

^gAs of December 1, 2021

^hIncludes horses, ponies, mules, burros, and donkeys

ⁱBased on 2017 Census of Agriculture, Tennessee was ranked 9th for horses and ponies and 2nd for mules, burros, and donkeys

^jIncludes eggs and farm chickens; excludes commercial broilers and turkeys

^kReceipts from marketing and sale of farm slaughter

^lMilk cash receipts from marketings

Source: USDA/ERS, 2023b; USDA/NASS, 2019c, 2022a, 2022b, 2022c, 2022d, 2022e, 2022f, 2022g, 2023d

Based on IMPLAN model estimates, Tennessee’s more significant agricultural commodities in terms of dollar value, along with their corresponding U.S. market share, are shown in Table 3. In descending order, they were grain farming (barley, corn, oats, sorghum, and wheat); oilseed farming (primarily soybeans); poultry and egg production; beef cattle farming; greenhouse, nursery, and floriculture production; cotton farming; animal production, except cattle, poultry, and eggs; all other crop farming (primarily hay and seed); vegetable and

Table 3. State Value of Agricultural Commodities and U.S. Market Share, 2021

Agricultural Industry	Total Industry Output ^a	Market Share of U.S. Production
	(Million \$)	(Percent)
Grain farming	\$1,047.5	1.0%
Oilseed farming	\$967.4	1.6%
Poultry & egg production	\$696.0	1.5%
Beef cattle farming	\$591.3	0.8%
Greenhouse, nursery, & floriculture production	\$380.4	1.9%
Cotton farming	\$273.2	3.4%
Animal production, except cattle/poultry/eggs ^b	\$212.0	0.6%
All other crop farming ^c	\$187.4	1.0%
Vegetable and melon farming	\$119.2	0.5%
Dairy cattle & milk production	\$98.0	0.2%
Tobacco farming	\$84.1	7.9%
Fruit farming	\$13.6	0.1%
Tree nut farming	\$2.6	0.03%

^aTotal Industry Output – annual value of production by industry (a measure of economic activity)

^bPrimarily hogs, sheep & goats, aquaculture, equine, and apiculture

^cPrimarily hay/seed farming

Source: IMPLAN Group, LLC, 2021 Data

melon farming; dairy cattle and milk production; tobacco farming; fruit farming; and tree nut farming. Tobacco farming; cotton farming; greenhouse, nursery, and floriculture production; oilseeds farming; and poultry and egg production had the largest market share of U.S. production at 7.9 percent, 3.4 percent, 1.9 percent, 1.6 percent, and 1.5 percent, respectively.

From 2008 through 2021, the number of Tennessee milk cows decreased an average of 5.5 percent per year (Figure 8). While production per cow increased an average of one percent per year for that same timeframe, total milk production for the state decreased an average of 4.6 percent annually. Compared to the 2019 report, total milk production in 2021 in the state declined by 7.8 percent from 551.0 million pounds to 508.0 million, the number of head declined 12.5 percent from 32,000 head to 28,000, and production per cow increased 5.4 percent from 17,219 pounds per cow to 18,143 pounds. In 2021, cash receipts from dairy ranked 33 compared to other states in the U.S. The highest national rank, 30, was for the years 2014 and 2015, the lowest, 34, was for 2008. Compared to other agriculture cash receipts for other Tennessee agricultural commodities, dairy cash receipts ranged from sixth (2015) to tenth (2008 and 2021) in rank. For 2021, dairy cash receipts (\$97.1 million) were less than those earned for corn (\$864.7 million), soybeans (\$782.0 million), broilers (\$602.6 million), cattle and calves (\$582.8 million), miscellaneous crops (\$346.7 million), cotton (\$250.3 million), hay (\$192.9 million), wheat (\$141.1 million), and hogs (\$121.5 million). Most of the dairy industry in Tennessee is comprised of small farms. Approximately 86.5 percent of the dairy farms in the state have less than 100 head. For the remaining 13.5 percent of the farms with greater than 100 head, 61.7 percent had dairy herd sizes of 100-199 head, 30.8 percent for 200-499 head, 6.0 percent for 500-999 head, and 1.5 percent for 1,000-2,499 head (USDA/ERS, 2023b; USDA/NASS, 2022d).

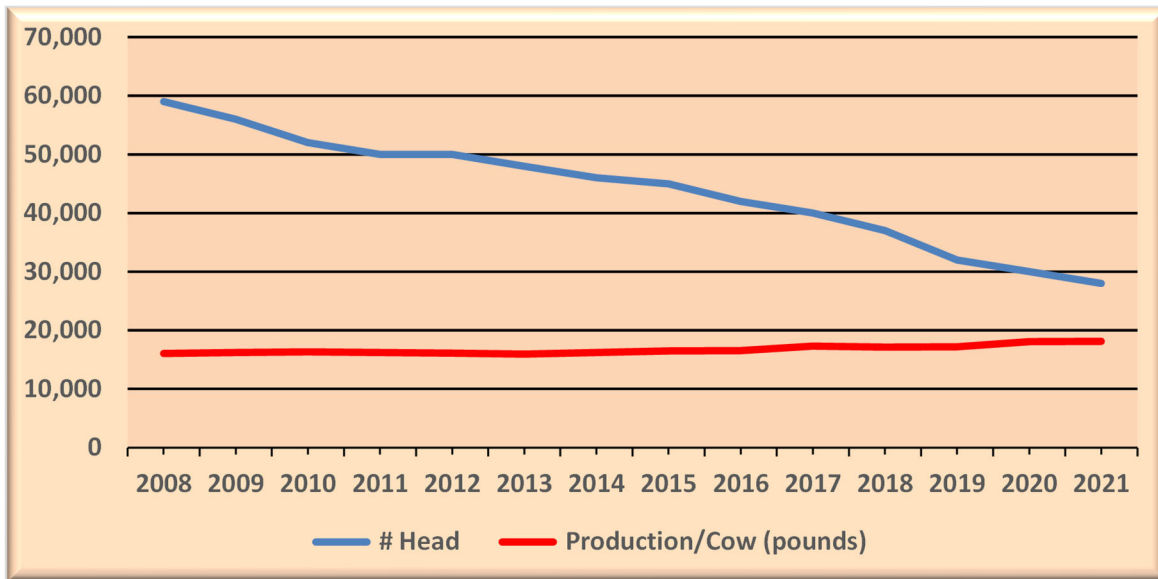


Figure 8. Number of Dairy Cows and Production per Cow in Tennessee, 2008-2021

(Source: USDA/NASS, 2022d)

Tennessee’s 2021 agricultural commodity (foreign) exports totaled \$1.9 billion. Of that value, 85.5 percent was from plant products with the remaining value, 14.5 percent, from animal products. The value of the top ten commodities exported included soybeans at \$435.8 million, other plant products (includes sweeteners and products, other horticulture products, planting seeds, and other processed foods) at \$300.1 million, cotton at \$218.0 million, corn at \$203.8 million, feeds and other feed grains (includes processed feeds, fodder, barley, oats, rye, and sorghum) at \$135.2 million, soybean meal at \$89.3 million, wheat \$85.5 million, beef and veal at \$84.2 million, broiler meat at \$71.8 million, and tobacco at \$70.5million (USDA/ERS, 2023a).⁶ For 2021, Tennessee’s exports of agricultural crop products (North American Industry Classification (NAICS) code 111 (oilseed & grain farming; vegetable & melon farming; fruit & tree nut farming; greenhouse, nursery, & floriculture production; and other crop farming)) totaled \$703.0 million with the top five major markets consisting of China (\$160.0 million), Turkey (\$103.0 million), Pakistan (\$93.0 million), Vietnam (\$81.0 million), and Bangladesh (\$34.0 million). For agricultural livestock products (NAICS code 112 (cattle ranching & farming; hog & pig farming; poultry & egg production; sheep & goat farming; aquaculture; and other animal production)), exports totaled \$25.0 million with China (\$11.0 million), Mexico (\$3.0 million), Brazil (\$1.0 million), Canada (\$1.0 million), and Vietnam (\$1.0 million) the top five markets (USDOC/ITA, 2023).

⁶State calculated export values are allocated based on the share of US farm cash receipts for those products and may not be reflective of actual state exports and could differ from the state export data reported by U.S. customs (USDA/ERS, 2023a).

Forest Overview

Roughly 51 percent of Tennessee is covered in forest (Figure 9).⁷ The forest cover is primarily hardwoods (89 percent of the forest composition) making the state one of the top three hardwood lumber producing states in the U.S. There are over 120 tree species in Tennessee. White oak, red oak, hickory, yellow poplar, and maple are among the more predominant hardwood species. For softwoods, loblolly pine, Virginia pine, red cedar, and shortleaf pine are major species. The dominant forest type in the state is oak and hickory, accounting for an estimated 9.9 million acres (Tennessee Forestry Association, 2017). Of the 13.8 million acres in forest, 82.9 percent are privately owned with Federal (10.0 percent) and state/local forests (7.1 percent) comprising the rest. It is estimated the state has an estimated 8.5 billion live trees with a volume of 33.6 billion cubic feet (USDA/FS, 2020).

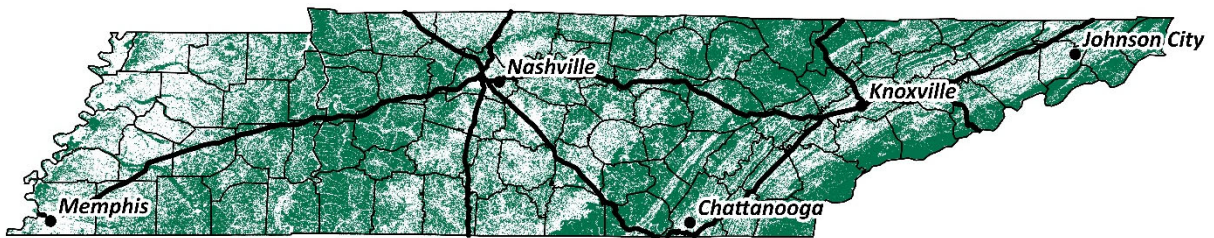


Figure 9. Location of Forest Land in Tennessee, 2021

(Source: USDA/NASS, 2023b)

For 2019, average annual sawtimber⁸ removals on timberland⁹ were estimated at over 1.3 billion board feet (Table 4). Of that value, most of the removals, 80.2 percent, were from private landowners (1.0 billion board feet), followed by other non-federal public (177.7 million board feet), state and local (53.2 million board feet) and federal (24.6 million board feet). The predominant species removed on federal lands were cypress, ash, white and red oaks, and for state and local, white and red oaks, loblolly/shortleaf pines, and hickory. White and red oaks and yellow poplar were primarily removed from other non-federal lands. For private owned lands, the predominant species removed were yellow poplar, white and red oaks, and loblolly/shortleaf pines, and hickory (USDA Forest Service, 2023).

⁷Raster image is based on USDA/NASS's cropland data layer—a raster, geo-referenced, crop-specific land cover data layer with a ground resolution is 30 square meters. Map includes all forest types (deciduous, evergreen, mixed, and woody wetlands).

⁸Commercial tree species with at least a 12-foot sawlog or two noncontiguous saw logs 8 feet or longer and meeting regional specifications for freedom from defect. Softwoods must be at least 9.0 inches in diameter at breast height (d.b.h.); hardwoods must be at least 11.0 inches d.b.h. (USDA Forest Service, 2023 (*metadata*)).

⁹Timberland is defined as forest land producing or is capable of producing crops of industrial wood and not withdrawn from timber utilization by statute or administrative regulation (USDA Forest Service, 2023 (*metadata*)).

Table 4. Average Annual Removals of Sawtimber Trees by Species Group and Owner Class, 2019

Tree Species Group	Federal	State & Local	Private	Other ^a	Total ^b
	<i>Board Feet (International 1/4-inch rule)</i>				
Loblolly & shortleaf pine		4,383,316 ^e	110,751,982 ^c	7,442,061 ^d	122,577,359 ^c
Other yellow pine		727,878 ^e	5,121,528 ^e	13,624,657 ^e	19,474,063 ^d
Eastern white & red pine	55,017 ^e	-	15,592,537 ^e	6,581,930 ^e	22,229,484 ^e
Eastern hemlock		-	1,064,195 ^e	-	1,064,195 ^e
Cypress	17,981,222 ^e	-	-	9,109,787 ^e	27,091,009 ^e
Other eastern softwoods		-	3,765,817 ^d	1,476,335 ^e	5,242,152 ^d
Select white oaks	276,203 ^e	9,550,576 ^e	168,361,055 ^c	26,071,410 ^d	204,259,244 ^c
Select red oaks		8,263,529 ^e	51,322,074 ^d	3,020,674 ^e	62,606,277 ^d
Other white oaks	1,588,056 ^e	2,942,821 ^e	90,302,762 ^d	13,268,990 ^d	108,102,629 ^c
Other red oaks	1,425,271 ^e	1,272,190 ^e	149,900,834 ^c	25,564,705 ^d	178,163,000 ^c
Hickory		3,164,598 ^e	84,109,240 ^c	8,127,877 ^d	95,401,715 ^c
Hard maple		284,871 ^e	20,183,268 ^d	2,030,577 ^e	22,498,716 ^d
Soft maple		-	7,487,734 ^d	2,428,641 ^e	10,964,392 ^d
Beech	1,048,017 ^e	-	10,472,039 ^d	2,258,839 ^e	12,730,878 ^d
Sweetgum		3,156,028 ^e	30,246,302 ^d	8,313,127 ^e	41,715,457 ^d
Tupelo & blackgum		952,168 ^e	6,770,387 ^d	1,813,999 ^e	9,536,554 ^d
Ash	2,235,248 ^e	1,062,656 ^e	19,350,077 ^d	892,201 ^e	23,540,182 ^d
Basswood		-	2,604,691 ^e	813,503 ^e	3,418,194 ^e
Yellow-poplar		16,640,878 ^e	213,575,423 ^c	22,098,598 ^d	252,314,899 ^c
Black walnut		-	10,085,950 ^d	782,566 ^e	10,868,516 ^d
Other eastern soft hardwoods		791,763 ^e	31,306,922 ^d	21,352,873 ^d	53,451,558 ^c
Other eastern hard hardwoods		-	702,865 ^e	583,245 ^e	1,286,110 ^e
Total	24,609,034^e	53,193,272^d	1,033,077,682^c	177,656,595^c	1,288,536,583^c

^aOther non-federal public^bTotals may not add due to rounding^cPercent sampling error ≤ 25 percent^dPercent sampling error > 25 percent and ≤ to 50 percent^ePercent sampling error > 50 percent

Source: USDA Forest Service, 2023

Tennessee's 2021 top twenty forest products export values ranked in descending order are listed in Table 5. Sawn oak and ash lumber, wooden casks, non-coniferous lumber, and builders' joinery and carpentry wood not elsewhere specified or included comprise the top five (USDA/FAS, 2023). Exports of Tennessee's forest products (wood products (*NAICS code 321*) and furniture and related products (*NAICS code 337*)) outside the U.S. totaled \$250.0 million for this timeframe. Wood products had the highest export value at \$166.0 million, followed by furniture and related products at \$84.0 million. For 2019, Tennessee exports of forestry products (*NAICS code 113*) totaled \$49.0 million with the top five major markets consisting of Canada (\$23.0

Table 5. Top 20 Value of Tennessee Forest Products Exports to the World, 2021\$

BICO- HS6 ^a	Forest Products	2017	2018	2019	2020	2021
				\$1,000		
440791	Sawn Wood > 6mm, Oak	127,117	119,932	83,683	64,999	87,685
440795	Sawn Wood > 6mm, Ash	22,530	20,318	12,318	11,436	15,008
441600	Wooden Casks & Barrels	27,588	26,475	20,449	16,920	13,493
440799	Sawn Wood > 6mm, Noncon ^b Nesoic ^c	32,141	25,496	10,203	7,310	12,105
441899	Builders' Joinery & Carpentry Nesoic ^c , Wood	5,247	4,202	4,525	4,928	10,320
440797	Sawn Wood > 6mm, Poplar & Aspen	0	2,575	7,661	9,136	10,229
440399	Wood, Rough, Noncon ^b Nesoic ^c	19,150	13,384	6,329	4,121	9,339
440391	Wood, Rough, Oak	15,710	14,684	8,825	5,570	9,260
440711	Sawn Wood > 6mm, Pine	0	119	183	668	2,466
440794	Sawn Wood > 6mm, Cherry	3,076	2,683	591	625	2,237
440793	Sawn Wood > 6mm, Maple	1,286	708	692	642	1,709
441012	Wood Oriented Strand Board (OSB)	4,997	5,169	6,838	3,896	1,276
441520	Wooden Pallets	2,351	2,091	1,503	571	1,251
440929	Shaped Wood, Noncon ^b Nesoic ^c	1,532	1,468	2,862	1,067	1,011
441233	Plywood, Ply <= 6mm, Cherry, Maple, Oak, etc.	0	82	2,093	744	889
442199	Wooden Articles Nesoic ^c	405	531	190	252	834
440719	Sawn Wood > 6mm, Coniferous Nesoic ^c	0	351	608	1,590	638
440397	Wood, Rough, Poplar & Aspen	0	45	390	198	615
441299	Panels Nesoic, Coniferous	55	471	690	641	604
441234	Plywood, Ply <= 6mm, Noncon ^b Nesoic ^c	0	489	0	10	523
	Total	263,185	241,273	170,633	135,324	181,492
	World Total	289,811	256,912	176,875	139,045	185,157

^aBICO-HS6-six digit harmonized system report of bulk, intermediate, and consumer-oriented agricultural products

^bNonconiferous

^cNesoic-Not elsewhere specified or included

Source: USDA/FAS, 2023

million), China (\$12.0 million), Hong Kong (\$3.0 million), Mexico (\$3.0 million), and Japan (\$1.0 million) (USDOC/ITA, 2023).

Agriculture and Forestry Manufacturing Overview

Agriculture and forestry manufacturing industries by county for the state (Figures 10 through 19) included food (*NAICS code 311*), animal slaughtering and processing (*NAICS code 3116*), beverage and tobacco products (*NAICS code 312*), textile mills (*NAICS code 313*), textile product mills (*NAICS code 314*), apparel (*NAICS code 315*), leather and allied products (*NAICS code 316*), wood products (*NAICS code 321*), paper (*NAICS code 322*), and furniture and related products (*NAICS code 337*). For these industries in 2021, \$46.6 billion dollars of goods were shipped and close to 80,000 Tennesseans were employed with a payroll of \$3.8 billion (Table 6). Food manufacturing shipped the largest value of goods at \$23.6 billion, followed by beverage and tobacco products manufacturing at \$8.7 billion, and paper manufacturing at \$6.2 billion. As a group, textile mills, including textile product mills and apparel, shipped close to \$1.9 billion. For the forest products group, which included wood products manufacturing, paper manufacturing, and furniture and related products, \$12.5

billion of goods were shipped. Tennessee’s national market share for value of shipments for food manufacturing was 2.6 percent, beverage and tobacco products at 5.2 percent, textile mills at 4.3 percent, textile product mills at 2.2 percent, apparel manufacturing at 2.1 percent, wood product manufacturing at 2.7 percent, paper manufacturing at 3.1 percent, and furniture and related products at 2.8 percent. Of the value-added agri-forestry sectors, food manufacturing employed the largest share at 35,100. The forest products group (wood product manufacturing, paper manufacturing, and furniture and related products) employed 32,904. The textile mills and related products, including apparel, employed 7,595 workers (U.S. Census Bureau, 2023; U.S. Department of Labor, 2023).

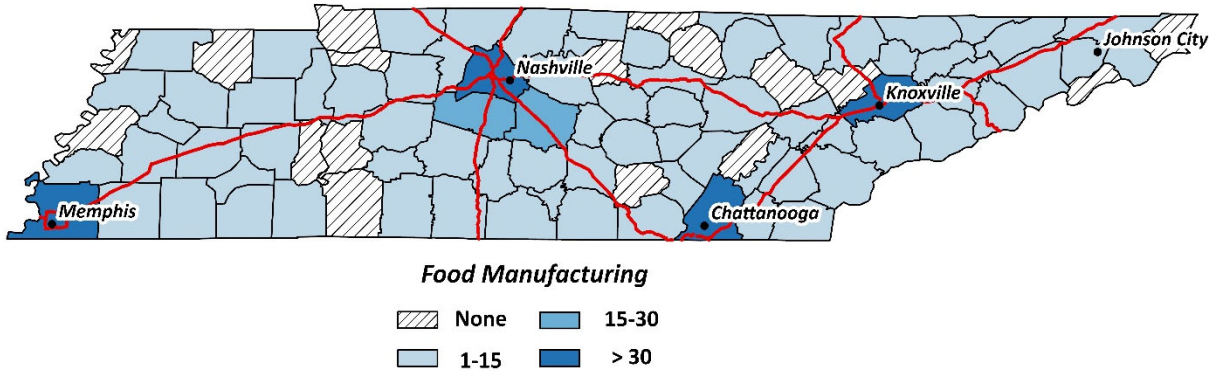


Figure 10. Number of Food Manufacturing Establishments in Tennessee, 2021
(Source: U.S. Department of Labor, 2023)



Figure 11. Number of Animal Slaughtering & Processing Establishments in Tennessee, 2021
(Source: U.S. Department of Labor, 2023)

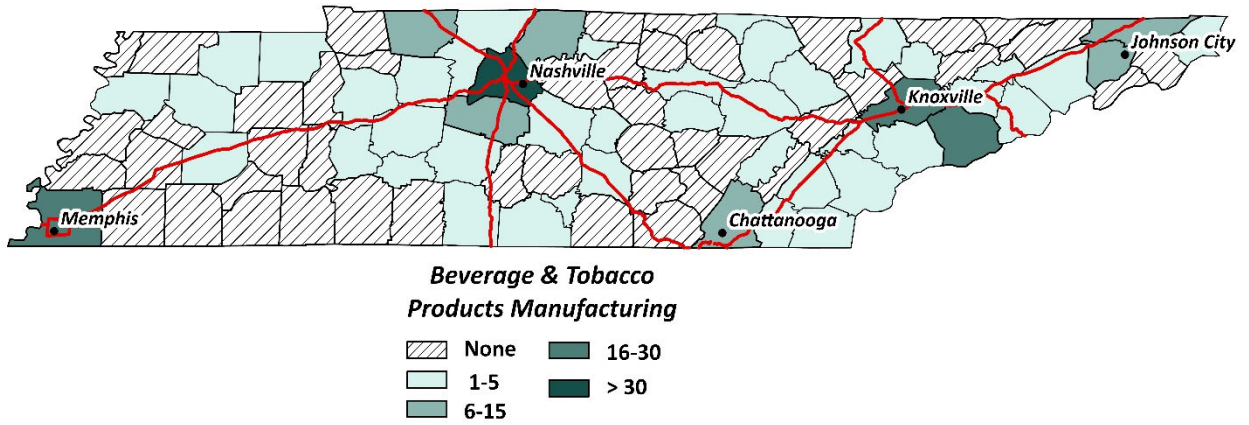


Figure 12. Number of Beverage and Tobacco Products Establishments in Tennessee, 2021
 (Source: U.S. Department of Labor, 2023)

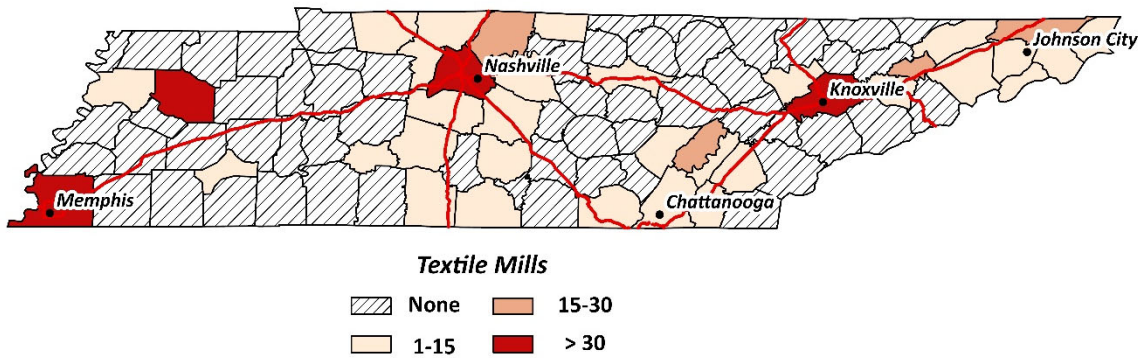


Figure 13. Number of Textile Mill Establishments in Tennessee, 2021
 (Source: U.S. Department of Labor, 2023)

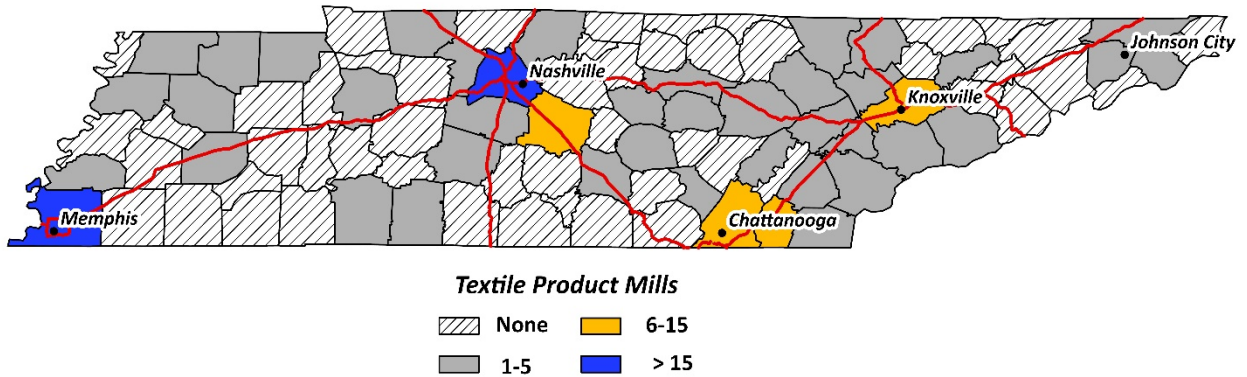


Figure 14. Number of Textile Product Mill Establishments in Tennessee, 2021
 (Source: U.S. Department of Labor, 2023)

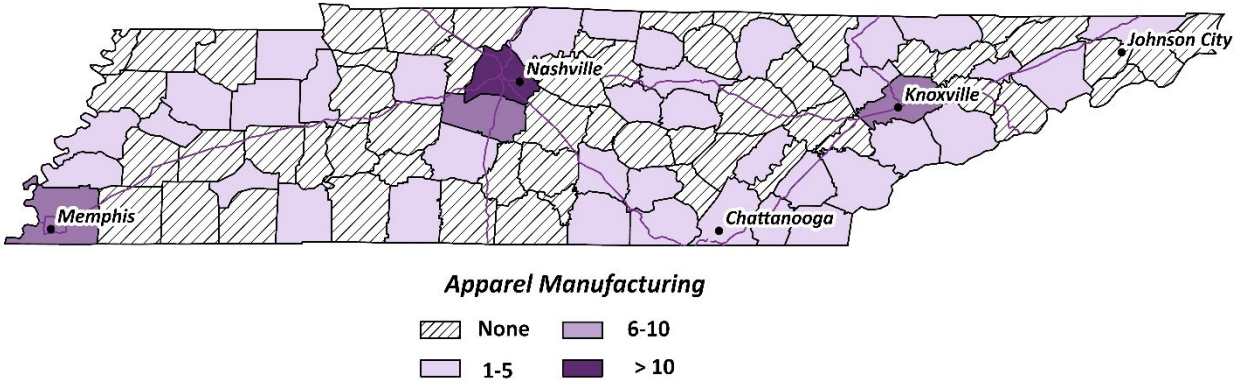


Figure 15. Number of Apparel Manufacturing Establishments in Tennessee, 2021
 (Source: U.S. Department of Labor, 2023)

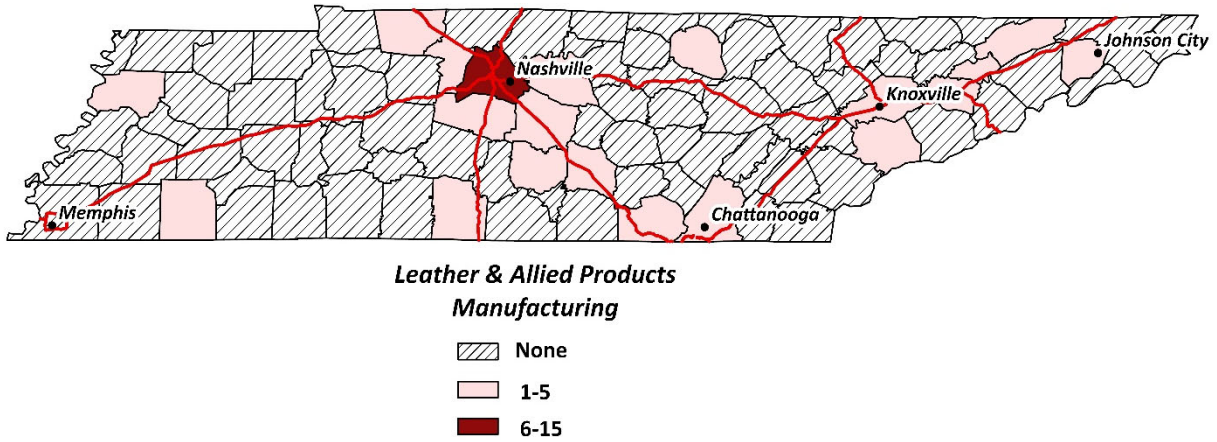


Figure 16. Number of Leather & Allied Product Establishments in Tennessee, 2021
 (Source: U.S. Department of Labor, 2023)

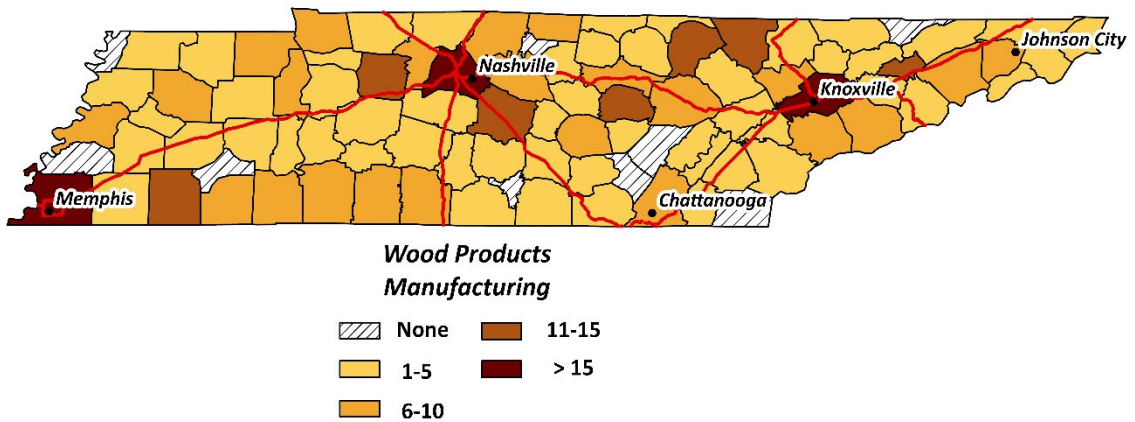


Figure 17. Number of Wood Products Manufacturing Establishments in Tennessee, 2021
 (Source: U.S. Department of Labor, 2023)

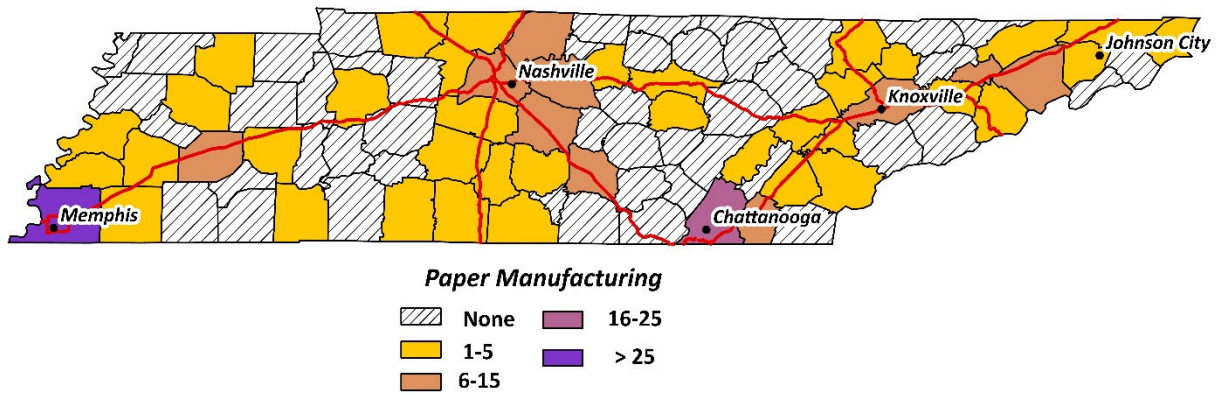


Figure 18. Number of Paper Manufacturing Establishments in Tennessee, 2021

(Source: U.S. Department of Labor, 2023)

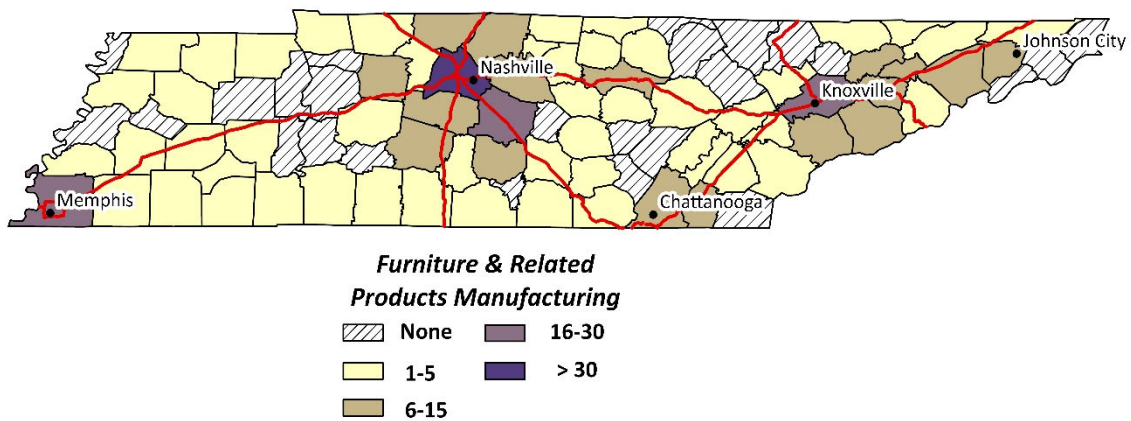


Figure 19. Number of Furniture & Related Products Establishments in Tennessee, 2021

(Source: U.S. Department of Labor, 2023)

Table 6. Agri-Forestry Manufacturing Statistics for Tennessee, 2021

Manufacturing Industry/NAICS Code	Employees	Annual Payroll	Establishments	Value of Shipments
	(Number)	(Thousand \$)	(Number)	(Thousand \$)
Food (311)	35,100	\$1,841,363	552	\$23,571,084
<i>Animal slaughtering/processing (3116)</i>	10,831	\$454,987	83	\$4,296,183
Beverage & tobacco products (312)	4,331	\$254,900	271	\$8,687,504
Textile mills (313)	2,878	\$173,412	81	\$1,140,513
Textile product mills (314)	2,268	\$93,375	150	\$523,283
Apparel (315)	2,449	\$60,098	107	\$197,858
Leather & allied products (316)	^a	^a	33	^a
Wood products (321)	12,804	\$578,128	504	\$4,214,411
Paper (322)	10,327	\$688,551	209	\$6,151,903
Furniture & related products (337)	9,773	\$137,166	394	\$2,109,356
Total^b	79,930	\$3,826,993	2,301	\$46,595,912

^aNot reported due to high sampling variability.

^bValues for animal slaughtering and processing are included in food manufacturing (311) values.

Source: U.S. Census Bureau, 2023

U.S. Department of Labor, 2023

State Level Changes in Livestock and Crops: 2019 to 2021

Comparing 2019 and 2021 statewide agricultural data revealed an increase in the numbers of chickens (including broilers), eggs, and hogs, while the number of beef cattle and calves, along with milk cows, decreased. Prices increased for all livestock products with the largest increase for poultry, followed by hogs and beef. Many of the traditional row crops grown in the state experienced increased harvested acreage except for cotton, tobacco and hay. Crop prices increased for all the major commodities (e.g., cotton, corn, soybeans, tobacco, wheat, and hay).

Livestock Changes in Inventory and Prices

Compared to 2019 production levels, the largest increases in livestock numbers were for hogs (22.0 percent), followed by all other chickens (19.3 percent), and broilers (9.9 percent). Milk cows experienced the largest decrease in numbers at 12.5 percent, with beef cattle remaining relatively flat (-0.6 percent) (Table 7). Prices increased for all the major livestock products as reported in Table 7. The largest increase was for all other chickens at 29.0 percent, followed by hogs (18.7 percent increase), beef (10.3 percent increase), broilers (9.9 percent), and eggs (6.9 percent).

Table 7. Comparison of Tennessee Livestock Numbers and Prices, 2019 and 2021^a

Commodity	Inventory		Change	Units	Price		Change	Units
	2019	2021			2019	2021		
	(1,000)		%	1,000	(dollars/unit)		%	
All cattle & calves ^b	1,800	1,790	-0.6	head	\$83.25	\$91.85	10.3	100 lbs
All other chickens	2,601	3,103	19.3	no.	\$9.30	\$12.00	29.0	head
Broilers	177,700	195,300	9.9	no.	\$0.49	\$0.53	9.9	pound
Eggs	344,600	373,700	8.4	no.	\$2.07	\$2.21	6.9	dozen
Milk cows	32	28	-12.5	head	--	--	--	head
All hogs ^b	250	305	22.0	head	\$55.36	\$65.72	18.7	100 lbs

^aData in nominal values

^bLive weight adjustments made for changes in inventory and in shipments and receipts includes marketing and sales of farm slaughter.

Source: USDA/NASS 2019b, 2020a, 2020c, 2020d, 2020e, 2020f, 2022a, 2022b, 2022c, 2022e, 2022f, and 2022g

Crop Changes in Acres Planted and Prices

Comparing crop harvested acres for 2019 and 2021 for Tennessee's major crops, wheat had the largest increase at 53.5 percent, followed by soybeans (10.9 percent) and corn (4.4 percent). The remaining major crops had decreased harvested acreage with cotton having the largest decrease of 33.3 percent, followed by tobacco (-9.8 percent) and all hay (-3.3 percent) (Table 8). Corn harvested acres increased from 710 to 910 thousand acres. All the major crop commodities experienced higher prices for the timeframe examined. The largest price increases were for cotton (49.2 percent), followed by corn (43.5 percent), soybeans (41.4 percent), wheat (26.1 percent), hay (14.5 percent), and tobacco (6.0 percent) (USDA/NASS, 2019a, 2020b, 2021, 2023a, and 2023d).

Table 8. Comparison of Tennessee Crop Acreages and Prices, 2019 and 2021^a

Commodity	Harvested Acres			Price			Units
	2019	2021	Change	2019	2021	Change	
	1,000 acres		%	\$/unit		%	
Hay, all	1,763	1,705	-3.3%	\$112.24	\$128.48	14.5%	ton
Corn	910	950	4.4%	\$3.95	\$5.67	43.5%	bushel
Soybeans	1,370	1,520	10.9%	\$9.05	\$12.80	41.4%	bushel
Cotton	405	270	-33.3%	\$0.59	\$0.88	49.2%	pound
Tobacco	13.3	12.0	-9.8%	\$2.48	\$2.63	6.0%	pound
Wheat	215	330	53.5%	\$5.45	\$6.87	26.1%	bushel

^aData in Nominal Values

Source: USDA/NASS, 2019a, 2020b, 2021, 2023a, and 2023d

Special Section: Farmland Loss

In 2016, The American Farmland Trust (AFT) initiated a research effort that focused on farmland loss in the U.S. resulting in two reports. The first, *Farms Under Threat: The State of America’s Farmland*, was released in 2018. The second follow-up report conducted with the assistance of Conservation Science Partners (CSP) was released in 2020, *Farms Under Threat: The State of the States*, incorporates spatial analyses of US/state farmland loss between 2001 and 2016. Using various available datasets¹⁰, along with agricultural experts from other agencies, they developed a methodology based on a number of factors, to assess agricultural land’s suitability for long-term cultivation and food production. The factors are designated at *PVR*, where “P” indicates land productivity, “V” indicates versatility, and “R” indicates resiliency. Weights were assigned to the factors by various agricultural experts. Values can range from 0 to 1. A high PVR value indicates land that is more productive, versatile, and resilient for long-term cultivation. Consequently, cropland will normally have a higher PVR value compared to pastureland and woodland. Based on this methodology, two land classifications were determined - land best suited for intensive crop production, or significantly agricultural land, and best lands in each state (Figures 20 - 22 for Tennessee¹¹) (American Farmland Trust, 2020a).

¹⁰Sources used include USDA NRCS’s National Resource Inventory (NRI), USGS National Land Cover Database (NLCD), NRCS Soil Survey Geographic Database (SSURGO), and NRCS Digital General Soil Map of the U.S. (STATSGO).

¹¹Raster image is from American Farmland Trust’s and Conservation Science Partners. Pixels are 120-meter resolution.

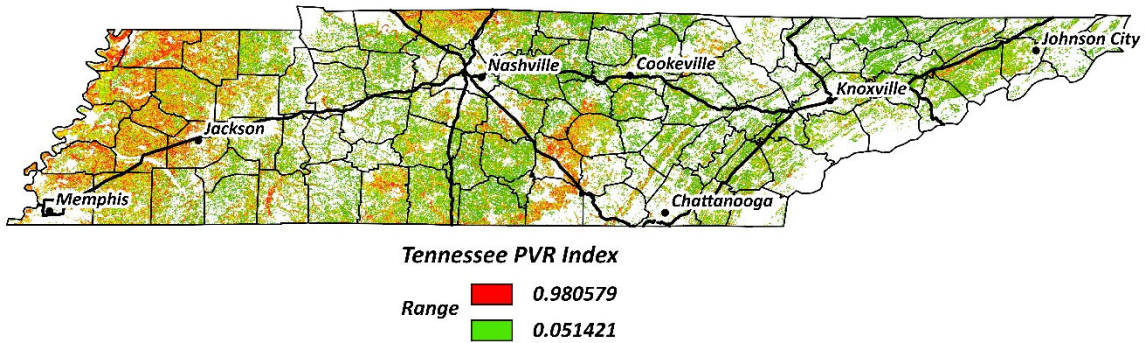


Figure 20. Productivity, Versality, and Resiliency Values for Tennessee

Source: American Farmland Trust and Conservation Science Partners, 2020a

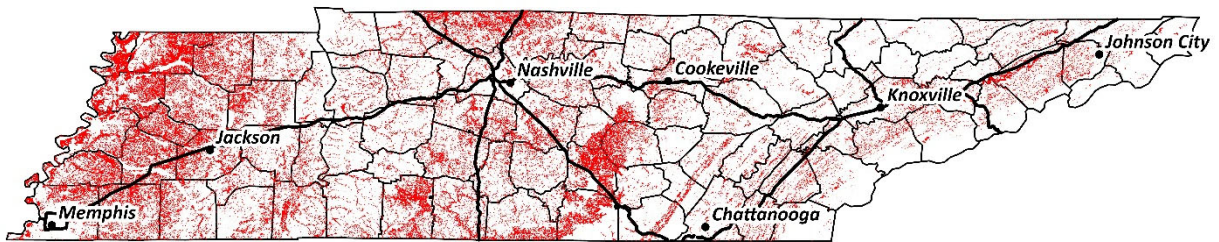


Figure 21. Nationally Significant Agricultural Land for Tennessee

Source: American Farmland Trust and Conservation Science Partners, 2020a

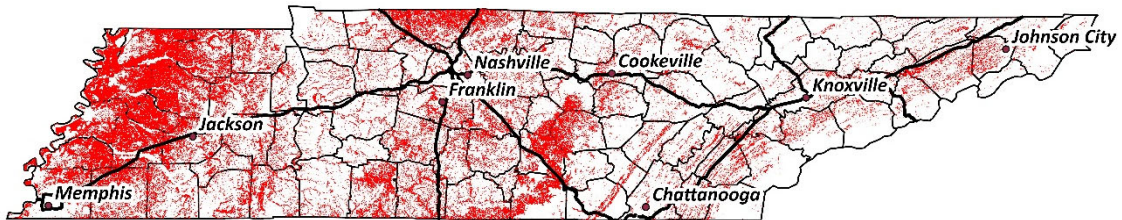


Figure 22. Best Agricultural Land for Tennessee

Source: American Farmland Trust and Conservation Science Partners, 2020a

For the US, AFT/CSP findings indicate that between 2001 and 2016 farmland/ranchland converted to urban and highly developed (UHD) land totaled 4.1 million acres. For low density residential (LDR) land for that same timeframe, the value was close to 7 million acres. According to AFT/CSP, LDR land conversion predisposes further conversion to UHD land (23 times more likely). Population growth was a major determinant in developing farmland for UHD. For LDR lands, the primary factor was due to weak land use regulations at the state level (American Farmland Trust, 2020b).

Tennessee ranked fourth in the nation as one of the most threatened states for agricultural land converted to UHD and LDR land use, preceded by Texas, North Carolina, and New Jersey (Figure 23). States having the greatest threat to agricultural land conversion and a low policy response ranked in alphabetical

order were Alabama, Arkansas, Georgia, Indiana, Kentucky, Louisiana, Mississippi, South Carolina, Tennessee, Texas, and West Virginia. Conversely, states with a low threat to agricultural land conversion and having a high policy response were Oregon and Washington.¹²

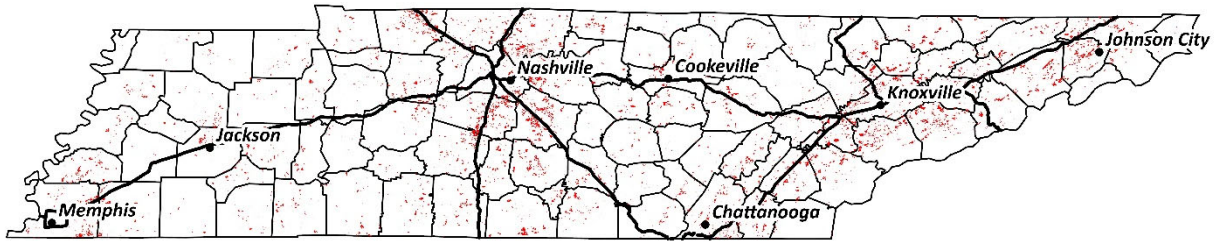


Figure 23. Agricultural Land Converted to Urban and Highly Developed or Low-Density Residential Land Use between 2001 and 2016

Source: American Farmland Trust and Conservation Science Partners, 2020a

For nationally significant agricultural land, Tennessee ranked third in the nation for conversion to UHD and LDR from 2001-2016 at 212,000 acres, with Texas and North Carolina at 555,000 and 387,000 acres, respectively. For the 2001-2016 timeframe, Tennessee was tenth in population growth at 894,000 preceded by Colorado, Virginia, Washington, Arizona, Georgia, North Carolina, Florida, California, and Texas. States having the largest acres converted to UHD and LDR uses in order were Texas (1.4 million acres), North Carolina (732,000 acres), Tennessee (659,000 acres), Georgia (544,000 acres), California (466,000 acres), Alabama (362,000 acres), Pennsylvania (347,000 acres), Virginia (340,000 acres), Mississippi (336,000 acres), Missouri (325,000 acres), Ohio (312,000 acres), and Florida (289,000 acres). In terms of the percentage of land in agriculture in 2001 that was converted to UHD and LDR by 2016 – Tennessee ranked seventh at 5.1 percent, preceded by Massachusetts at 5.2 percent, Rhode Island (5.8 percent), Delaware (5.8 percent), Connecticut (6.4 percent), North Carolina (6.7 percent), and New Jersey (8.7 percent) (American Farmland Trust, 2020c).

Economic Contributions and Importance of Tennessee’s Agricultural and Forestry Industrial Complex

The Tennessee Agri-Industry Model (TN-AIM) is based on the Impact Analysis for Planning (IMPLAN) Cloud platform (Version 7.0) model and its databases (IMPLAN Group LLC, 2021) (see Appendix A for additional information on IMPLAN’s methods). Expenditures by agriculture and forestry industries for goods and services, land, labor, capital equipment, and other materials enhance Tennessee’ economy and the state’s tax base. The economic benefits generated from these activities can be measured in terms of the number of jobs created

¹²AFT/CSP encourages “Rural Smart Growth”. They recommend adopting/strengthening of various policies resulting from the analysis of local/state agricultural land trends and conditions. Other policy suggestions include protecting farmland, support farm viability and access to land for new generation of farmers, state and local governments plan for agriculture in economic development settings, and save the best agricultural land for agriculture (American Farmland Trust, 2020c).

and the amount of personal income accruing to residents. These impact measures can be further broken down into **direct**, plus **indirect** and **induced** (or *ripple*) effects. Total economic contributions attributable to increased business activity are computed as the sum of the direct, indirect, and induced effects. **Direct** effects are those attributable specifically to the industries expenditures in a region (i.e., in this study agriculture/forestry input industries, commodity agriculture, logging, agriculture/forestry value-added industries). **Indirect** effects arise from the industries' expenditures on raw materials, supplies, and other operating expenses, which help to support jobs in other local businesses. **Induced**, or *ripple* effects, are created as the new income generated by the direct and indirect effects is spent and re-spent within the local economy. In this analysis only the **direct** and **total** (direct + indirect + induced) expenditures are shown.

Output from TN-AIM includes descriptive metrics of the economy including total industry output (a measure of economic activity), employment, labor income, and total value-added for 546 industries in the Tennessee economy (Appendix B). **Total industry output** is defined as the value of production by industry per year or a measure of overall economic activity by that industry. **Employment** represents the total wage and salary employees, plus self-employed jobs in a region, for both full-time and part-time workers. **Labor income** is defined as employee compensation (pay plus the value of certain benefits), and proprietary (owner-operator) income. **Total value added** is defined as all income to workers paid by employers; self-employed income; interests, rents, royalties, dividends, and profit payments; and excise and sales taxes collected by businesses from individuals. It is equivalent to state Gross Regional Product (GRP), which is analogous to Gross Domestic Product for the entire U.S.

In this report, Tennessee's agri-forestry industrial complex (Figure 1 on page i) is defined to include the industries typically associated such as **Agriculture Inputs** (i.e., lime, fertilizer, chemicals, and machinery), commodity agriculture such as growing crops and the breeding of livestock (**Primary Agriculture**), and value-added sub-sectors such as food and beverage manufacturing, apparel and textiles and tobacco products (**Secondary Agriculture**). **Forestry Inputs** includes sawmill, woodworking, and paper machinery; timber tract operations; and commercial logging. **Primary Forestry** includes sawmills, wood preservation, along with pulp-, paper-, and paperboard mills. Forestry products manufacturing comprises the **Secondary Forestry** designation used in the analyses.

Tennessee's Agricultural Economic Impact Results

Tennessee's economy was \$820.0 billion in output (economic activity) in 2021. The services industry was the largest sector of the economy at \$266.8 billion in economic activity and over 1.9 million jobs (Table 9).¹³ The agri-forestry industrial complex ranked fourth in terms of total industry output at \$58.0 billion. The

¹³Agricultural services (i.e., landscape/horticultural services (NAICS 561730) and veterinary services (NAICS 541940)) are excluded.

Table 9. Estimated Economic Indicators for Tennessee, 2021

Sector	TIO ^a	TVA ^b	Jobs	TVA/Job	TVA/TIO
	(Billion \$)		(1,000)		
Services	\$266.8	\$161.9	1,906.3	\$84,909	0.61
Manufacturing	\$133.3	\$40.4	257.7	\$156,858	0.30
Real Estate	\$68.9	\$46.2	141.6	\$326,292	0.67
Agri-Forest Industry^c	\$58.0	\$21.5	188.7	\$113,843	0.37
Agriculture^c	\$43.5	\$15.9	148.9	\$106,783	0.37
Inputs	\$2.0	\$0.6	2.9	\$206,897	0.30
Primary Agriculture	\$4.9	\$1.6	79.8	\$20,050	0.33
Secondary Agriculture	\$36.6	\$13.7	66.2	\$206,949	0.37
Forestry^c	\$14.5	\$5.5	39.8	\$138,191	0.38
Inputs	\$0.4	\$0.2	3.3	\$60,606	0.50
Primary Forestry	\$3.5	\$1.4	5.3	\$264,151	0.40
Secondary Forestry	\$10.6	\$3.9	31.2	\$125,000	0.37
Government	\$57.3	\$44.5	473.0	\$94,162	0.78
Wholesale Trade	\$52.0	\$29.5	130.7	\$225,487	0.57
Retail Trade	\$43.5	\$26.9	369.2	\$72,831	0.62
Construction	\$40.0	\$19.1	247.7	\$77,268	0.48
Finance	\$30.1	\$12.5	67.5	\$184,503	0.41
Insurance	\$29.0	\$15.7	122.4	\$128,017	0.54
Transportation	\$22.1	\$10.3	130.5	\$78,993	0.47
Miscellaneous	\$10.6	\$4.5	83.0	\$54,631	0.43
Utilities	\$5.8	\$2.7	4.5	\$613,265	0.47
Mining	\$2.8	\$1.1	5.8	\$194,165	0.40
Total^c	\$820.0	\$436.8	4,128.5		

^aTotal Industry Output – annual value of production by industry.

^bTotal Value Added – income to workers paid by employers; self-employed income; interest, rents, royalties, dividends, and profit payments; and production and import taxes.

^cTotals may not add due to rounding.

Source: IMPLAN Group, LLC, 2021 Data

state's value-added, or GRP, is estimated at \$436.8 billion with the agri-forestry industrial complex contributing \$21.5 billion towards the state's GRP. For every dollar of sales, the agri-forestry industrial complex directly contributed \$0.37 to the state's GRP, which is higher than manufacturing's direct contribution at \$0.30.

State Level Economic Impacts

Direct economic activity for total industry output (TIO), employment, labor income, and total value-added (TVA) for agriculture and forestry for the state are presented in Table 10. ***In 2021, agriculture and forestry related industries contributed a total of \$58.0 billion in direct economic activity to the state of Tennessee, or 7.1 percent of the state's economy. Direct employment in agriculture and forestry related industries was 188.7 thousand persons, or 4.6 percent of the workforce. Direct total value added was \$21.5 billion, including \$8.6 billion in labor income.*** Much of the industry output generated from agri-forestry industrial complex was generated through secondary or manufactured products. For agriculture,

Table 10. Direct Economic Activity in Agriculture and Forestry for Tennessee, 2021

Sector	TIO^a	Employment	Labor Income^b	TVA^c
	(Million \$)	(Number)	(Million \$)	(Million \$)
All Sectors^d	820,036	4,128,541	275,541	436,829
Agriculture & Forestry	58,034	188,728	8,853	21,483
Agriculture	43,533	148,950	5,883	15,978
Inputs	2,064	2,944	269	598
Primary Agriculture	4,903	79,804	709	1,656
Secondary Agriculture	36,566	66,202	4,906	13,724
Forestry	14,501	39,778	2,970	5,505
Inputs	366	3,293	222	223
Primary Forestry	3,495	5,267	493	1,376
Secondary Forestry	10,640	31,218	2,255	3,906

^aTotal Industry Output - annual value of production by industry.

^bLabor Income - employment compensation (wage and salaries plus benefits) and proprietary income (payments received by self-employed individuals and unincorporated business owners).

^cTotal Value Added - income to workers paid by employers; self-employed income; interest, rents, royalties, dividends, and profit payments; and production and import taxes.

^dIncludes non-agricultural and non-forestry (total economy).

approximately 53.6 percent of the workforce was employed in primary agriculture (crop and livestock commodities), 44.4 percent in secondary agriculture (food and beverage, tobacco products, and textile manufacturing) and 2.0 percent in agricultural inputs (agricultural chemicals and machinery). For forestry, 78.5 percent of the forestry workforce was employed in secondary forestry (wood products manufacturing), 13.2 percent in primary forestry (pulp, paper, and paperboard mills; sawmills; and wood preservation), and 8.3 percent in forestry inputs (forestry machinery, timber tract production,¹⁴ and commercial logging).

Agricultural and Forestry Inputs:

The largest output value for agricultural inputs was from agricultural machinery followed by agricultural chemicals (Table 11). Approximately 65.3 percent of the total value for total industry output came from agricultural machinery. Agricultural machinery also had the largest employment and labor income, whereas agricultural chemicals had the largest total value added. For forestry inputs, commercial logging had the largest output value, employment, labor income, and total value added. Sawmills, woodworking, and paper machinery had the next largest output value, but forestry, forest products, and timber tract production had the largest employment, labor income, and total value added. A more detailed presentation of the total industry output from processing by sub-sector is shown in Appendixes C and D.

¹⁴Includes growing trees for reforestation; growing forest products such as gums, barks, balsam needles, rhizomes, fibers, and ginseng; and timber tracts for selling timber.

Table 11. Direct Economic Activity in Agricultural and Forestry Inputs, 2021

Sector	TIO ^a	Employment	Labor Income ^b	TVA ^c
	(Million \$)	(Number)	(Million \$)	(Million \$)
Total Agriculture Inputs	2,064	2,944	269	598
Agricultural Machinery	1,348	2,442	153	291
Agricultural Chemicals	716	502	115	307
Total Forestry Inputs	366	3,293	222	223
Commercial Logging	291	2,825	185	185
Sawmills, Woodworking, & Paper Machinery	47	183	16	16
Forestry, Forest Products, & Timber Tract Operations	28	295	20	22

^aTotal Industry Output – annual value of production by industry.

^bLabor Income – employment compensation (wage and salaries plus benefits) and proprietary income (payments received by self-employed individuals and unincorporated business owners).

^cTotal Value Added – income to workers paid by employers; self-employed income; interests, rents, royalties, dividends, and profit payments; and production and import taxes.

Primary and Secondary Agricultural Products:

The largest output value (21.4 percent) in the state for agriculture commodities from farm production was from grain farming (Table 12), followed by oilseed farming (primarily soybeans at 19.7 percent); poultry and egg production (14.2 percent); beef cattle farming (12.1 percent); cotton farming (7.8 percent); greenhouse, nursery, and floriculture production (5.6 percent); agriculture and forestry support activities (4.5 percent); vegetable and melon farming (4.3 percent); all other crop farming (3.8 percent);¹⁵ animal production, except cattle, poultry, and eggs (2.4 percent); dairy cattle and milk production (2.0 percent); and tobacco farming (1.7 percent). In terms of labor income, agriculture and forestry support activities had the largest value, followed by oilseed farming; grain farming; greenhouse, nursery, and floriculture production; cotton farming; vegetable and melon farming; beef cattle farming; all other crop farming (primarily hay/seed farming); poultry and egg production; tobacco farming; animal production, except cattle, poultry, and eggs; and dairy cattle and milk production. The largest total value-added contributors included oilseed farming (primarily soybeans); agriculture and forestry support activities; cotton farming; beef cattle farming; vegetable and melon farming; greenhouse, nursery, and floriculture production; all other crop farming (primarily hay/seed farming); poultry and egg production; animal production, except cattle, poultry, and eggs; grain farming, tobacco farming, and dairy cattle and milk production.

¹⁵Includes support activities for crop production (i.e., cotton ginning; soil preparation, planting, and cultivating; crop harvesting; and farm management services), animal production (i.e., breeding services, pedigree record services boarding horses, dairy herd improvement activities, livestock spaying, and sheep dipping and shearing), and forestry (i.e., estimated timber, forest fire-fighting, forest pest control, and consulting on wood attributes and reforestation).

Table 12. State Level: Direct Economic Activity in Farm Production, 2021

Rank	Sector	TIO ^{a,b} (Million \$)	Employment (Number)	Labor Income ^c (Million \$)	TVA ^d (Million \$)
	All Farm Production	4,903	79,804	709	1,656
1	Grain farming	1,048	10,696	87	54
2	Oilseed farming	967	5,398	94	523
3	Poultry & egg production	696	2,638	26	66
4	Beef cattle farming	591	14,568	31	174
5	Cotton farming	380	5,118	64	181
6	Greenhouse, nursery, & floriculture production	273	3,210	67	107
7	Agriculture & forestry support activities	220	7,092	237	210
8	Vegetable & melon farming	212	5,553	35	141
9	All other crop farming	187	20,432	31	74
10	Animal production, except cattle/poultry/eggs	119	1,755	13	57
11	Dairy cattle & milk production	98	438	4	18
12	Tobacco farming	84	1,849	20	37
13	Commercial hunting & trapping	14	309	2	9
14	Fruit farming	9	204	0 ^e	3
15	Tree nut farming	3	65	0 ^e	2
16	Commercial fishing	2	479	-3	1

^aTotal Industry Output – annual value of production by industry.

^bA value of production measure that includes on-farm consumption, and it is net of inventory changes.

^cLabor Income – employment compensation (wage and salaries plus benefits) and proprietary income (payments received by self-employed individuals and unincorporated business owners).

^dTotal Value Added – income to workers paid by employers; self-employed income; interests, rents, royalties, dividends, and profit payments; and production and import taxes.

^eValues of zero are nonzero values less than 1.

Among secondary agricultural products, food manufacturing contributed the largest total industry output, followed by beverage manufacturing, tobacco products manufacturing, textile mills, apparel manufacturing, textile product mills, and leather and allied product manufacturing (Table 13). Approximately 69.5 percent of the total value of total industry output from processed agricultural products came from food manufacturing. In addition, food manufacturing employed the largest number of workers, had the largest amount of labor income, and contributed the largest amount in total value added when compared to other agriculture value added industries.

Table 13. Direct Economic Activity in Secondary Agricultural Products, 2021

Sector	TIO ^a (Million \$)	Employment (Number)	Labor Income ^b (Million \$)	TVA ^c (Million \$)
Total Secondary Agriculture	36,566	66,202	4,906	13,724
Food Manufacturing	25,401	46,477	3,643	8,079
Beverage Manufacturing	4,889	7,532	496	1,946
Tobacco Products Manufacturing	3,837	1,006	100	2,971
Textile Mills	1,307	3,613	243	319

Table 13. Direct Economic Activity in Secondary Agricultural Products, 2021

Sector	TIO ^a (Million \$)	Employment (Number)	Labor	
			Income ^b (Million \$)	TVA ^c (Million \$)
Apparel Manufacturing	581	4,639	276	234
Textile Product Mills	490	2,476	133	161
Leather & Allied Product Manufacturing	62	458	16	14

^aTotal Industry Output – annual value of production by industry.

^bLabor Income – employment compensation (wage and salaries plus benefits) and proprietary income (payments received by self-employed individuals and unincorporated business owners).

^cTotal Value Added – income to workers paid by employers; self-employed income; interests, rents, royalties, dividends, and profit payments; and production and import taxes.

Primary and Secondary Forest Products:

The largest output and total value-added values for primary forest products was from paper mills, followed by paperboard mills, sawmills, wood preservation, and pulp mills (Table 14). Approximately 71.8 percent of the total value of total industry output from primary forest products came from paper mills (42.9 percent) and paperboard mills (28.9 percent). Sawmills, paper mills, and paperboard mills employed the largest numbers.

Table 14. Direct Economic Activity in Primary Forest Products, 2021

Sector	TIO ^a (Million \$)	Employment (Number)	Labor	
			Income ^b (Million \$)	TVA ^c (Million \$)
Total Primary Forest Products	3,495	5,267	493	1,376
Paper Mills	1,499	1,612	195	639
Paperboard Mills	1,009	1,076	160	412
Sawmills	880	2,436	126	280
Wood Preservation	79	99	6	34
Pulp Mills	29	45	6	10

^aTotal Industry Output – annual value of production by industry.

^bLabor Income – employment compensation (wage and salaries plus benefits) and proprietary income (payments received by self-employed individuals and unincorporated business owners).

^cTotal Value Added – income to workers paid by employers; self-employed income; interests, rents, royalties, dividends, and profit payments; and production and import taxes.

For secondary forest products, paper manufacturing had the largest output value, followed by furniture and related products manufacturing; wood windows and doors and millwork; manufactured homes manufacturing; other wood products; and veneer, plywood, and engineered wood product manufacturing (Table 15). The paper manufacturing sector was comprised of paperboard containers, paper bags and coated and treated paper, stationery products, and other converted paper products. Furniture and related products manufacturing was comprised of household and institutional, office, and other (mattress, blind and shades) furniture categories. The other wood products manufacturing category was comprised of wood containers and pallets, all other miscellaneous wood products, and wood kitchen cabinets and countertops.

Table 15. Direct Economic Activity in Secondary Forest Products, 2021

Sector	TIO ^a	Employment	Labor Income ^b	TVA ^c
	(Million \$)	(Number)	(Million \$)	(Million \$)
Total Secondary Forest Products	10,640	31,218	2,255	3,906
Paper Manufacturing	5,421	9,661	907	1,783
Furniture & Related Products Manufacturing	1,721	8,364	462	517
Wood Windows & Doors & Millwork Manufacturing	1,018	3,495	232	472
Manufactured Homes Manufacturing	991	3,344	279	502
Other Wood Products Manufacturing	871	4,765	256	349
Veneer, Plywood, & Engineered Wood Products Manufacturing	619	1,589	120	282

^aTotal Industry Output – annual value of production by industry.

^bLabor Income – employment compensation (wage and salaries plus benefits) and proprietary income (payments received by self-employed individuals and unincorporated business owners).

^cTotal Value Added – income to workers paid by employers; self-employed income; interests, rents, royalties, dividends, and profit payments; and production and import taxes.

Estimated Total Economic Impacts of Agriculture and Forestry:

The estimated total (multiplier-based) economic impacts of agriculture and forestry included not only the direct impacts from the industry, but also the impacts the industry had on input supplying industries (indirect impacts) and on expenditures by households (induced impacts). Thus, the total economic impacts from agriculture and forestry included direct, indirect, and induced impacts. Table 16 includes values for total industry output, employment, labor income, and value added resulting from agriculture and forestry, including the indirect and induced impacts. Agriculture and forestry contributed an estimated value of \$89.0 billion to Tennessee's \$820.0 billion economy in 2021. A more detailed total impact presentation of output, employment, labor income, and value added by sub-sector is shown in Appendix D.

Table 16. Estimated Total (Multiplier-Based) Economic Impacts from Agriculture and Forestry, 2021

Sector	TIO ^a	Employment	Labor Income ^b	TVA ^c
	(Million \$)	(Number)	(Million \$)	(Million \$)
Agriculture & Forestry	88,999	366,154	18,658	37,738
Agriculture	65,590	281,794	12,698	27,362
Inputs	3,125	7,819	614	1,167
Primary Agriculture	7,902	92,889	1,573	3,210
Secondary Agriculture	54,564	181,087	10,511	22,985
Forestry	23,409	84,360	5,960	10,376
Inputs	669	5,553	337	404
Primary Forestry	5,752	16,969	1,288	2,609
Secondary Forestry	16,987	61,839	4,335	7,362

^aTotal Industry Output – annual value of production by industry.

^bLabor Income – employment compensation (wage and salaries plus benefits) and proprietary income (payments received by self-employed individuals and unincorporated business owners).

^cTotal Value Added – income to workers paid by employers; self-employed income; interests, rents, royalties, dividends, and profit payments; and production and import taxes.

Agricultural and Forestry Inputs Total Impacts:

The largest total (multiplier-based) impact for all four variables across all agricultural inputs was for agricultural machinery (Table 17). For example, agricultural machinery comprised 66.2 percent of the impact on output. Lawn and garden equipment manufacturing was the largest output contributor for total agricultural inputs (see Appendix X). For total forestry inputs, commercial logging had the largest output value, employment, labor income, and total value added. Sawmills, woodworking, and paper machinery had the next largest output, labor income, and total value added, whereas forestry, forest products, and timber tract production had the largest employment impact.

Table 17. Estimated Total Economic Impacts from Agricultural and Forestry Inputs, 2021

Sector	TIO ^a	Employment	Labor Income ^b	TVA ^c
	(Million \$)	(Number)	(Million \$)	(Million \$)
Total Agriculture Inputs	3,125	7,819	614	1,167
<i>Agricultural Machinery</i>	<i>2,068</i>	<i>5,703</i>	<i>387</i>	<i>674</i>
Farm Machinery & Equipment	480	1,403	103	172
Lawn & Garden Equipment	1,588	4,300	284	502
<i>Agricultural Chemicals</i>	<i>1,056</i>	<i>2,116</i>	<i>226</i>	<i>493</i>
Nitrogenous Fertilizer	15	32	3	6
Phosphatic Fertilizer	9	22	2	4
Fertilizer Mixing	29	84	7	12
Pesticide & Other Ag Chemicals	897	1,693	192	420
Lime	106	285	23	52
Total Forestry Inputs	669	5,553	337	404
Commercial Logging	528	4,651	274	326
Sawmills, Woodworking, & Paper Machinery	91	415	33	42
Forestry, Forest Products, & Timber Tract Operations	51	487	30	36

^aTotal Industry Output – annual value of production by industry.

^bLabor Income – employment compensation (wage and salaries plus benefits) and proprietary income (payments received by self-employed individuals and unincorporated business owners).

^cTotal Value Added – income to workers paid by employers; self-employed income; interests, rents, royalties, dividends, and profit payments; and production and import taxes.

Primary and Secondary Agricultural Products Total Impacts:

Figures 24 through 29 depict the estimated direct, indirect, and induced impacts for Tennessee’s top agricultural commodities from farm production (oilseeds; grains; vegetables and melons; greenhouse, nursery, and floriculture production; tobacco; cotton; all other crops (primarily hay/seeds); beef cattle; dairy cattle and milk production; poultry and egg production; and animal production, except cattle, poultry, and eggs). The top five indirect and induced sectors impacted based on output value are also listed. Using oilseed farming as an example, which had direct sales of \$967.4 million, the indirect economic impacts from input supplying industries are \$262.6 million (19.2 percent of the \$1.4 billion in total impact) and the induced impacts or expenditures by households are \$135.6 million (9.9 percent). The top five sectors most impacted from the indirect impact (in descending order) included other real estate, wholesale trade, pesticides and other

agricultural chemicals, maintenance and repair construction, and truck transportation. Likewise, from household expenditures (induced impacts) the sectors most impacted (in descending order) based on output value included owner-occupied dwellings, hospitals, office of physicians, limited-service restaurants, and other real estate.

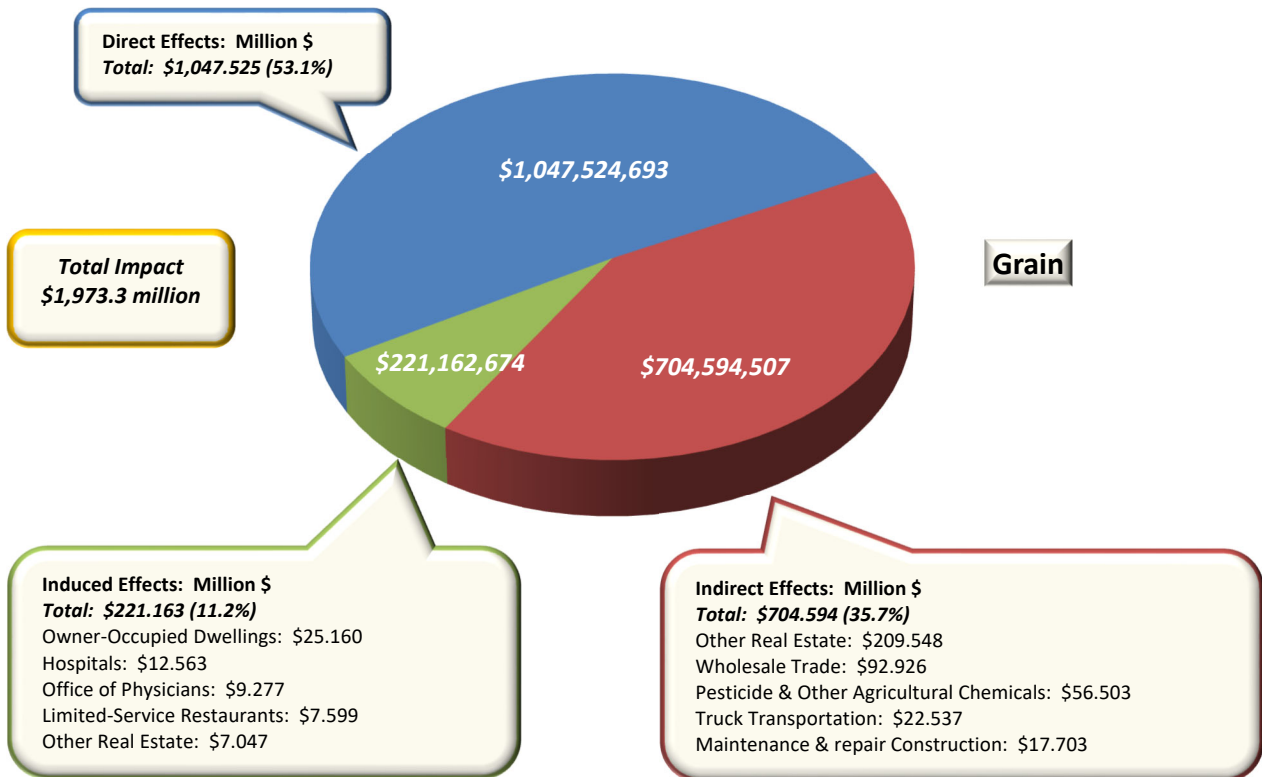
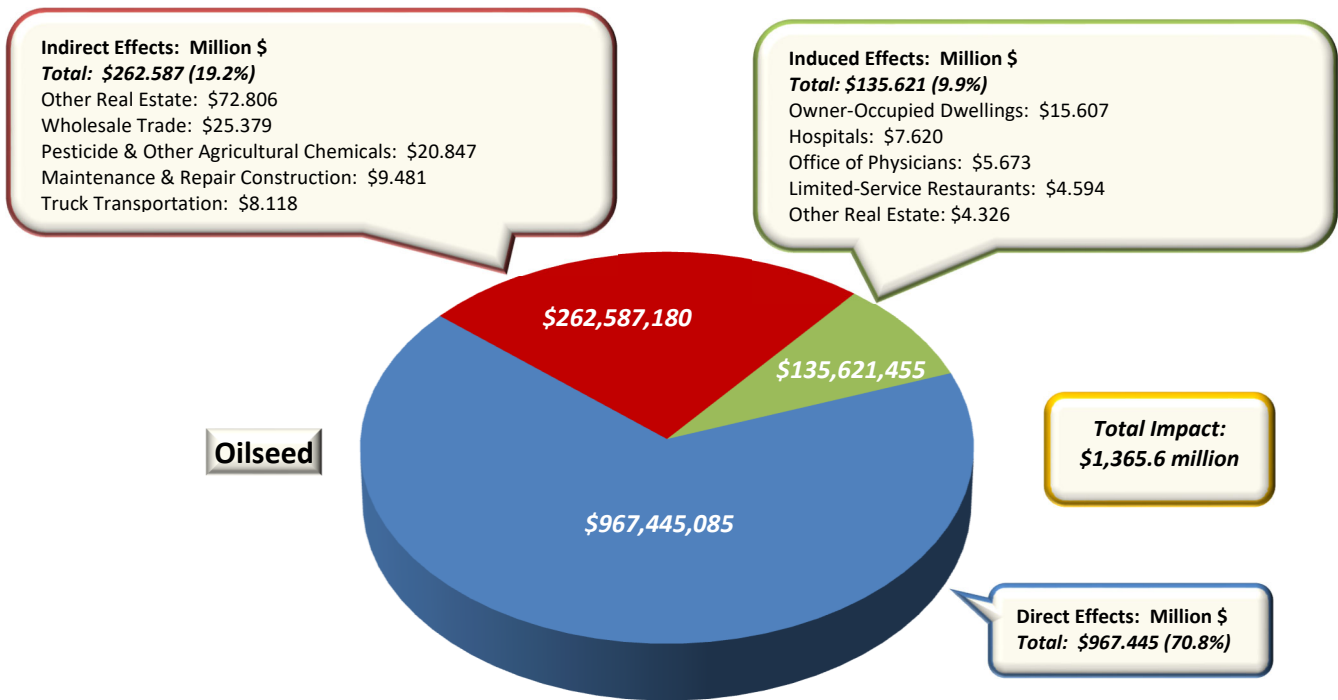


Figure 24. Estimated Direct, Indirect, and Induced Impacts for Oilseed Farming and Grain Farming

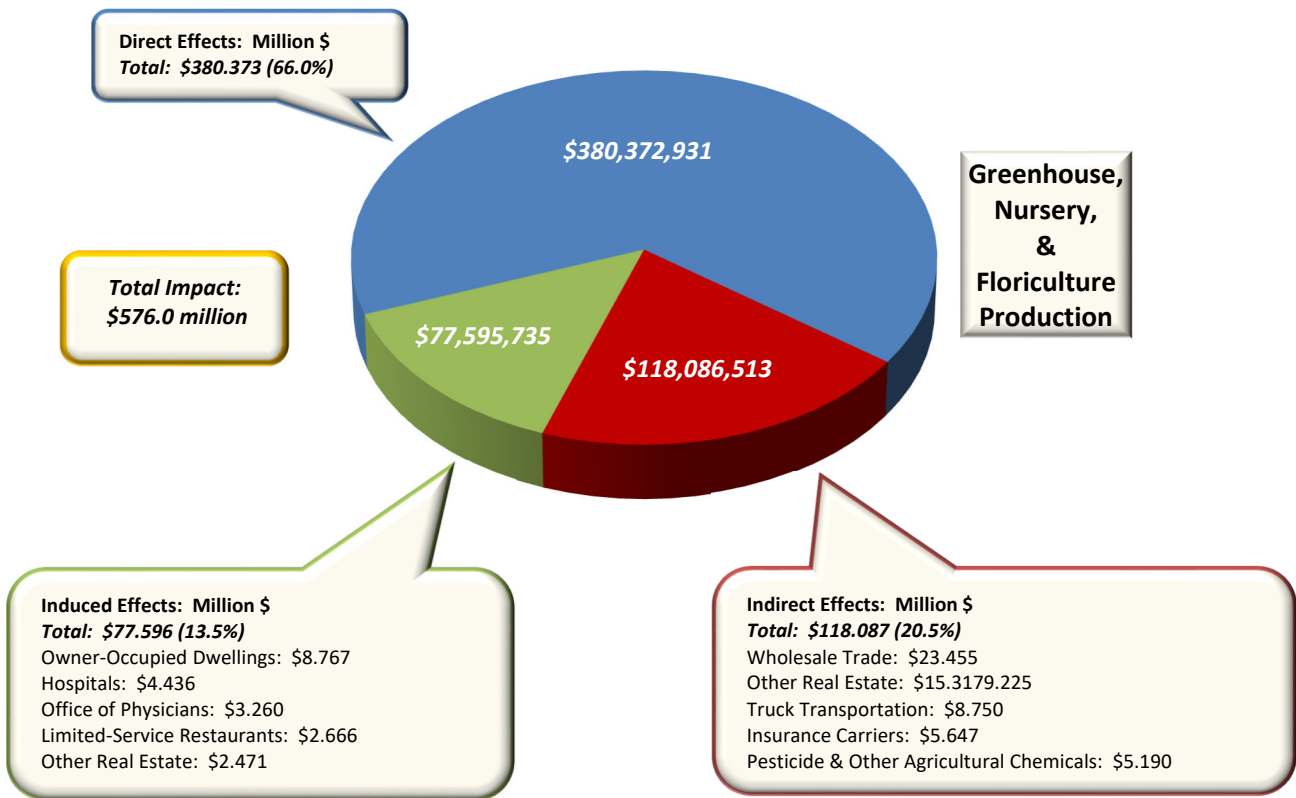
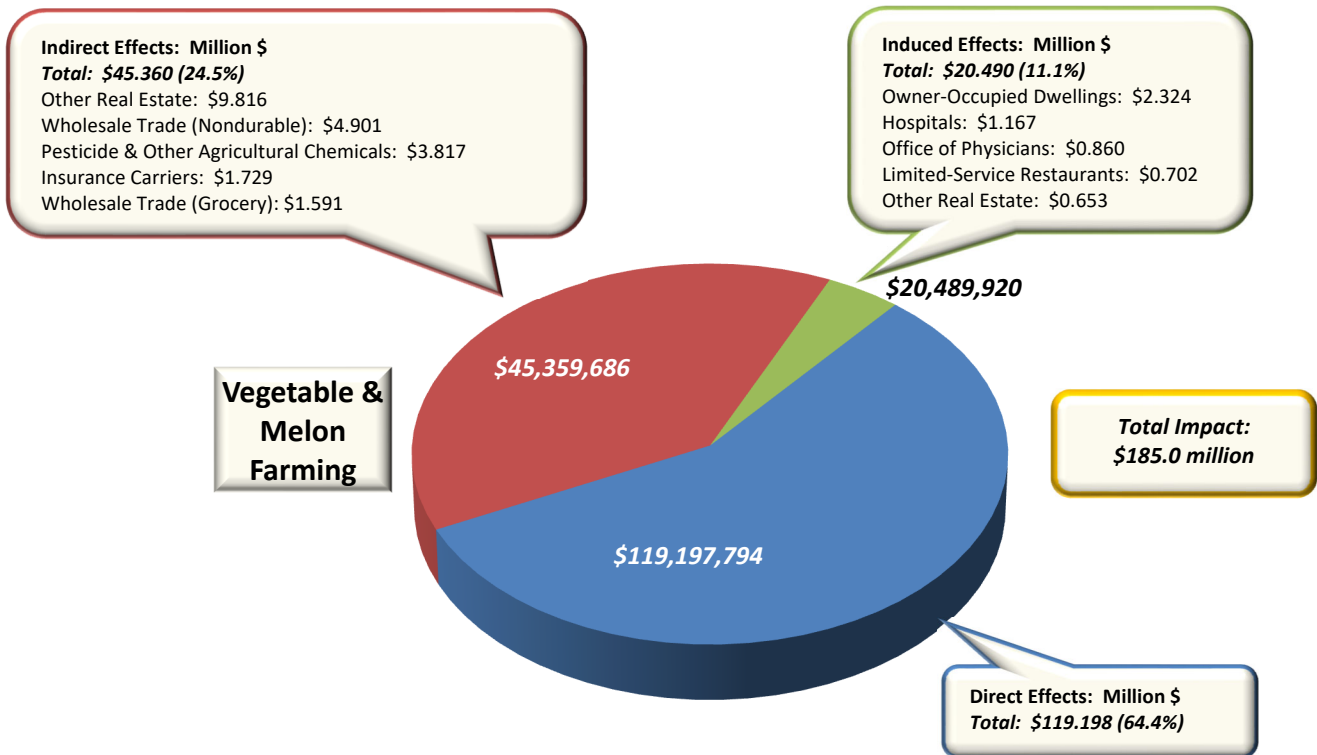


Figure 25. Estimated Direct, Indirect, and Induced Impacts for Vegetable & Melon Farming and Greenhouse, Nursery, & Floriculture Production

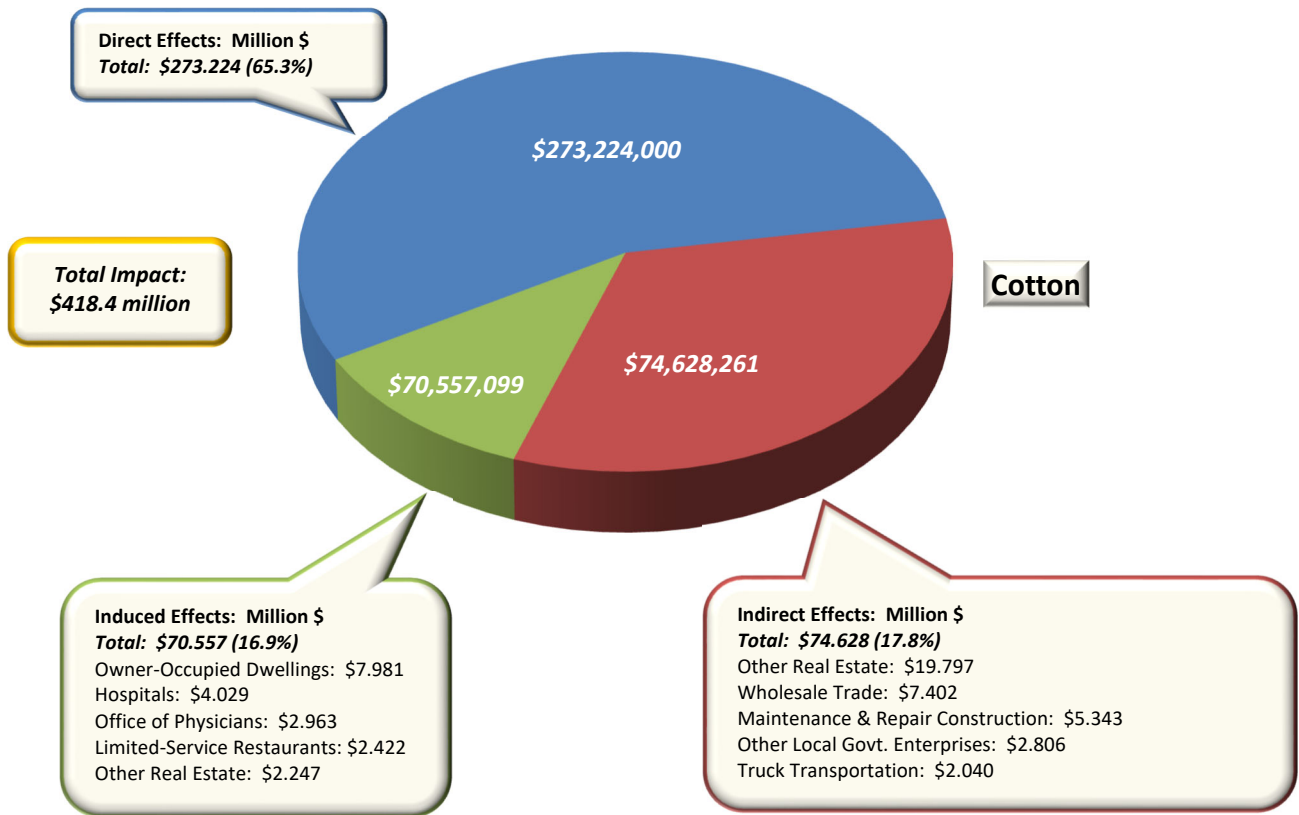
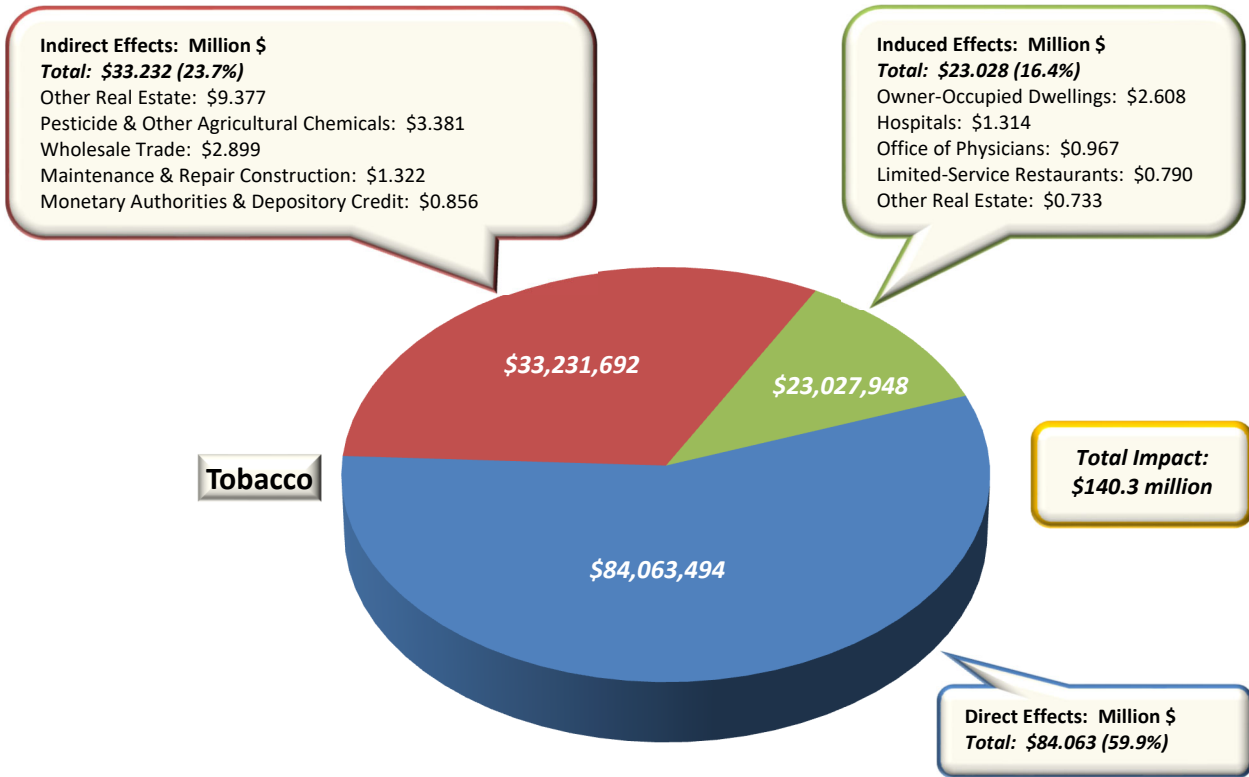


Figure 26. Estimated Direct, Indirect, and Induced Impacts for Tobacco Farming and Cotton Farming

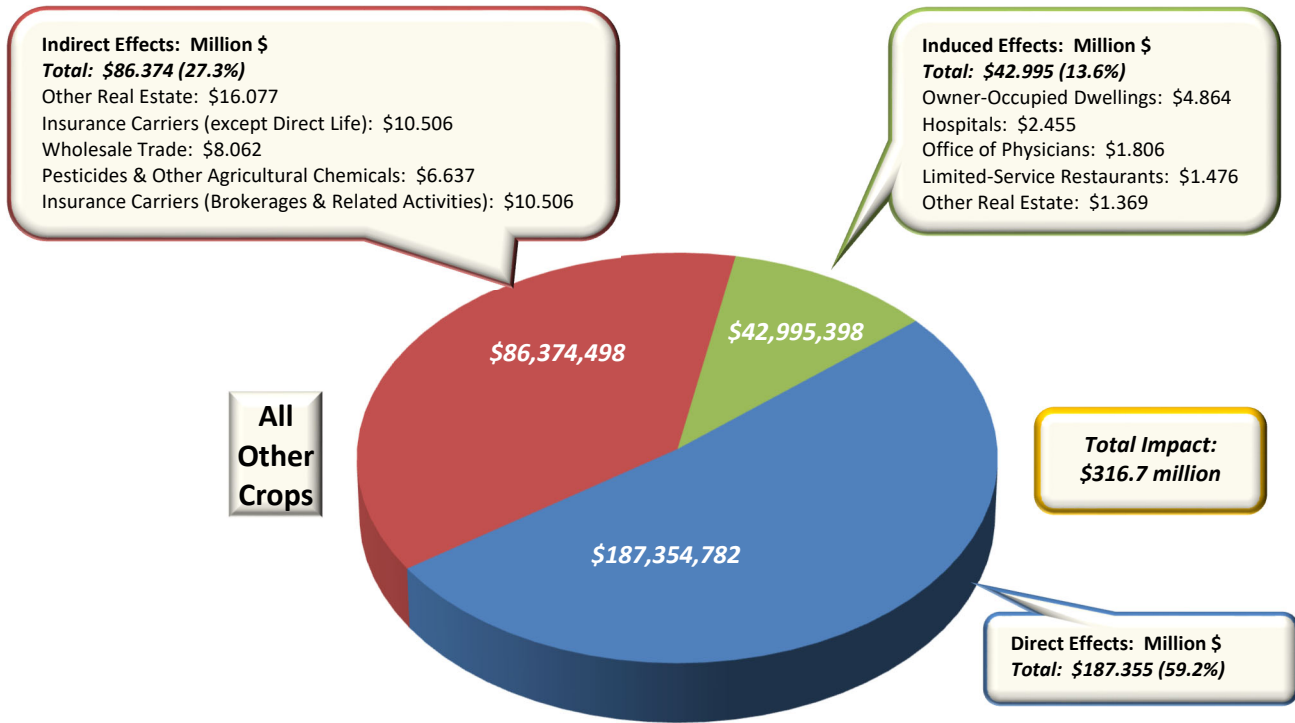


Figure 27. Estimated Direct, Indirect, and Induced Impacts for All Other Crop Farming

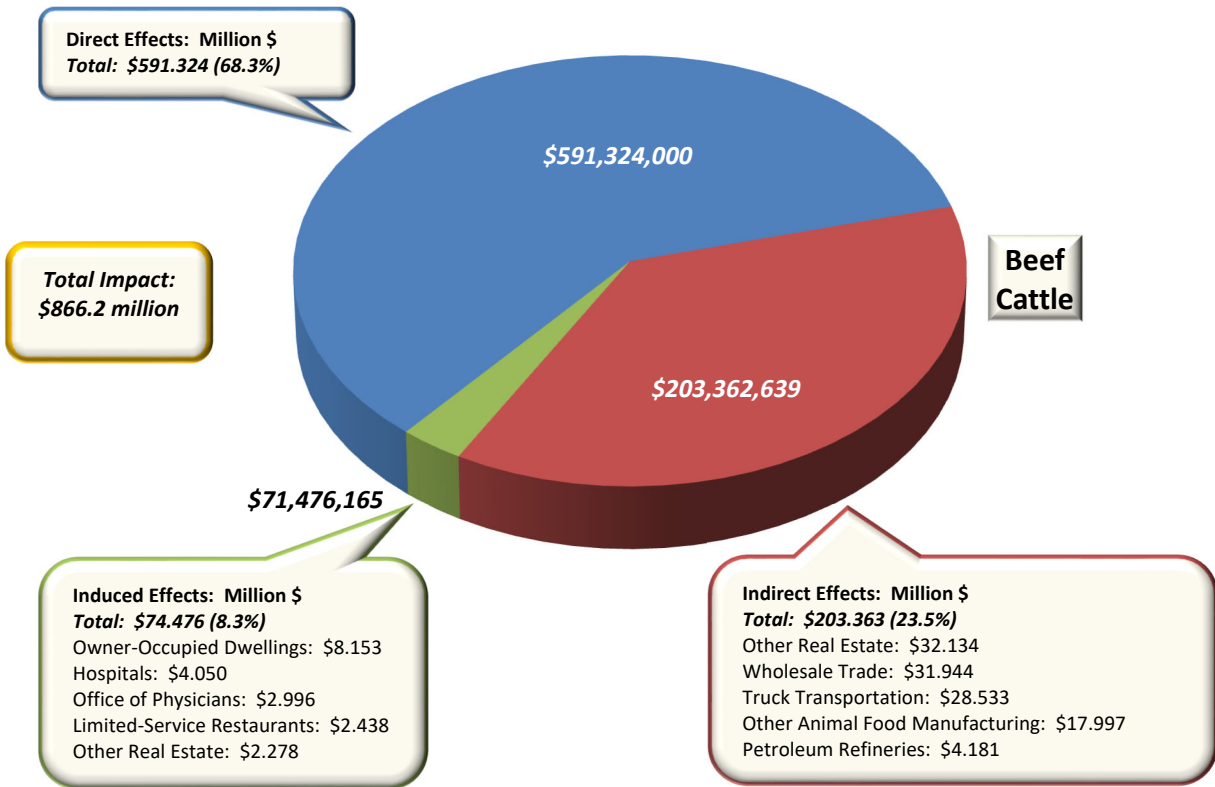
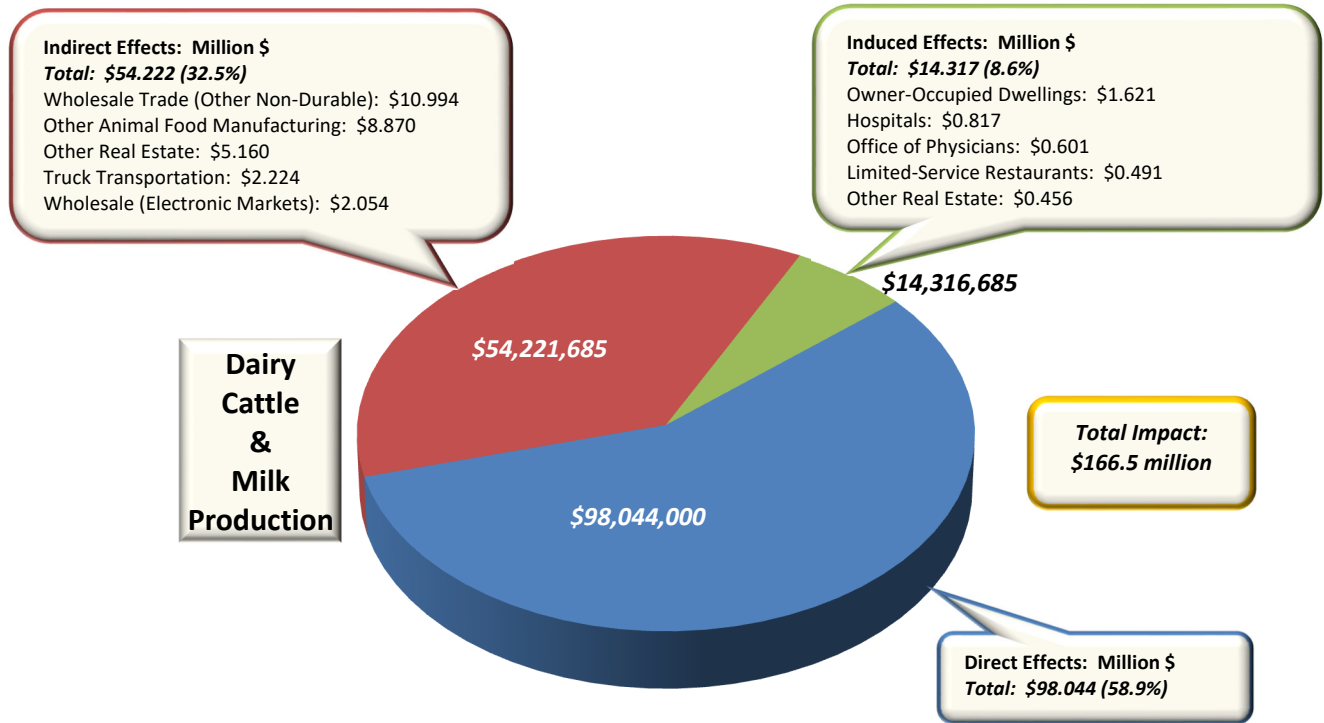


Figure 28. Estimated Direct, Indirect, and Induced Impacts for Dairy Cattle & Milk Production and Beef Cattle Farming

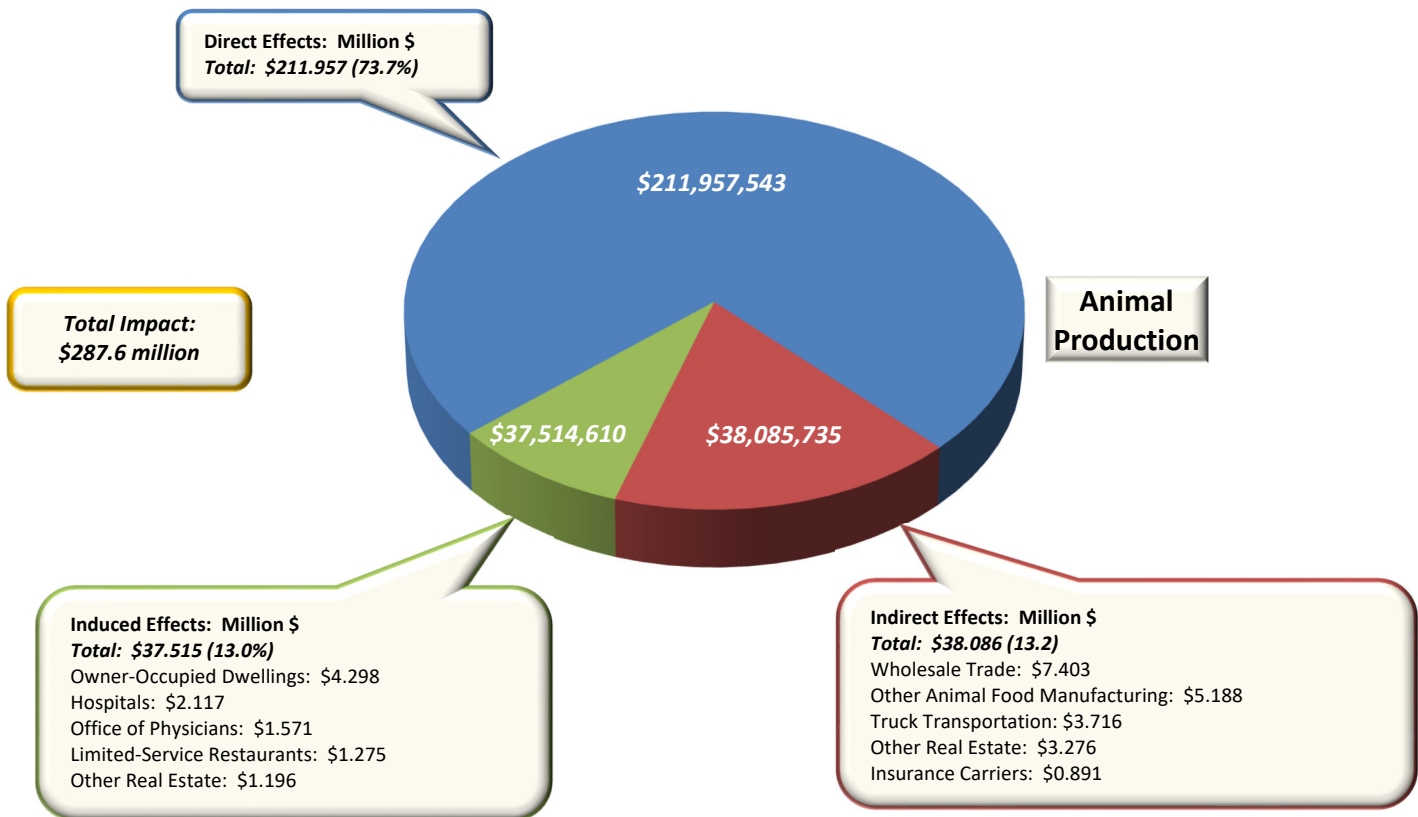
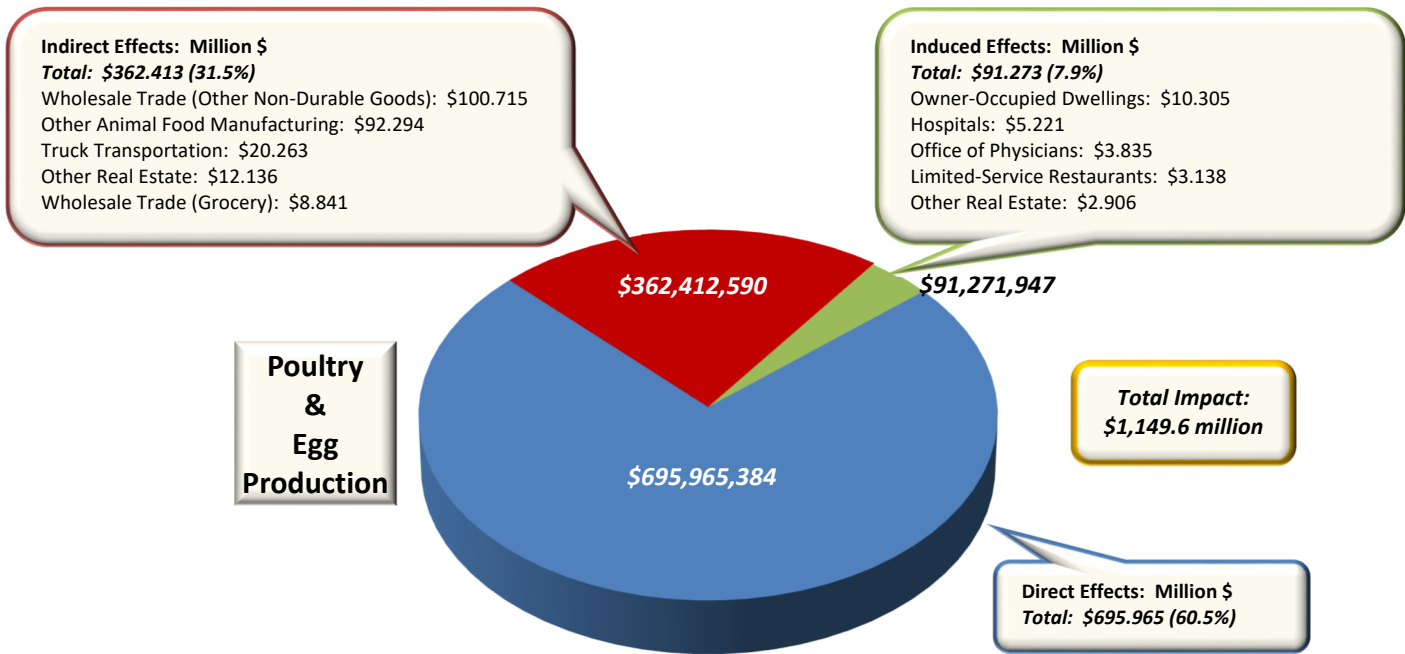


Figure 29. Estimated Direct, Indirect, and Induced Impacts for Poultry & Egg Production and Animal Production, except Cattle, Poultry, & Eggs

For secondary agricultural products and for all estimated variables (output, employment, labor income, and value added), food manufacturing contributed the greatest total economic impact values (Table 18). Beverage manufacturing was next except for total value added where tobacco products had the largest value.

Table 18. Estimated Total Economic Impacts from Secondary Agricultural Products, 2021

Sector	TIO ^a	Employment	Labor Income ^b	TVA ^c
	(Million \$)	(Number)	(Million \$)	(Million \$)
Total Secondary Agricultural Products	54,564	181,087	10,511	22,985
Food Manufacturing	39,025	138,978	7,822	14,988
Beverage Manufacturing	7,021	17,542	1,177	3,099
Tobacco Products	4,575	4,946	350	3,359
Textile Mills	2,021	7,835	468	687
Textile Product Mills	953	5,231	295	404
Apparel Manufacturing	858	5,866	367	406
Leather & Allied Product Manufacturing	110	688	33	42

^aTotal Industry Output – annual value of production by industry.

^bLabor Income – employment compensation (wage and salaries plus benefits) and proprietary income (payments received by self-employed individuals and unincorporated business owners).

^cTotal Value Added – income to workers paid by employers; self-employed income; interests, rents, royalties, dividends, and profit payments; and production and import taxes.

Primary and Secondary Forest Products Total Impacts:

Figure 30 shows the estimated direct, indirect, and induced impacts for sawmills and commercial logging. The top five indirect and induced sectors based on output value are also listed. Paper mills contributed the largest value for all the indicators analyzed except for employment. Sawmills (Table 19) had the largest number of workers at 6,895.

Table 19. Estimated Total Economic Impacts from Primary Forest Products, 2021

Sector	TIO ^a	Employment	Labor Income ^b	TVA ^c
	(Million \$)	(Number)	(Million \$)	(Million \$)
Total Primary Forest Products	5,752	16,969	1,288	2,609
Paper Mills	2,321	5,489	468	1,079
Paperboard Mills	1,649	4,187	374	754
Sawmills	1,622	6,895	417	703
Wood Preservation	113	260	17	53
Pulp Mills	48	138	12	20

^aTotal Industry Output – annual value of production by industry.

^bLabor Income – employment compensation (wage and salaries plus benefits) and proprietary income (payments received by self-employed individuals and unincorporated business owners).

^cTotal Value Added – income to workers paid by employers; self-employed income; interests, rents, royalties, dividends, and profit payments; and production and import taxes.

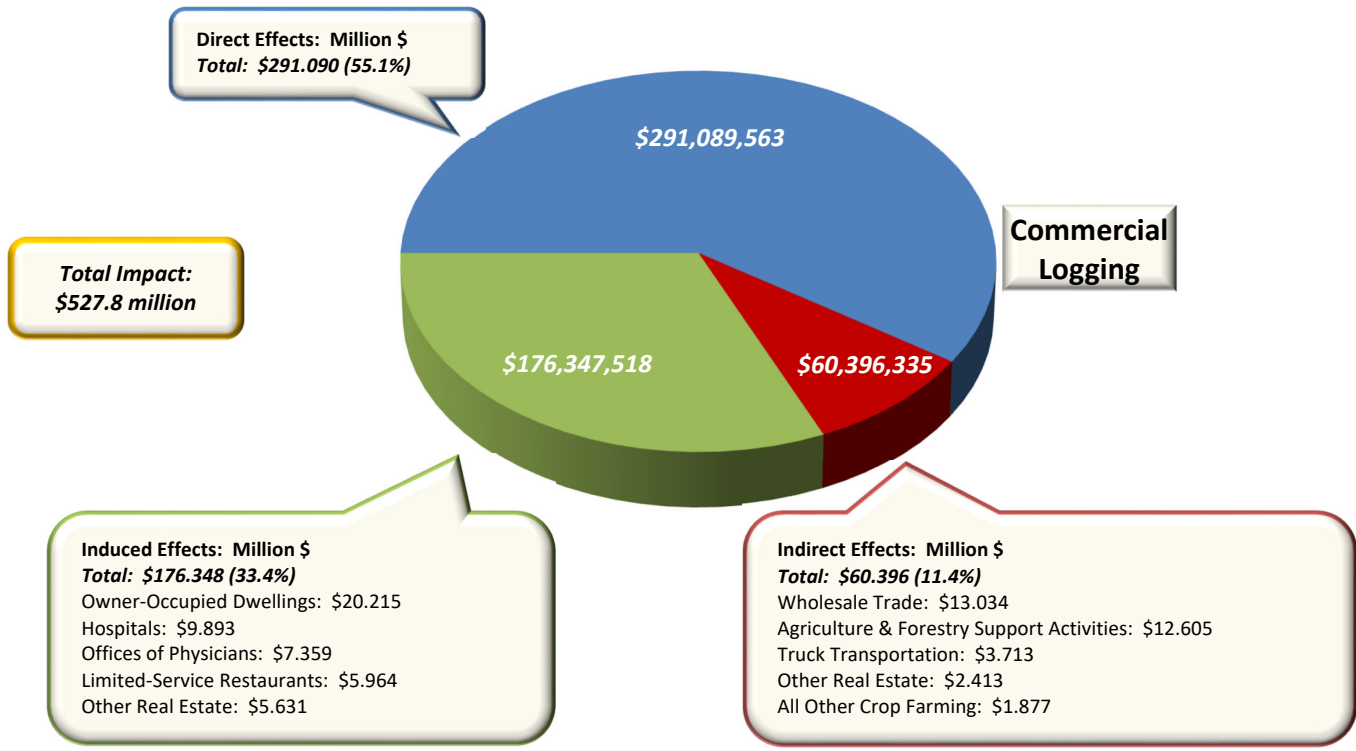
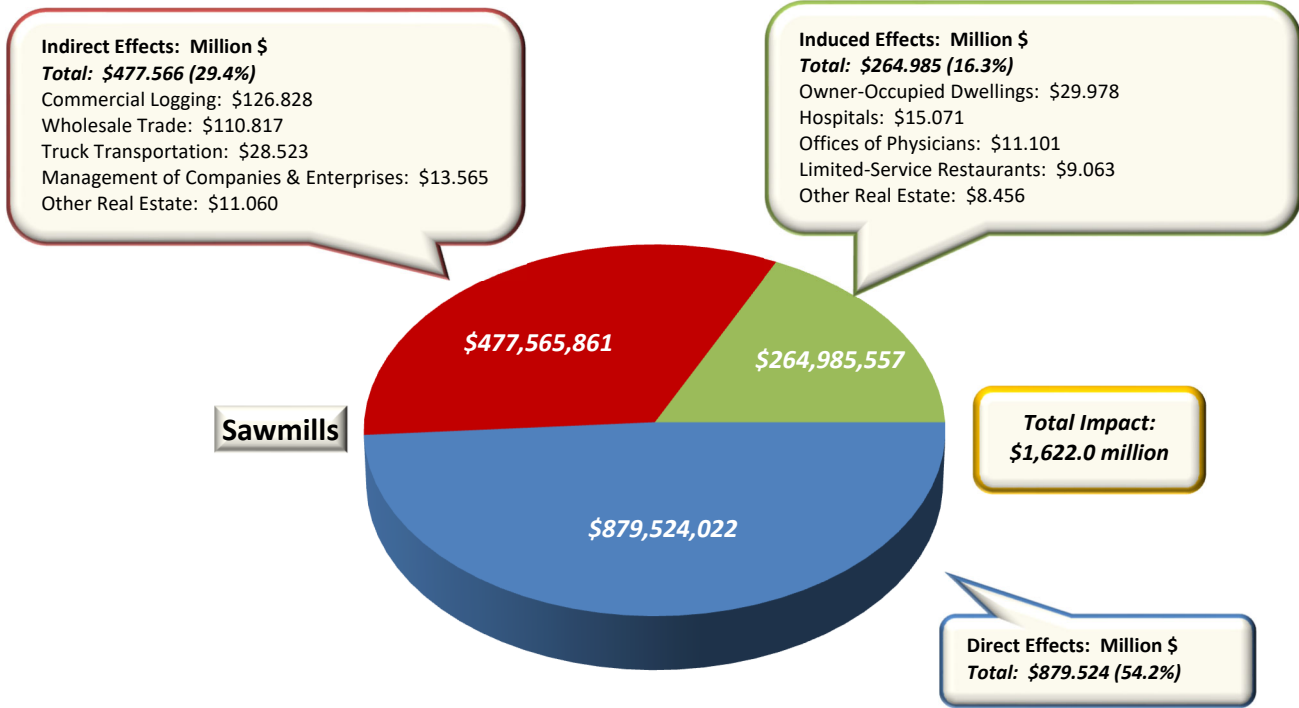


Figure 30. Estimated Direct, Indirect, and Induced Impacts for Sawmills and Commercial Logging

For all indicators for secondary forest products, paper manufacturing; furniture and related products manufacturing; wood windows, doors, and millwork; and manufactured homes were the largest contributors (Table 20). Other wood products manufacturing (e.g., wood containers and pallets, all other miscellaneous wood products, and wood kitchen cabinets and countertops) also had large numbers of employees.

Table 20. Estimated Total Economic Impacts from Secondary Forest Products, 2021

Sector	TIO ^a	Employment	Labor Income ^b	TVA ^c
	(Million \$)	(Number)	(Million \$)	(Million \$)
Total Secondary Forest Products	16,987	61,839	4,335	7,362
Paper Manufacturing	8,428	23,611	1,873	3,413
Furniture & Related Products Manufacturing	2,950	14,451	878	1,198
Wood Windows & Doors & Millwork	1,645	6,651	441	810
Manufactured Homes Manufacturing	1,522	6,056	453	795
Other Wood Products Manufacturing	1,480	7,790	457	680
Veneer, Plywood, & Engineered Wood Products Manufacturing	963	3,278	234	466

^aTotal Industry Output – annual value of production by industry.

^bLabor Income – employment compensation (wage and salaries plus benefits) and proprietary income (payments received by self-employed individuals and unincorporated business owners).

^cTotal Value Added – income to workers paid by employers; self-employed income; interests, rents, royalties, dividends, and profit payments; and production and import taxes.

The 2021 output and employment multipliers for agricultural commodities and forestry activities ranged from 1.030 to 1.909 for total industrial output and 1.004 to 3.889 for employment (Table 21). For interpretation, if dairy cattle and milk production increased total industry output by \$1 million, the state's economy would increase by an estimated \$0.70 million overall, and for each job supported in this same industry an estimated .61 additional jobs would be supported in other industries. Sawmills that produce \$1 million of total industry output generated an additional \$0.54 million indirectly through the purchase of inputs and \$0.84 million in total economic activity (purchased inputs plus household spending) within the state.

Table 21. Output and Employment Multipliers for Selected Agriculture and Forestry Sectors, 2021

IMPLAN Sector	TIO ^a		Employment	
	Indirect ^b	Indirect & Induced ^c	Indirect ^b	Indirect & Induced ^c
Oilseed farming	1.271	1.412	1.194	1.335
Grain farming	1.673	1.884	1.259	1.374
Vegetable & melon farming	1.381	1.552	1.100	1.165
Fruit farming	1.203	1.346	1.031	1.066
Tree nut farming	1.177	1.320	1.025	1.057
Greenhouse, nursery, and floriculture	1.310	1.514	1.087	1.172
Tobacco farming	1.395	1.669	1.072	1.142
Cotton farming	1.273	1.531	1.095	1.218
All other crop farming	1.461	1.691	1.015	1.027
Dairy cattle & milk production	1.553	1.699	1.424	1.607
Beef cattle farming	1.344	1.465	1.055	1.082
Poultry & egg production	1.521	1.652	1.428	1.621

Table 21. Output and Employment Multipliers for Selected Agriculture and Forestry Sectors, 2021

IMPLAN Sector	TIO ^a		Employment	
	Indirect ^b	Indirect & Induced ^c	Indirect ^b	Indirect & Induced ^c
Animal production, except cattle/poultry/eggs	1.180	1.357	1.025	1.063
Commercial hunting & trapping	1.457	1.584	1.096	1.126
Agriculture & forestry support activities	1.030 ^d	1.909 ^d	1.004 ^d	1.156
Commercial logging	1.207	1.813	1.295	1.646
Sawmills	1.543	1.844	2.219	2.831
Wood preservation	1.297	1.433	2.010	2.620
Pulp mills	1.373	1.644	2.107	3.103
Paper mills	1.350	1.548	2.369	3.406
Paperboard mills	1.398	1.635	2.639	3.889 ^d
Forestry, forest products, & timber tracts	1.126	1.792	1.290	1.650

^aTotal Industry Output – annual value of production by industry.

^bEconomic effects from business-to-business purchases in the supply chain (Direct + Indirect)/(Direct).

^cIncludes indirect effects plus the economic effects from household spending of labor income (Direct + Indirect + Induced)/(Direct).

^dDenotes the lowest or highest multipliers for total industrial output and employment.

Figures 31 through 36 compare each of Tennessee’s 95 individual county’s direct agriculture and forestry economic activity (no multiplier effects) to that county’s entire economy (all economic activity for the county). These values were based on each individual county’s total industry output for those industries. In this section, “**primary agriculture**” includes crop production and livestock breeding and feeding, whereas “**primary forestry**” includes the management and logging of trees. “**All agriculture**” includes primary agriculture, plus the input supplying industries and agriculture manufacturing. Likewise, “**all forestry**” includes primary forestry, plus input supplying industries and forestry manufacturing. Lake County had the highest level of economic activity for **primary agriculture** at 18.9 percent, followed by Clay County at 16.4 percent (Table 22). For **all agriculture**, Moore County had the highest level at 59.9 percent, followed by Trousdale County at 26.5 percent. For **primary forestry**, Wayne County followed by Grundy County had the highest level of economic activity at 1.9 percent and 1.6 percent; for **all forestry**, Grainger County and Hardin County had the highest levels at 24.2 percent and 20.6 percent. Combining both “**primary agriculture**” and “**primary forestry**”, Lake County (18.9 percent for direct) and Moore County (60.1 percent for total) had the highest levels of economic activity.

Table 22. Tennessee Counties with the Highest Proportion of Direct Economic Activity for Agriculture and Forestry, 2021

Rank	Agriculture		Forestry		Combined	
	Primary	All	Primary	All	Primary	All
1 st	Lake (18.9%)	Moore (59.9%)	Wayne (1.9%)	Grainger (24.2%)	Lake (18.9%)	Moore (60.1%)
2 nd	Clay (16.4%)	Trousdale (26.5%)	Grundy (1.6%)	Hardin (20.6%)	Clay (16.4%)	Weakley (34.4%)

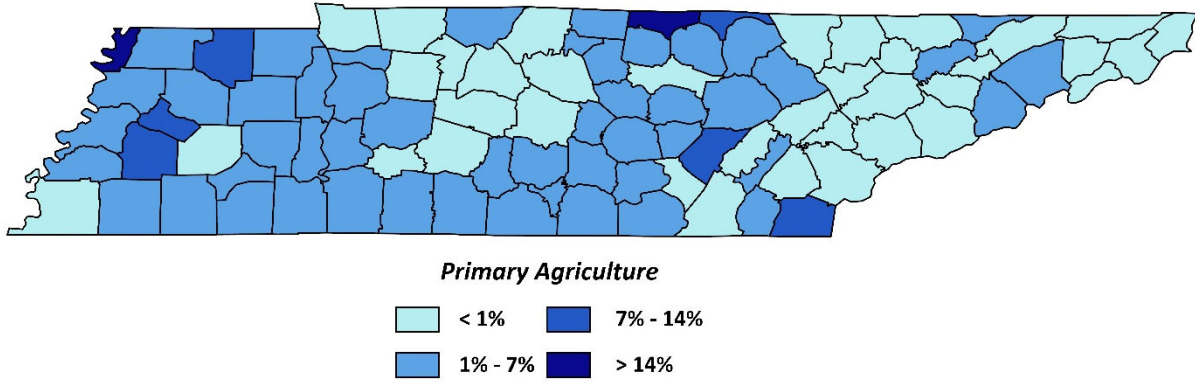


Figure 31. Percent of Direct Economic Activity from Primary Agriculture, 2021
 (Source: IMPLAN Group, LLC, 2021 Data)

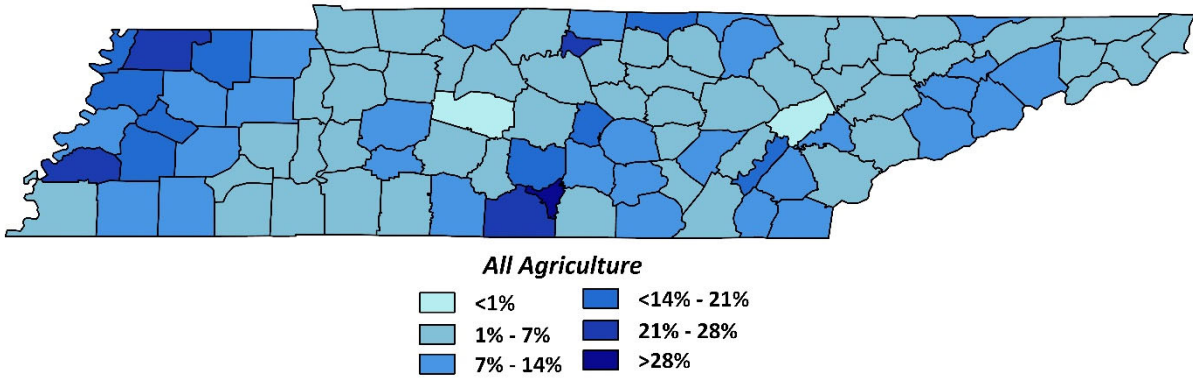


Figure 32. Percent of Direct Economic Activity from All Agriculture, 2021
 (Source: IMPLAN Group, LLC, 2021 Data)

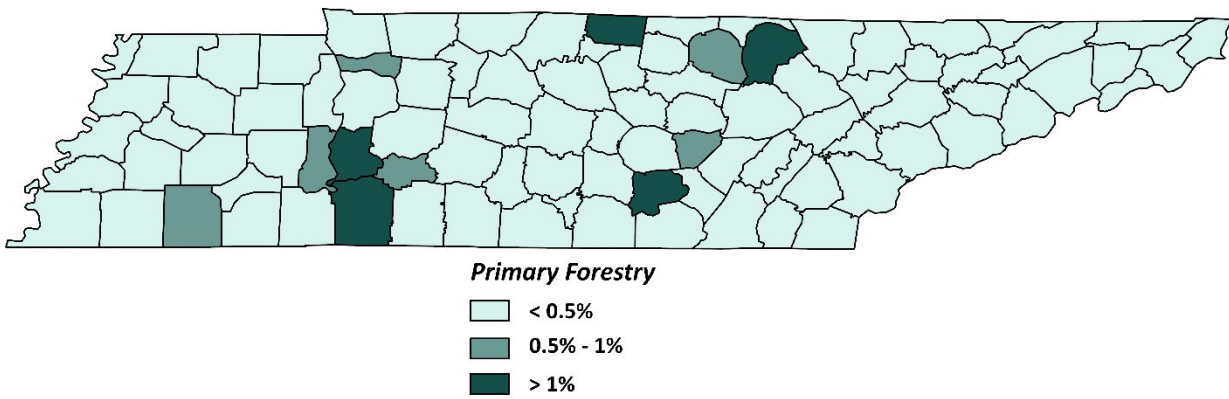


Figure 33. Percent of Direct Economic Activity from Primary Forestry, 2021
 (Source: IMPLAN Group, LLC, 2021 Data)

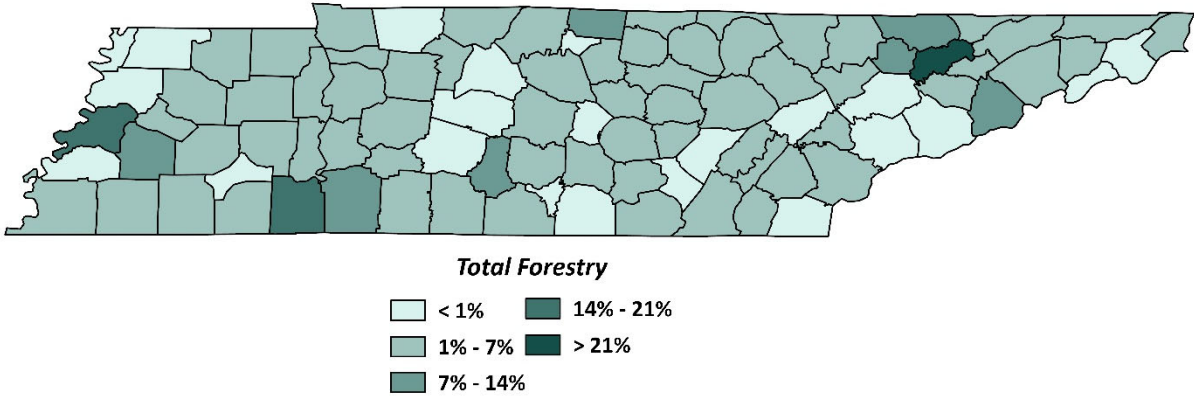


Figure 34. Percent of Direct Economic Activity from All Forestry, 2021

(Source: IMPLAN Group, LLC, 2021 Data)

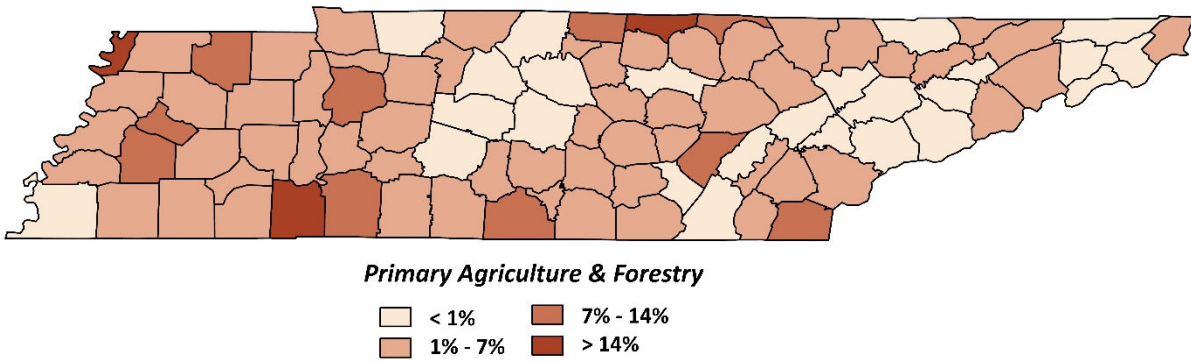


Figure 35. Percent of Direct Economic Activity from Primary Agriculture and Forestry, 2021

(Source: IMPLAN Group, LLC, 2021 Data)

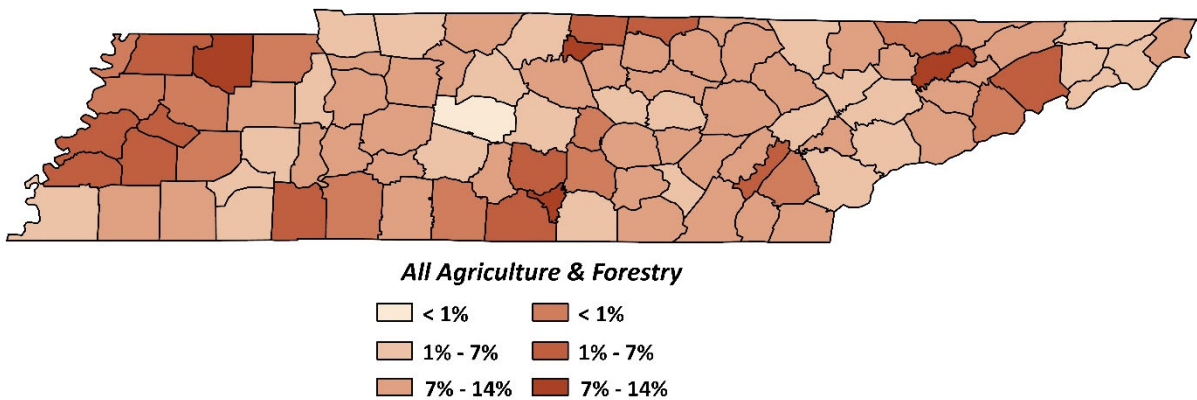


Figure 36. Percent of Direct Economic Activity from All Agriculture and Forestry, 2021

(Source: IMPLAN Group, LLC, 2021 Data)

Tax Impacts from Tennessee Agriculture and Forestry

Total tax collection revenues for Tennessee in fiscal year 2019 estimated at close to \$22.1 billion in the form of local and state taxes (TN Department of Revenue, 2023). Based on the IMPLAN data for Tennessee in 2021, tax impacts at the county and state levels as a result of direct and multiplier effects for agriculture and forestry (includes the production and processing of agricultural and forest products and the input suppliers of these products) are estimated at \$360.0 million and \$1.8 billion, respectively (Table 23). An additional \$3.9 billion is generated for the federal government. Agriculture tax revenues are estimated at \$1.7 billion for state/county and \$2.7 billion for federal. Forestry generated \$467.5 million in tax revenues for state/county and \$1.2 billion in federal. For state/county tax revenues, taxes on imports and production for both agriculture and forestry have the largest value; for federal tax revenues, personal (household) taxes have the largest value. Negative values at the federal level indicate subsidies exceeded production and import taxes.

Table 23. Estimated State/Local and Federal Tax Revenues from Tennessee Agriculture and Forestry, 2021

	Revenues		
	County	State	Federal
		(Million \$)	
Agriculture^a			
Production & import taxes ^b	\$280.7	\$1,117.3	-\$329.2
Corporate profits taxes	\$0.0	\$250.5	\$487.2
Personal (household) taxes ^d	\$1.5	\$18.3	\$2,506.0
Total	\$282.2	\$1,386.1	\$2,664.0
Forestry^a			
Production & import taxes ^b	\$76.9	\$305.9	-\$90.1
Corporate profits taxes ^c	\$0.0	\$75.6	\$147.0
Personal (household) taxes ^d	\$0.7	\$8.4	\$1,162.7
Total	\$77.6	\$389.9	\$1,219.6
Agriculture & Forestry Total	\$359.8	\$1,776.0	\$3,883.6

^aIncludes the production and processing of agricultural and forest products and the input suppliers of these products.

^bFor state/county, sales taxes, property taxes, motor vehicle licenses taxes, severance taxes, other taxes, and special assessments; for federal, excise taxes and custom duty taxes.

^cFor state/county/federal, corporate profit taxes.

^dFor state/county, personal income tax, motor vehicle license tax, other tax (fishing/hunting); for federal, social insurance and personal income taxes.

Source: Clouse, 2022; Minnesota IMPLAN Group, 2021 Data

Summary and Conclusion

The agri-forestry industrial complex included the primary industries typically associated with agriculture and forest operations such as crop production, livestock breeding and feeding, and the management and logging of trees. Also included in the industrial complex are the input supplying industries and value-added subsectors, which included food and beverage manufacturing, apparel and textiles, and forestry products manufacturing. In 2021, the agri-forestry industrial complex was directly and indirectly

responsible for \$89.0 billion to the Tennessee economy, which was 10.9 percent of the economic activity conducted in the state, and was responsible for an estimated 366,154 jobs, or 8.9 percent of the total number of workers. Agriculture, a subset of the agri-forestry industrial complex, includes farming and related industries, as well as value-added food and fiber production, processing and manufacturing accounted for 8.0 percent of the state's economy and generated \$65.6 billion in output. Agriculture supported 281,794 jobs, with 92,889 (both full- and part-time) in agricultural production. Forestry included the management and logging of forests; primary forestry products such as sawmills, pulp-, paper-, and paperboard mills, and wood preservation, plus forestry products manufacturing (secondary forestry products). Forestry accounted for 2.9 percent of the state's economy, employed over 84,360 Tennesseans, and generated \$23.4 billion in output.

When comparing a county's direct (without multiplier effects) agriculture and forestry economic activity to its total economic activity (all industries) for each of Tennessee's 95 counties, Lake County had the highest share of economic activity for commodity agriculture (crop and livestock breeding and feeding) at 18.9 percent. For all agriculture (includes direct agriculture, plus agricultural input supplying and agriculture-based manufacturing sectors), Moore County had the highest share of economic activity at 59.9 percent. For direct forestry (i.e., the management and logging of forests), Wayne County had the highest level of direct economic activity at 1.9 percent. For all forestry (includes direct forestry, plus input supplying industries and forestry manufacturing), Grainger County had the highest share at 24.2 percent. Combining both agriculture and forestry, Moore and Meigs Counties had the largest shares of local economic activity at 65.5 percent and 34.0 percent, respectively.

Comparing 2019 and 2021 statewide agricultural data revealed many of the traditional row crops grown in the state experienced increased harvested acreage, except for cotton, tobacco and hay. Crop prices increased for all the major commodities (e.g., cotton, corn, soybeans, tobacco, wheat, and hay) discussed. For livestock, the numbers of chickens, including broilers, eggs, and hogs increased, while beef cattle and calves, along with milk cows, decreased. Prices increased for all livestock products with the largest from poultry, followed by hogs and beef. Many of the traditional row crops grown in the state experienced increased harvested acreage except for cotton, tobacco and hay. Crop prices increased for all the major commodities (e.g., cotton, corn, soybeans, tobacco, wheat, and hay) discussed.

Comparing 2021 major industry sectors to previous studies using 2006, 2009, 2011, 2013, 2015, 2017, and 2019 IMPLAN data, the value of direct economic activity for agriculture increased an average of 6.6 percent, whereas economic activity for forestry declined 0.4 percent in nominal terms. Most other major industrial sectors had increases in economic activity for this timeframe with Services having the largest average increase at 14.1 percent, followed by Wholesale Trade (12.9 percent); Mining (11.4 percent); Construction (10.4 percent); Government (10.0 percent); Finance, Insurance, and Real Estate combined (9.4 percent); Retail

Trade (7.4 percent); and Manufacturing (2.3 percent). For workers or jobs in agriculture and forestry, forestry had the largest average decrease at 5.0 percent with agriculture having a 0.9 percent decrease. For workers or jobs in other industries, the largest average increase was for Services at 4.7 percent, followed by Mining (3.0 percent), Construction (2.1 percent), and Government (1.8 percent). The largest average decrease was for Retail Trade at 10.0 percent, followed by Manufacturing at 1.2 percent, and Wholesale Trade at 1.1 percent.

Literature Cited

- American Farmland Trust. 2020a. Productivity, Versatility, and Resiliency (PVR) Analysis Fact Sheet. Farms Under Threat: The State of the States. Available at <https://farmlandinfo.org/publications/farms-under-threat-the-state-of-the-states/>.
- American Farmland Trust. 2020b. Executive Summary. Farms Under Threat: The State of the States. Available at <https://farmlandinfo.org/publications/farms-under-threat-the-state-of-the-states/>.
- American Farmland Trust. 2020c. Executive Summary. Farms Under Threat: The State of the States – Full Report. Available at <https://farmlandinfo.org/publications/farms-under-threat-the-state-of-the-states/>.
- Clouse, C. 2022. “Tax Impact Report”. Available at <https://support.implan.com/hc/en-us/articles/115009679588-Tax-Impact-Report>
- IMPLAN Group LLC, IMPLAN System (2021 data and Cloud Platform V. 7.0 software), 16905 Northcross Dr., Suite 120, Huntersville, NC 28078. Available at <http://www.implan.com/>.
- Leontief, Wassily. 1936. “Quantitative Input and Output Relations in the Economic System of the United States.” *Review of Economics and Statistics* 18(3):105-125.
- Menard, J., B. English, and K. Jensen. 2021. “Economic Contributions of Agriculture and Forestry in Tennessee, 2019.” Available at https://arec.tennessee.edu/wp-content/uploads/sites/17/2021/10/FINAL_RR21_004_A_V2.pdf.
- Olson, D. and S. Lindall. 1999. “IMPLAN Professional Software, Analysis, and Data Guide.” Minnesota IMPLAN Group, Inc., 502 2nd Street, Suite 301, Hudson, WI 54016.
- Pyatt, G., and J. Round. 1985. “Social Accounting Matrices, A Basis for Planning.” The World Bank, Washington, D.C.
- Steinback, S. 2004. “Using Ready-Made Regional Input-Output Models to Estimate Backward-Linkage Effects of Exogenous Output Shocks.” *Review of Regional Studies* (34(1): 57-71.
- Stone, R. 1961. Input-Output and National Accounts.” Paris Organisation for European Economic Co-operation.
- Tennessee Department of Revenue. 2023. “Monthly and Fiscal Year Tax Collections” Fiscal Year Spreadsheets. Available at <https://www.tn.gov/revenue/tax-resources/tax-collections-information/monthly-fiscal-year-collections.html>.
- Tennessee Forestry Association. 2017. “2013 Tennessee Forest Facts.” Publications and Resources. Available at <https://www.tnforestry.com/forest-facts>.
- Thorvaldson, J. 2018. “IIMPLAN’s Gravity Model and Trade Flow RPCs”. IMPLAN Blog. Available at <https://blog.implan.com/estimating-region-specific-foreign-trade-rates>.
- U.S. Census Bureau. 2002. North American Industry Classification System (NAICS). Available at <http://www.census.gov/eos/www/naics/>.

- U.S. Census Bureau. 2007. North American Industry Classification System (NAICS). Available at <http://www.census.gov/eos/www/naics/>.
- U.S. Census Bureau. 2012. North American Industry Classification System (NAICS). Available at <http://www.census.gov/eos/www/naics/>.
- U.S. Census Bureau. 2017. North American Industry Classification System (NAICS). Available at <http://www.census.gov/eos/www/naics/>.
- U.S. Census Bureau. 2023. 2018-2021 Annual Survey of Manufacturers: Tables. Geographic Area Statistics. "Summary Statistics for Industry Groups and Industries in the U.S. and States: 2018 and 2021. Available at <https://www.census.gov/data/tables/time-series/econ/asm/2018-2021-asm.html>.
- U.S. Department of Agriculture, Economic Research Service (ERS). 2022. "Glossary". Farm Household Well-being. Available at <https://www.ers.usda.gov/topics/farm-economy/farm-household-well-being/glossary/>.
- U.S. Department of Agriculture, Economic Research Service (ERS). 2023a. "State Export Data." Available at <https://www.ers.usda.gov/data-products/state-agricultural-trade-data/>.
- U.S. Department of Agriculture, Economic Research Service (ERS). 2023b. Data Files: U.S. and State-Level Farm Income and Wealth Statistics. "Annual Cash Receipts by Commodity, US and States, 2008-2023F." Available at <https://www.ers.usda.gov/data-products/farm-income-and-wealth-statistics/data-files-u-s-and-state-level-farm-income-and-wealth-statistics/>.
- U.S. Department of Agriculture, Foreign Agricultural Service. 2023. Global Agricultural Trade System. Available at <https://apps.fas.usda.gov/gats/ExpressQuery1.aspx>.
- U.S. Department of Agriculture, Forest Service, Forest Inventory and Analysis Program. 2023. Forest Inventory EVALIDator web-application Version 2.0.6. Available at <https://apps.fs.usda.gov/fiadb-api/evaluator>.
- U.S. Department of Agriculture, Forest Service, Forest Inventory and Analysis. 2020. "Forests of Tennessee, 2019." Available at https://public.tableau.com/views/FIA_OneClick_V1_2/Factsheet?%3AshowVizHome=no.
- U.S. Department of Agriculture, National Agricultural Statistical Service (NASS). 2019a. "Agricultural Statistics 2019." Available at https://downloads.usda.library.cornell.edu/usda-esmis/files/j3860694x/ft849j281/vx022816w/Ag_Stats_2019_Complete_Publication.pdf.
- U.S. Department of Agriculture, National Agricultural Statistical Service (NASS). 2019b. "Cattle." Released February 28, 2019. Available at <https://downloads.usda.library.cornell.edu/usda-esmis/files/h702q636h/765377121/bc386r54d/catl0219.pdf>.
- U.S. Department of Agriculture, National Agricultural Statistical Service (NASS). 2019c. "Tennessee State and County Data." 2017 Census of Agriculture Report. Volume 1, Geographic Area Series, Part 42. Available at https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_2_County_Level/Tennessee/https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_2_County_Level/Tennessee/.

- U.S. Department of Agriculture, National Agricultural Statistical Service (NASS). 2020a. "Chicken and Eggs 2019 Summary." Available at <https://downloads.usda.library.cornell.edu/usda-esmis/files/1v53jw96n/zs25xt30s/9p290t89h/ckegan20.pdf>.
- U.S. Department of Agriculture, National Agricultural Statistical Service (NASS). 2020b. "Crop Production 2019 Summary." Available at https://www.nass.usda.gov/Publications/Todays_Reports/reports/cropan20.pdf.
- U.S. Department of Agriculture, National Agricultural Statistical Service (NASS). 2020c. "Meat Animals Production, Disposition, and Income, 2019 Summary." Available at <https://downloads.usda.library.cornell.edu/usda-esmis/files/02870v85d/6m3127982/x920gh39g/meatan20.pdf>.
- U.S. Department of Agriculture, National Agricultural Statistical Service (NASS). 2020d. "Milk Production, Disposition, and Income, 2019 Summary." Available at <https://downloads.usda.library.cornell.edu/usda-esmis/files/4b29b5974/5h73qf66r/hd76sk303/mlkpd20.pdf>.
- U.S. Department of Agriculture, National Agricultural Statistical Service (NASS). 2020e. "Poultry – Production and Value 2019 Summary." Available at <https://downloads.usda.library.cornell.edu/usda-esmis/files/m039k491c/jq086502q/rn301m63j/plva0420.pdf>.
- U.S. Department of Agriculture, National Agricultural Statistical Service (NASS). 2020f. "Quarterly Hogs and Pigs." Released December 23, 2020. Available at <https://downloads.usda.library.cornell.edu/usda-esmis/files/rj430453j/7d279j76f/g445d5751/hgpg1220.pdf>.
- U.S. Department of Agriculture, National Agricultural Statistical Service (NASS). 2021. "Agricultural Statistics 2021." Available at https://downloads.usda.library.cornell.edu/usda-esmis/files/j3860694x/gq67m183k/np194m208/2021_Agricultural_Statistics_Book.pdf.
- U.S. Department of Agriculture, National Agricultural Statistical Service (NASS). 2022a. "Cattle." Released January 31, 2022. Available at <https://downloads.usda.library.cornell.edu/usda-esmis/files/h702q636h/pn89f870n/jw828f69f/catl0122.pdf>.
- U.S. Department of Agriculture, National Agricultural Statistical Service (NASS). 2022b. "Chicken and Eggs 2021 Summary." Available at <https://downloads.usda.library.cornell.edu/usda-esmis/files/1v53jw96n/xk81kp293/cn69n606q/ckegan22.pdf>.
- U.S. Department of Agriculture, National Agricultural Statistical Service (NASS). 2022c. "Meat Animals Production, Disposition, and Income, 2021 Summary." Available at <https://downloads.usda.library.cornell.edu/usda-esmis/files/02870v85d/8p58qh98c/b2775098d/meatan22.pdf>.
- U.S. Department of Agriculture, National Agricultural Statistical Service (NASS). 2022d. "Milk Production, Disposition, and Income." Various Releases. Available at <https://usda.library.cornell.edu/concern/publications/4b29b5974>.
- U.S. Department of Agriculture, National Agricultural Statistical Service (NASS). 2022e. "Milk Production, Disposition, and Income, 2021 Summary." Available at <https://downloads.usda.library.cornell.edu/usda-esmis/files/4b29b5974/8049hb01v/xw42pd66f/mlkpd22.pdf>.

- U.S. Department of Agriculture, National Agricultural Statistical Service (NASS). 2022f. "Poultry – Production and Value 2021 Summary." Available at <https://downloads.usda.library.cornell.edu/usda-esmis/files/m039k491c/dr2703010/v405tf48t/plva0422.pdf>.
- U.S. Department of Agriculture, National Agricultural Statistical Service (NASS). 2022g. "Quarterly Hogs and Pigs." Released December 23, 2022. Available at <https://downloads.usda.library.cornell.edu/usda-esmis/files/rj430453j/37721p56r/rn302c239/hgpg1222.pdf>.
- U.S. Department of Agriculture, National Agricultural Statistical Service (NASS). 2023a. "Crop Production 2021 Summary." Available at <https://downloads.usda.library.cornell.edu/usda-esmis/files/k3569432s/sn00c1252/g158cj98r/cropan22.pdf>.
- U.S. Department of Agriculture, National Agricultural Statistical Service (NASS). 2023b. CropScape 2021 Cropland Data Layer. Available at https://www.nass.usda.gov/Research_and_Science/Cropland/SARS1a.php.
- U.S. Department of Agriculture, National Agricultural Statistical Service (NASS). 2023c. Farms and Land in Farms. Various Releases. Available at <https://usda.library.cornell.edu/concern/publications/5712m6524>.
- U.S. Department of Agriculture, National Agricultural Statistical Service (NASS). 2023d. Quick Stats Lite. Available at https://www.nass.usda.gov/Quick_Stats/Lite/index.php.
- U.S. Department of Commerce (DOC), International Trade Administration (ITA). 2023. "TradeStats Express™ Home." State Trade by Product. Available at <https://www.trade.gov/report/tradestats-express-national-and-state-trade-data>.
- U.S. Department of Labor. 2023. Quarterly Census of Employment and Wages. QCEW Data Files. 2021 Annual Averages by Industry. Available at <https://www.bls.gov/cew/downloadable-data-files.htm>.

Appendix A: IMPLAN Methodology

The Tennessee Agri-Industry Model (TN-AIM) is based on the Impact Analysis for Planning (IMPLAN) model and its databases (IMPLAN Group LLC, 2021). Beginning with this report and subsequent reports, IMPLAN's Cloud platform (Version 7.0) is used. IMPLAN's Cloud platform offers an industry contribution analyses option for IMPLAN modelers, which was used to generate the estimated economic impacts for this analysis. IMPLAN uses a National Trade Flows Model (NTFM) (doubly-constrained gravity model) to estimate a new set of regional purchase coefficients and other trade data that estimates local purchases based on a region's characteristics (Thorvaldson, 2018). Not only does the model describe a regional economy, but it can also be used for predictive purposes by providing multiplier-based estimates.

Multipliers measure the response of the economy to a change in production or demand. Multiplier analysis generally focuses on the impacts of exogenous changes on: a) output of the sectors in the economy, b) resulting changes in income earned by households and c) resulting change in employment (in physical terms) that is expected to be generated. The concept of multipliers rests on the difference between the initial impact of an exogenous change (final demand) and the total impacts of a change. **Direct** impacts measure the response of a given industry given a change in final demand for that same industry. **Indirect** impacts represent the response by all local industries that occur as a result of a change in final demand for a specific industry. **Induced** impacts represent the response by all local industries caused by increased (decreased) expenditures of new household income and inter-institutional transfers generated (lost) from the direct and indirect impacts of the change in final demand for a specific industry.

This study uses Type I and Type SAM (Social Accounting Matrix) multipliers. Type I multipliers, used to estimate the indirect impacts, are calculated by dividing direct plus indirect impacts by the direct impacts. Type SAM multipliers are used to estimate the induced impacts and are calculated as (direct + indirect + induced impacts)/direct impacts. As argued by the current developers of IMPLAN, the Type SAM multipliers consider the expenditures resulting from increased incomes of households as well as inter-institutional transfers resulting from the economic activity. Therefore, Type SAM multipliers assume that as final demand changes, incomes also increase. As consumers and institutions increase expenditures this leads to increased demands from local industries. To prevent double-counting the economic contributions estimated, regional purchase coefficients¹⁶ (RPC) are set to zero for the backward linked supply and service industries.¹⁷ To account for double-counting in agriculture (inputs, primary agriculture (*agriculture commodities*), and secondary agriculture), sectors comprising the input sector (see Table B.1.) for the state are aggregated with the RPC set

¹⁶IMPLAN's regional purchase coefficient (RPC) represents how much of each commodity purchasing industries and institutions buy from regional sources. For example, a RPC of .55 for a given commodity means that for each \$1 of local need, 55 percent of the commodity is purchased locally.

¹⁷Hence, the analysis provided in this document belongs in the category of contribution analysis. For more details, see Steinback, 2004.

to zero for the primary agriculture analysis; for secondary agriculture, both agricultural inputs and primary agriculture aggregated sectors are set to zero. This same methodology is used for the forest analysis.

Input-output model results from previous studies in this series were based on the Standard Industrial Classification (SIC) system as defined by the United States Census Bureau. Beginning in 2006, results are based on the North American Industrial Classification System (NAICS) (Census NAICS, 2002, 2007, 2012, and 2017). The reader should not compare industry sector level results from the previous studies using the SIC system with the results from this most recent study using NAICS. For readers who are interested in time series data, this creates a problem since many industries are grouped into different or entirely new categories. Plus, changes in input-output modeling and data sources are additional reasons the reader should be wary with respect to evaluating changes in impacts over time.

IMPLAN uses a macro-regional social accounting system and generates a set of balanced economic/social accounts and multipliers.¹⁸ The social accounting system is an extension of input-output analysis.¹⁹ Input-output analysis can provide important and timely information on the interrelationships in a regional economy and the impacts of changes on that economy. Input-output analysis has been expanded beyond market-based transaction accounting to include non-market financial flows by using a social accounting matrix or SAM framework (Pyatt and Round, 1985). The model describes the transfer of money between industries and institutions and contains both market-based transactions and non-market financial flows, such as inter-institutional transfers (see Figure A.1). The 'Make' and 'Use' components of the SAM include the commodities made and used by industries. Factors represent the value-added by industries, including wages and compensation to workers, interest, profits, and indirect business taxes. Capital includes expenditures made by industries and institutions to obtain equipment and construction. The SAM takes into account corporate profits as 'Enterprises'. The SAM also accounts for non-industrial financial flows, including factor exports and imports, institution exports, factor distribution, and inter-institutional transfers. Factor exports include payments reimbursed from outside the region for exports less the payments for imports. Institutional exports would include situations such as jobs commuting outside the region. Factor distributions are payments from the factor sectors to institutions, such as households or governments. Inter-institutional transfers include payments between institutions, such as federal government grants to state governments, welfare, social security payments, and taxes paid to governments.

¹⁸While IMPLAN provides a macro-based SAM it does not account for income distribution by functional class as would a SAM defined traditionally in the approach laid out by Stone (1961).

¹⁹Input-output (I-O) analysis, also known as inter-industry analysis, is the name given to an analytical work conducted by Wassily Leontief (1936) in the late 1930's. The fundamental purpose of the I-O framework is to analyze the interdependence of industries in an economy through market-based transactions.

	Industry	Commodity	Factors	Institutions	Enterprises	Capital	Trade	Total
Industry		<i>Make</i>					<i>Exports</i>	Total Industry Income
Commodity	<i>Use</i>			<i>Consumption</i>		<i>Consumption</i>		Total Commodity Income
Factors	<i>Value Added</i>						<i>Exports</i>	Total Factor Income
Institutions		<i>Sales</i>	<i>Transfers</i>	<i>Transfers</i>	<i>Transfers</i>		<i>Exports</i>	Total Institutional Income
Enterprises								Total Enterprise Income
Capital						<i>Transfers</i>	<i>Exports</i>	Total Capital Income
Trade	<i>Imports</i>		<i>Factor Trade</i>	<i>Imports</i>		<i>Transfers</i>	<i>Exports</i>	Total Trade Income
Total	Total Industry Outlay	Total Commodity Outlay	Total Factor Outlay	Total Institution Outlay	Total Enterprise Outlay	Total Capital Outlay	Total Trade Exports	

Figure A.1. Social Accounting Matrix Framework

Source: Olson and Lindall, 1999

Appendix B: IMPLAN/NAICS Sector Bridge with Agri-Forestry Industrial Complex Identification

Table B.1. IMPLAN 546 Industry Sector Descriptions, NAICS, and Agri-Forestry Aggregation Designation

Sector	Description	2017 NAICS	Agri-Forestry ^a
1	Oilseed farming	111110,111120,111191	Primary Ag
2	Grain farming	111130, 111140, 111150, 111160, 111191, 111199	Primary Ag
3	Vegetable & melon farming	111211, 111219	Primary Ag
4	Fruit farming	111310, 111320, 111331, 111332, 111333, 111334, 111336, 111339	Primary Ag
5	Tree nut farming	111335, 111336	Primary Ag
6	Greenhouse, nursery, & floriculture production	111411, 111419, 111421, 111422	Primary Ag
7	Tobacco farming	111910	Primary Ag
8	Cotton farming	111920	Primary Ag
9	Sugarcane & sugar beet farming	111930, 111991	Primary Ag
10	All other crop farming	111940, 111992, 111998	Primary Ag
11	Beef cattle ranching & farming, including feedlots & dual-purpose ranching & farming	112111, 112112	Primary Ag
12	Dairy cattle & milk production	112120	Primary Ag
13	Poultry & egg production	112310, 112320, 112330, 112340, 112390	Primary Ag
14	Animal production, except cattle & poultry & eggs	112210, 112410, 112420, 112511, 112512, 112519, 112910, 112920, 112930, 112990	Primary Ag
15	Forestry, forest products, & timber tract production	113110, 113210	For Inputs
16	Commercial logging	113310	For Inputs
17	Commercial fishing	114111, 114112, 114119	Primary Ag
18	Commercial hunting & trapping	114210	Primary Ag
19	Support activities for agriculture & forestry	115111, 115112, 115113, 115114, 115115, 115116, 115210, 115310	Primary Ag
20	Oil & gas extraction	211120, 211130	Mining
21	Coal mining	212111, 212112, 212113	Mining
22	Copper, nickel, lead, & zinc mining	212230	Mining
23	Iron ore mining	212210	Mining
24	Gold ore mining	212221	Mining
25	Silver ore mining	212222	Mining
26	Uranium-radium-vanadium ore mining	212291	Mining
27	Other metal ore mining	212299	Mining
28	Stone mining & quarrying	212311, 212312, 212313, 212319	Mining
29	Sand & gravel mining	212321, 212322, 212324	Mining
30	Other clay, ceramic, refractory minerals mining	212325	Mining
31	Potash, soda, & borate mineral mining	212391	Mining
32	Phosphate rock mining	212392	Mining
33	Other chemical & fertilizer mineral mining	212393	Mining
34	Other nonmetallic minerals	212399	Mining
35	Drilling oil & gas wells	213111	Mining
36	Support activities for oil & gas operations	213112	Mining
37	Metal mining services	213114	Services
38	Other nonmetallic minerals services	213113, 213115	Services
39	Electric power generation – Hydroelectric	221111	Utilities
40	Electric power generation - Fossil fuel	221112	Utilities
41	Electric power generation - Nuclear	221113	Utilities
42	Electric power generation - Solar	221114	Utilities
43	Electric power generation - Wind	221115	Utilities
44	Electric power generation – Geothermal	221116	Utilities

Table B.1. IMPLAN 546 Industry Sector Descriptions, NAICS, and Agri-Forestry Aggregation Designation

Sector	Description	2017 NAICS	Agri-Forestry ^a
45	Electric power generation - Biomass	221117	Utilities
46	Electric power generation - All other	221118	Utilities
47	Electric power transmission & distribution	221121, 221122	Utilities
48	Natural gas distribution	221210	Utilities
49	Water, sewage & other systems	221310, 221320, 221330	Utilities
50	Construction of new health care structures	23	Construction
51	Construction of new manuf. structures	23	Construction
52	Construction of new power & communication structures	23	Construction
53	Construction of new educational & vocational structures	23	Construction
54	Construction of new highways & streets	23	Construction
55	Construction of new commercial structures, including farm structures	23	Construction
56	Construction of other new nonresidential structures	23	Construction
57	Construction of new single-family residential structures	23	Construction
58	Construction of new multifamily residential structures	23	Construction
59	Construction of other new residential structures	23	Construction
60	Maintenance & repair construction of nonresidential structures	23	Construction
61	Maintenance & repair construction of residential structures	23	Construction
62	Maintenance & repair construction of highways, streets, bridges, & tunnels	23	Construction
63	Dog & cat food manuf.	311111	Secondary Ag
64	Other animal food manuf.	311119	Secondary Ag
65	Flour milling	311211	Secondary Ag
66	Rice milling	311212	Secondary Ag
67	Malt manuf.	311213	Secondary Ag
68	Wet corn milling	311221	Secondary Ag
69	Soybean & other oilseed processing	311224	Secondary Ag
70	Fats & oils refining & blending	311225	Secondary Ag
71	Breakfast cereal manuf.	311230	Secondary Ag
72	Beet sugar manuf.	311313	Secondary Ag
73	Sugar cane mills & refining	311314	Secondary Ag
74	Nonchocolate confectionery manuf.	311340	Secondary Ag
75	Chocolate & confectionery manuf. from cacao beans	311351	Secondary Ag
76	Confectionery manuf. from purchased chocolate	311352	Secondary Ag
77	Frozen fruits, juices & vegetables manuf.	311411	Secondary Ag
78	Frozen specialties manuf.	311412	Secondary Ag
79	Canned fruits & vegetables manuf.	311421	Secondary Ag
80	Canned specialties	311422	Secondary Ag
81	Dehydrated food products manuf.	311423	Secondary Ag
82	Cheese manuf.	311513	Secondary Ag
83	Dry, condensed, & evaporated dairy product manuf.	311514	Secondary Ag
84	Fluid milk manuf.	311511	Secondary Ag

Table B.1. IMPLAN 546 Industry Sector Descriptions, NAICS, and Agri-Forestry Aggregation Designation

Sector	Description	2017 NAICS	Agri-Forestry ^a
85	Creamery butter manuf.	311512	Secondary Ag
86	Ice cream & frozen dessert manuf.	311520	Secondary Ag
87	Frozen cakes & other pastries manuf.	311813	Secondary Ag
88	Poultry processing	311615	Secondary Ag
89	Animal, except poultry, slaughtering	311611	Secondary Ag
90	Meat processed from carcasses	311612	Secondary Ag
91	Rendering & meat byproduct processing	311613	Secondary Ag
92	Seafood product preparation & packaging	311710	Secondary Ag
93	Bread & bakery product, except frozen, manuf.	311811, 311812	Secondary Ag
94	Cookie & cracker manuf.	311821	Secondary Ag
95	Dry pasta, mixes, & dough manuf.	311824	Secondary Ag
96	Tortilla manuf.	311830	Secondary Ag
97	Roasted nuts & peanut butter manuf.	311911	Secondary Ag
98	Other snack food manuf.	311919	Secondary Ag
99	Coffee & tea manuf.	311920	Secondary Ag
100	Flavoring syrup & concentrate manuf.	311930	Secondary Ag
101	Mayonnaise, dressing, & sauce manuf.	311941	Secondary Ag
102	Spice & extract manuf.	311942	Secondary Ag
103	All other food manuf.	311991, 311999	Secondary Ag
104	Bottled & canned soft drinks & water	312111, 312112	Secondary Ag
105	Manufactured ice	312113	Manuf
106	Breweries	312120	Secondary Ag
107	Wineries	312130	Secondary Ag
108	Distilleries	312140	Secondary Ag
109	Tobacco product manuf.	312230	Secondary Ag
110	Fiber, yarn, & thread mills	313110	Secondary Ag
111	Broadwoven fabric mills	313210	Secondary Ag
112	Narrow fabric mills & schiffli machine embroidery	313220	Secondary Ag
113	Nonwoven fabric mills	313230	Secondary Ag
114	Knit fabric mills	313240	Secondary Ag
115	Textile & fabric finishing mills	313310	Secondary Ag
116	Fabric coating mills	313320	Secondary Ag
117	Carpet & rug mills	314110	Secondary Ag
118	Curtain & linen mills	314120	Secondary Ag
119	Textile bag & canvas mills	314910	Secondary Ag
120	Rope, cordage, twine, tire cord & tire fabric mills	314994	Secondary Ag
121	Other textile product mills	314999	Secondary Ag
122	Hosiery & sock mills	315110	Secondary Ag
123	Other apparel knitting mills	315190	Secondary Ag
124	Cut & sew apparel contractors	315210	Secondary Ag
125	Men's & boys' cut & sew apparel manuf.	315220	Secondary Ag
126	Women's & girls' cut & sew apparel manuf.	315240	Secondary Ag
127	Other cut & sew apparel manuf.	315280	Secondary Ag
128	Apparel accessories & other apparel manuf.	315990	Secondary Ag
129	Leather & hide tanning & finishing	316110	Secondary Ag
130	Footwear manuf.	316210	Secondary Ag
131	Other leather & allied product manuf.	316992, 316998	Secondary Ag
132	Sawmills	321113	Primary For

Table B.1. IMPLAN 546 Industry Sector Descriptions, NAICS, and Agri-Forestry Aggregation Designation

Sector	Description	2017 NAICS	Agri-Forestry ^a
133	Wood preservation	321114	Primary For
134	Veneer & plywood manuf.	321211, 321212	Secondary For
135	Engineered wood member & truss manuf.	321213, 321214	Secondary For
136	Reconstituted wood product manuf.	321219	Secondary For
137	Wood windows & door manuf.	321911	Secondary For
138	Cut stock, resawing lumber, & planing	321912	Secondary For
139	Other millwork, including flooring	321918	Secondary For
140	Wood container & pallet manuf.	321920	Secondary For
141	Manufactured home (mobile home) manuf.	321991	Secondary For
142	Prefabricated wood building manuf.	321992	Secondary For
143	All other miscellaneous wood product manuf.	321999	Secondary For
144	Pulp mills	322110	Primary For
145	Paper mills	322121, 322122	Primary For
146	Paperboard mills	322130	Primary For
147	Paperboard container manuf.	322211, 322212, 322219	Secondary For
148	Paper bag & coated & treated paper manuf.	322220	Secondary For
149	Stationery product manuf.	322230	Secondary For
150	Sanitary paper product manuf.	322291	Secondary For
151	All other converted paper product manuf.	322299	Secondary For
152	Printing	323111, 323113, 323117	Manuf
153	Support activities for printing	323120	Manuf
154	Petroleum refineries	324110	Manuf
155	Asphalt paving mixture & block manuf.	324121	Manuf
156	Asphalt shingle & coating materials manuf.	324122	Manuf
157	Petroleum lubricating oil & grease manuf.	324191	Manuf
158	All other petroleum & coal products manuf.	324199	Manuf
159	Petrochemical manuf.	325110	Manuf
160	Industrial gas manuf.	325120	Manuf
161	Synthetic dye & pigment manuf.	325130	Manuf
162	Other basic inorganic chemical manuf.	325180	Manuf
163	Other basic organic chemical manuf.	325193, 325194, 325199	Manuf
164	Plastics material & resin manuf.	325211	Manuf
165	Synthetic rubber manuf.	325212	Manuf
166	Artificial & synthetic fibers & filaments manuf.	325220	Manuf
167	Nitrogenous fertilizer manuf.	325311	Ag Inputs
168	Phosphatic fertilizer manuf.	325312	Ag Inputs
169	Fertilizer mixing	325314	Ag Inputs
170	Pesticide & other agricultural chemical manuf.	325320	Ag Inputs
171	Medicinal & botanical manuf.	325411	Manuf
172	Pharmaceutical preparation manuf.	325412	Manuf
173	In-vitro diagnostic substance manuf.	325413	Manuf
174	Biological product (except diagnostic) manuf.	325414	Manuf
175	Paint & coating manuf.	325510	Manuf
176	Adhesive manuf.	325520	Manuf
177	Soap & other detergent manuf.	325611	Manuf

Table B.1. IMPLAN 546 Industry Sector Descriptions, NAICS, and Agri-Forestry Aggregation Designation

Sector	Description	2017 NAICS	Agri-Forestry ^a
178	Polish & other sanitation good manuf.	325612	Manuf
179	Surface active agent manuf.	325613	Manuf
180	Toilet preparation manuf.	325620	Manuf
181	Printing ink manuf.	325910	Manuf
182	Explosives manuf.	325920	Manuf
183	Custom compounding of purchased resins	325991	Manuf
184	Photographic film & chemical manuf.	325992	Manuf
185	Other miscellaneous chemical product manuf.	325998	Manuf
186	Plastics packaging materials & unlaminated film & sheet manuf.	326111, 326112, 326113	Manuf
187	Unlaminated plastics profile shape manuf.	326121	Manuf
188	Plastics pipe & pipe fitting manuf.	326122	Manuf
189	Laminated plastics plate, sheet (except packaging), & shape manuf.	326130	Manuf
190	Polystyrene foam product manuf.	326140	Manuf
191	Urethane & other foam product (except polystyrene) manuf.	326150	Manuf
192	Plastics bottle manuf.	326160	Manuf
193	Other plastics product manuf.	326191, 326199	Manuf
194	Tire manuf.	326211, 326212	Manuf
195	Rubber & plastics hoses & belting manuf.	326220	Manuf
196	Other rubber product manuf.	326291, 326299	Manuf
197	Pottery, ceramics, & plumbing fixture manuf.	327110	Manuf
198	Brick, tile, & other structural clay product manuf.	327120	Manuf
199	Flat glass manuf.	327211	Manuf
200	Other pressed & blown glass & glassware manuf.	327212	Manuf
201	Glass container manuf.	327213	Manuf
202	Glass product manuf. made of purchased glass	327215	Manuf
203	Cement manuf.	327310	Manuf
204	Ready-mix concrete manuf.	327320	Manuf
205	Concrete block & brick manuf.	327331	Manuf
206	Concrete pipe manuf.	327332	Manuf
207	Other concrete product manuf.	327390	Manuf
208	Lime manuf.	327410	Ag Inputs
209	Gypsum product manuf.	327420	Manuf
210	Abrasive product manuf.	327910	Manuf
211	Cut stone & stone product manuf.	327991	Manuf
212	Ground or treated mineral & earth manuf.	327992	Manuf
213	Mineral wool manuf.	327993	Manuf
214	Miscellaneous nonmetallic mineral products manuf.	327999	Manuf
215	Iron & steel mills & ferroalloy manuf.	331110	Manuf
216	Iron, steel pipe & tube manuf. from purchased steel	331210	Manuf
217	Rolled steel shape manuf.	331221	Manuf
218	Steel wire drawing	331222	Manuf

Table B.1. IMPLAN 546 Industry Sector Descriptions, NAICS, and Agri-Forestry Aggregation Designation

Sector	Description	2017 NAICS	Agri-Forestry ^a
219	Alumina refining & primary aluminum production	331313	Manuf
220	Secondary smelting & alloying of aluminum	331314	Manuf
221	Aluminum sheet, plate, & foil manuf.	331315	Manuf
222	Other aluminum rolling, drawing & extruding	331318	Manuf
223	Nonferrous metal (exc. aluminum) smelting & refining	331410	Manuf
224	Copper rolling, drawing, extruding & alloying	331420	Manuf
225	Nonferrous metal, except copper & aluminum, shaping	331491	Manuf
226	Secondary processing of other nonferrous metals	331492	Manuf
227	Ferrous metal foundries	331511, 331512, 331513	Manuf
228	Nonferrous metal foundries	331523, 331524, 331529	Manuf
229	Custom roll forming	332114	Manuf
230	Crown & closure manuf. & metal stamping	332119	Manuf
231	Iron & steel forging	332111, 332117	Manuf
232	Nonferrous forging	332112, 332117	Manuf
233	Cutlery, utensil, pot, & pan manuf.	332215	Manuf
234	hand tool manuf.	332216	Manuf
235	Prefabricated metal buildings & components manuf.	332311	Manuf
236	Fabricated structural metal manuf.	332312	Manuf
237	Plate work manuf.	332313	Manuf
238	Metal window & door manuf.	332321	Manuf
239	Sheet metal work manuf.	332322	Manuf
240	Ornamental & architectural metal work manuf.	332323	Manuf
241	Power boiler & heat exchanger manuf.	332410	Manuf
242	Metal tank (heavy gauge) manuf.	332420	Manuf
243	Metal cans manuf.	332431	Manuf
244	Metal barrels, drums & pails manuf.	332439	Manuf
245	Hardware manuf.	332510	Manuf
246	Spring & wire product manuf.	332613, 332618	Manuf
247	Machine shops	332710	Manuf
248	Turned product & screw, nut, & bolt manuf.	332721, 332722	Manuf
249	Metal heat treating	332811	Manuf
250	Metal coating & nonprecious engraving	332812	Manuf
251	Electroplating, anodizing, & coloring metal	332813	Manuf
252	Valve & fittings, other than plumbing, manuf.	332911, 332912, 332919	Manuf
253	Plumbing fixture fitting & trim manuf.	332913	Manuf
254	Ball & roller bearing manuf.	332991	Manuf
255	Small arms ammunition manuf.	332992	Manuf
256	Ammunition, except for small arms, manuf.	332993	Manuf
257	Small arms, ordnance, & accessories manuf.	332994	Manuf
258	Fabricated pipe & pipe fitting manuf.	332996	Manuf

Table B.1. IMPLAN 546 Industry Sector Descriptions, NAICS, and Agri-Forestry Aggregation Designation

Sector	Description	2017 NAICS	Agri-Forestry ^a
259	Other fabricated metal manuf.	332999	Manuf
260	Farm machinery & equipment manuf.	333111	Ag Inputs
261	Lawn & garden equipment manuf.	333112	Ag Inputs
262	Construction machinery manuf.	333120	Manuf
263	Mining machinery & equipment manuf.	333131	Manuf
264	Oil & gas field machinery & equipment manuf.	333132	Manuf
265	Semiconductor machinery manuf.	333242	Manuf
266	Food product machinery manuf.	333241	Manuf
267	Sawmill, woodworking, & paper machinery	333243	Primary For
268	Printing machinery & equipment manuf.	333244	Manuf
269	All other industrial machinery manuf.	333249	Manuf
270	Optical instrument & lens manuf.	333314	Manuf
271	Photographic & photocopying equipment manuf.	333316	Manuf
272	Other commercial service industry machinery manuf.	333318	Manuf
273	Air purification & ventilation equipment manuf.	333413	Manuf
274	Heating equipment (except warm air furnaces) manuf.	333414	Manuf
275	Air conditioning, refrigeration, & warm air heating equipment manuf.	333415	Manuf
276	Industrial mold manuf.	333511	Manuf
277	Special tool, die, jig, & fixture manuf.	333514	Manuf
278	Cutting tool & machine tool accessory manuf.	333515	Manuf
279	Machine tool manuf.	333517	Manuf
280	Rolling mill & other metalworking machinery manuf.	333519	Manuf
281	Turbine & turbine generator set units manuf.	333611	Manuf
282	Speed changer, industrial high-speed drive, & gear manuf.	333612	Manuf
283	Mechanical power transmission equipment manuf.	333613	Manuf
284	Other engine equipment manuf.	333618	Manuf
285	Pump & pumping equipment manuf.	333914	Manuf
286	Air & gas compressor manuf.	333912	Manuf
287	Elevator & moving stairway manuf.	333921	Manuf
288	Conveyor & conveying equipment manuf.	333922	Manuf
289	Overhead cranes, hoists, & monorail systems manuf.	333923	Manuf
290	Industrial truck, trailer, & stacker manuf.	333924	Manuf
291	Power-driven hand tool manuf.	333991	Manuf
292	Welding & soldering equipment manuf.	333992	Manuf
293	Packaging machinery manuf.	333993	Manuf
294	Industrial process furnace & oven manuf.	333994	Manuf
295	Fluid power cylinder & actuator manuf.	333995	Manuf

Table B.1. IMPLAN 546 Industry Sector Descriptions, NAICS, and Agri-Forestry Aggregation Designation

Sector	Description	2017 NAICS	Agri-Forestry ^a
296	Fluid power pump & motor manuf.	333996	Manuf
297	Scales, balances, & miscellaneous general purpose machinery manuf.	333997, 333999	Manuf
298	Electronic computer manuf.	334111	Manuf
299	Computer storage device manuf.	334112	Manuf
300	Computer terminals & other computer peripheral equipment manuf.	334118	Manuf
301	Telephone apparatus manuf.	334210	Manuf
302	Broadcast & wireless communications equipment manuf.	334220	Manuf
303	Other communications equipment manuf.	334290	Manuf
304	Audio & video equipment manuf.	334310	Manuf
305	Printed circuit assembly (electronic assembly) manuf.	334418	Manuf
306	Bare printed circuit board manuf.	334412	Manuf
307	Semiconductor & related device manuf.	334413	Manuf
308	Capacitor, resistor, coil, transformer, & other inductor manuf.	334416	Manuf
309	Electronic connector manuf.	334417	Manuf
310	Other electronic component manuf.	334419	Manuf
311	Electromedical & electrotherapeutic apparatus manuf.	334510	Manuf
312	Search, detection, & navigation instruments manuf.	334511	Manuf
313	Automatic environmental control manuf.	334512	Manuf
314	Industrial process variable instruments manuf.	334513	Manuf
315	Totalizing fluid meter & counting device manuf.	334514	Manuf
316	Electricity & signal testing instruments manuf.	334515	Manuf
317	Analytical laboratory instrument manuf.	334516	Manuf
318	Irradiation apparatus manuf.	334517	Manuf
319	Watch, clock, & other measuring & controlling device manuf.	334519	Manuf
320	Blank magnetic & optical recording media manuf.	334613	Manuf
321	Software & other prerecorded & record reproducing	334614	Manuf
322	Electric lamp bulb & part manuf.	335110	Manuf
323	Lighting fixture manuf.	335121, 335122, 335129	Manuf
324	Small electrical appliance manuf.	335210	Manuf
325	Household cooking appliance manuf.	335220	Manuf
326	Household refrigerator & home freezer manuf.	335220	Manuf
327	Household laundry equipment manuf.	335220	Manuf
328	Other major household appliance manuf.	335220	Manuf
329	Power, distribution, & specialty transformer manuf.	335311	Manuf
330	Motor & generator manuf.	335312	Manuf

Table B.1. IMPLAN 546 Industry Sector Descriptions, NAICS, and Agri-Forestry Aggregation Designation

Sector	Description	2017 NAICS	Agri-Forestry ^a
331	Switchgear & switchboard apparatus manuf.	335313	Manuf
332	Relay & industrial control manuf.	335314	Manuf
333	Storage battery manuf.	335911	Manuf
334	Primary battery manuf.	335912	Manuf
335	Fiber optic cable manuf.	335921	Manuf
336	Other communication & energy wire manuf.	335929	Manuf
337	Wiring device manuf.	335931, 335932	Manuf
338	Carbon & graphite product manuf.	335991	Manuf
339	All other miscellaneous electrical equipment & component manuf.	335999	Manuf
340	Automobile manuf.	336111	Manuf
341	Light truck & utility vehicle manuf.	336112	Manuf
342	Heavy duty truck manuf.	336120	Manuf
343	Motor vehicle body manuf.	336211	Manuf
344	Truck trailer manuf.	336212	Manuf
345	Motor home manuf.	336213	Manuf
346	Travel trailer & camper manuf.	336214	Manuf
347	Motor vehicle gasoline engine & engine parts manuf.	336310	Manuf
348	Motor vehicle electrical & electronic equipment manuf.	336320	Manuf
349	Motor vehicle transmission & power train parts manuf.	336350	Manuf
350	Motor vehicle seating & interior trim manuf.	336360	Manuf
351	Motor vehicle metal stamping	336370	Manuf
352	Other motor vehicle parts manuf.	336390	Manuf
353	Motor vehicle steering, suspension component (except spring), & brake systems manuf.	336330, 336340	Manuf
354	Aircraft manuf.	336411	Manuf
355	Aircraft engine & engine parts manuf.	336412	Manuf
356	Other aircraft parts & auxiliary equipment manuf.	336413	Manuf
357	Guided missile & space vehicle manuf.	336414	Manuf
358	Propulsion units & parts for space vehicles & guided missiles manuf.	336415, 336419	Manuf
359	Railroad rolling stock manuf.	336510	Manuf
360	Ship building & repairing	336611	Manuf
361	Boat building	336612	Manuf
362	Motorcycle, bicycle, & parts manuf.	336991	Manuf
363	Military armored vehicle, tank, & tank component manuf.	336992	Manuf
364	All other transportation equipment manuf.	336999	Manuf
365	Wood kitchen cabinet & countertop manuf.	337110	Secondary For
366	Upholstered household furniture manuf.	337121	Secondary For
367	Nonupholstered wood household furniture manuf.	337122	Secondary For
368	Other household nonupholstered furniture manuf.	337124, 337125	Secondary For
369	Institutional furniture manuf.	337127	Secondary For
370	Wood office furniture manuf.	337211	Secondary For

Table B.1. IMPLAN 546 Industry Sector Descriptions, NAICS, and Agri-Forestry Aggregation Designation

Sector	Description	2017 NAICS	Agri-Forestry ^a
371	Custom architectural woodwork & millwork	337212	Secondary For
372	Office furniture, except wood, manuf.	337214	Manuf
373	Showcase, partition, shelving, & locker manuf.	337215	Secondary For
374	Mattress manuf.	337910	Secondary For
375	Blind & shade manuf.	337920	Secondary For
376	Surgical & medical instrument manuf.	339112	Manuf
377	Surgical appliance & supplies manuf.	339113	Manuf
378	Dental equipment & supplies manuf.	339114	Manuf
379	Ophthalmic goods manuf.	339115	Manuf
380	Dental laboratories	339116	Manuf
381	Jewelry & silverware manuf.	339910	Manuf
382	Sporting & athletic goods manuf.	339920	Manuf
383	Doll, toy, & game manuf.	339930	Manuf
384	Office supplies (except paper) manuf.	339940	Manuf
385	Sign manuf.	339950	Manuf
386	Gasket, packing, & sealing device manuf.	339991	Manuf
387	Musical instrument manuf.	339992	Manuf
388	Fasteners, buttons, needles, & pins manuf.	339993	Manuf
389	Broom, brush, & mop manuf.	339994	Manuf
390	Burial casket manuf.	339995	Manuf
391	All other miscellaneous manuf.	339999	Manuf
392	Wholesale - Motor vehicle & motor vehicle parts & supplies	423110, 423120, 423130, 423140	Wholesale Trade
393	Wholesale - Professional & commercial equipment & supplies	423410, 423420, 423430, 423440, 423450, 423460, 423490	Wholesale Trade
394	Wholesale - Household appliances & electrical & electronic goods	423610, 423620, 423690	Wholesale Trade
395	Wholesale - Machinery, equipment, & supplies	423810, 423820, 423830, 423840, 423850, 423860	Wholesale Trade
396	Wholesale - Other durable goods merchant wholesalers	423210, 423220, 423310, 423320, 423330, 423390, 423510, 423520, 423710, 423720, 423730, 423740, 423910, 423920, 423930, 423940, 423990	Wholesale Trade
397	Wholesale - Drugs & druggists' sundries	424210	Wholesale Trade
398	Wholesale - Grocery & related product wholesalers	424410, 424420, 424430, 424440, 424450, 424460, 424470, 424480, 424490	Wholesale Trade
399	Wholesale - Petroleum & petroleum products	424710, 424720	Wholesale Trade
400	Wholesale - Other nondurable goods merchant wholesalers	424110, 424120, 424130, 424310, 424320, 424330, 424340, 424510, 424520, 424590, 424610, 424690, 424810, 424820, 424910, 424920, 424930, 424940, 424950, 424990	Wholesale Trade
401	Wholesale - Wholesale electronic markets & agents & brokers	425110, 425120	Wholesale Trade
402	Retail - Motor vehicle & parts dealers	441110, 441120, 441210, 441222, 441228, 441310, 441320	Retail Trade
403	Retail - Furniture & home furnishings stores	442110, 442210, 442291, 442299	Retail Trade
404	Retail - Electronics & appliance stores	443141, 443142	Retail Trade
405	Retail - Building material & garden equipment & supplies stores	444110, 444120, 444130, 444190, 444210, 444220, 445110, 445120, 445210, 445220, 445230, 445291, 445292, 445299, 445310	Retail Trade
406	Retail - Food & beverage stores	445299, 445310	Retail Trade
407	Retail - Health & personal care stores	446110, 446120, 446130, 446191, 446199,	Retail Trade

Table B.1. IMPLAN 546 Industry Sector Descriptions, NAICS, and Agri-Forestry Aggregation Designation			
Sector	Description	2017 NAICS	Agri-Forestry ^a
408	Retail - Gasoline stores	447110, 447190	Retail Trade
409	Retail - Clothing & clothing accessories stores	448110, 448120, 448130, 448140, 448150, 448190, 448210, 448310, 448320	Retail Trade
410	Retail - Sporting goods, hobby, musical instrument & book stores	451110, 451120, 451130, 451140, 451211, 451212	Retail Trade
411	Retail - General merchandise stores	452210, 452311, 452319	Retail Trade
412	Retail - Miscellaneous store retailers	453110, 453210, 453220, 453310, 453910, 453920, 453930, 453991, 453998	Retail Trade
413	Retail - Nonstore retailers	454110, 454210, 454310, 454390	Retail Trade
414	Air transportation	481111, 481112, 481211, 481212, 481219	Transportation
415	Rail transportation	482111, 482112	Transportation
416	Water transportation	483111, 483112, 483113, 483114, 483211, 483212	Transportation
417	Truck transportation	484110, 484121, 484122, 484210, 484220, 484230	Transportation
418	Transit & ground passenger transportation	485111, 485112, 485113, 485119, 485210, 485310, 485320, 485410, 485510, 485991, 485999	Transportation
419	Pipeline transportation	486110, 486210, 486910, 486990	Transportation
420	Scenic & sightseeing transportation & support activities for transportation	487110, 487210, 487990, 488111, 488119, 488190, 488210, 488310, 488320, 488330, 488390, 488410, 488490, 488510, 488991, 488999	Transportation
421	Couriers & messengers	492110, 492210	Services
422	Warehousing & storage	493110, 493120, 493130, 493190	Services
423	Newspaper publishers	511110	Services
424	Periodical publishers	511120	Services
425	Book publishers	511130	Services
426	Directory, mailing list, & other publishers	511140, 511199	Services
427	Greeting card publishing	511191	Services
428	Software publishers	511210	Services
429	Motion picture & video industries	512110, 512120, 512131, 512132, 512191, 512199	Services
430	Sound recording industries	512230, 512240, 512250, 512290	Services
431	Radio & television broadcasting	515111, 515112, 515120	Services
432	Cable & other subscription programming	515210	Services
433	Wired telecommunications carriers	517311	Services
434	Wireless telecommunications carriers (except satellite)	517312	Services
435	Satellite, telecommunications resellers, & all other telecommunications	517410, 517911, 517919	Services
436	Data processing, hosting, & related services	518210	Services
437	News syndicates, libraries, archives & all other information services	519110, 519120, 519190	Services
438	Internet publishing & broadcasting & web search portals	519130	Services
439	Nondepository credit intermediation & related activities	522210, 522220, 522291, 522292, 522293, 522294, 522298, 522310, 522320, 522390	Finance
440	Securities & commodity contracts intermediation & brokerage	523110, 523120, 523130, 523140, 523210	Finance
441	Monetary authorities & depository credit intermediation	521110, 522110, 522120, 522130, 522190	Finance
442	Other financial investment activities	523910, 523920, 523930, 523991, 523999	Finance
443	Direct life insurance carriers	524113	Insurance
444	Insurance carriers, except direct life	524114, 524126, 524127, 524128, 524130	Insurance
445	Insurance agencies, brokerages, & related activities	524210, 524291, 524292, 524298	Insurance

Table B.1. IMPLAN 546 Industry Sector Descriptions, NAICS, and Agri-Forestry Aggregation Designation

Sector	Description	2017 NAICS	Agri-Forestry ^a
446	Funds, trusts, & other financial vehicles	525110, 525120, 525190, 525910, 525920, 525990	Finance
447	Other real estate	531120, 531130, 531190, 531210, 531311, 531312, 531320, 531390	Real Estate
448	Tenant-occupied housing	531110	Real Estate
449	Owner-occupied dwellings	n/a	Real Estate
450	Automotive equipment rental & leasing	532111, 532112, 532120	Services
451	General & consumer goods rental except video tapes & discs	532210, 532281, 532283, 532284, 532289, 532310	Services
452	Video tape & disc rental	532282	Services
453	Commercial & industrial machinery & equipment rental & leasing	532411, 532412, 532420, 532490	Services
454	Lessors of nonfinancial intangible assets	533110	Services
455	Legal services	541110, 541191, 541199	Services
456	Accounting, tax preparation, bookkeeping, & payroll services	541211, 541213, 541214, 541219	Services
457	Architectural, engineering, & related services	541310, 541320, 541330, 541340, 541350, 541360, 541370, 541380	Services
458	Specialized design services	541410, 541420, 541430, 541490	Services
459	Custom computer programming services	541511	Services
460	Computer systems design services	541512	Services
461	Other computer related services, including facilities management	541513, 541519	Services
462	Management consulting services	541611, 541612, 541613, 541614, 541618	Services
463	Environmental & other technical consulting services	541620, 541690	Services
464	Scientific research & development services	541713, 541714, 541715, 541720	Services
465	Advertising, public relations, & related services	541810, 541820, 541830, 541840, 541850, 541860, 541870, 541890	Services
466	Photographic services	541921, 541922	Services
467	Veterinary services	541940	Services
468	Marketing research & all other miscellaneous professional, scientific, & technical services	541910, 541930, 541990	Services
469	Management of companies & enterprises	551111, 551112, 551114	Services
470	Office administrative services	561110	Services
471	Facilities support services	561210	Services
472	Employment services	561311, 561312, 561320, 561330	Services
473	Business support services	561410, 561421, 561422, 561431, 561439, 561440, 561450, 561491, 561492, 561499	Services
474	Travel arrangement & reservation services	561510, 561520, 561591, 561599	Services
475	Investigation & security services	561611, 561612, 561613, 561621, 561622	Services
476	Services to buildings	561710, 561720, 561740, 561790	Services
477	Landscape & horticultural services	561730	Services
478	Other support services	561910, 561920, 561990	Services
479	Waste management & remediation services	562111, 562112, 562119, 562211, 562212, 562213, 562219, 562910, 562920, 562991, 562998	Services
480	Elementary & secondary schools	611110	Government
481	Junior colleges, colleges, universities, & professional schools	611210, 611310	Government

Table B.1. IMPLAN 546 Industry Sector Descriptions, NAICS, and Agri-Forestry Aggregation Designation

Sector	Description	2017 NAICS	Agri-Forestry ^a
482	Other educational services	611410, 611420, 611430, 611511, 611512, 611513, 611519, 611610, 611620, 611630, 611691, 611692, 611699, 611710	Services
483	Offices of physicians	621111, 621112	Services
484	Offices of dentists	621210	Services
485	Offices of other health practitioners	621310, 621320, 621330, 621340, 621391, 621399	Services
486	Outpatient care centers	621410, 621420, 621491, 621492, 621493, 621498	Services
487	Medical & diagnostic laboratories	621511, 621512	Services
488	Home health care services	621610	Services
489	Other ambulatory health care services	621910, 621991, 621999	Services
490	Hospitals	622110, 622210, 622310	Services
491	Nursing & community care facilities	623110, 623311, 623312	Services
492	Residential mental retardation, mental health, substance abuse & other facilities	623210, 623220, 623990	Services
493	Individual & family services	624110, 624120, 624190	Services
494	Child day care services	624410	Services
495	Community food, housing, & other relief services, including rehabilitation services	624210, 624221, 624229, 624230, 624310	Services
496	Performing arts companies	711110, 711120, 711130, 711190	Services
497	Commercial Sports Except Racing	711211, 711219	Services
498	Racing & Track Operation	711212	Services
499	Independent artists, writers, & performers	711510	Services
500	Promoters of performing arts & sports & agents for public figures	711310, 711320, 711410	Services
501	Museums, historical sites, zoos, & parks	712110, 712120, 712130, 712190	Services
502	Amusement parks & arcades	713110, 713120,	Services
503	Gambling industries (except casino hotels)	713210, 713290	Services
504	Other amusement & recreation industries	713910, 713920, 713930, 713990	Services
505	Fitness & recreational sports centers	713940	Services
506	Bowling centers	713950	Services
507	Hotels & motels, including casino hotels	721110, 721120	Services
508	Other accommodations	721191, 721199, 721211, 721214, 721310	Services
509	Full-service restaurants	722511	Services
510	Limited-service restaurants	722513	Services
511	All other food & drinking places	722310, 722320, 722330, 722410, 722514, 722515	Services
512	Automotive repair & maintenance, except car washes	811111, 811112, 811113, 811118, 811121, 811122, 811191, 811198	Services
513	Car washes	811192	Services
514	Electronic & precision equipment repair & maintenance	811211, 811212, 811213, 811219	Services
515	Commercial & industrial machinery & equipment repair & maintenance	811310	Services
516	Personal & household goods repair & maintenance	811411, 811412, 811420, 811430, 811490	Services
517	Personal care services	812111, 812112, 812113, 812191, 812199	Services
518	Death care services	812210, 812220,	Services
519	Dry-cleaning & laundry services	812310, 812320, 812331, 812332	Services
520	Other personal services	812910, 812921, 812922, 812930, 812990	Services
521	Religious organizations	813110	Miscellaneous
522	Grantmaking, giving, & social advocacy organizations	813211, 813212, 813219, 813311, 813312, 813319	Miscellaneous

Table B.1. IMPLAN 546 Industry Sector Descriptions, NAICS, and Agri-Forestry Aggregation Designation

Sector	Description	2017 NAICS	Agri-Forestry ^a
523	Business & professional associations	813910, 813920	Miscellaneous
524	Labor & civic organizations	813410, 813930, 813940, 813990	Miscellaneous
525	Private households	814110	Services
526	Postal service	491110	Government
527	Federal electric utilities	92	Government
528	Other federal government enterprises	92	Government
529	State government passenger transit	92	Government
530	State government electric utilities	92	Government
531	Other state government enterprises	92	Government
532	Local government passenger transit	92	Government
533	Local government electric utilities	92	Government
534	Other local government enterprises	92	Government
535	* Not an industry (Used & secondhand goods) ^b	n/a	Miscellaneous
536	* Not an industry (Scrap) ^c	n/a	Miscellaneous
537	* Not an industry (Rest of world adjustment) ^d	n/a	Miscellaneous
538	* Not an industry (Noncomparable foreign imports) ^e	n/a	Miscellaneous
539	* Employment & payroll of state govt, education	92	Government
540	* Employment & payroll of state govt, hospitals & health services	92	Government
541	* Employment & payroll of state govt, other services	92	Government
542	* Employment & payroll of local govt, education	92	Government
543	* Employment & payroll of local govt, hospitals & health services	92	Government
544	* Employment & payroll of local govt, other services	92	Government
545	* Employment & payroll of federal govt, military	92	Government
546	* Employment & payroll of federal govt, non-military	92	Government

^aIdentification of North American Industry Classification System (NAICS) sector included in the Agri-Forestry industrial complex

^bGoods (commodities) previously used and then resold.

^cCommodities cast off as part of a production process and then resold as scrap.

^dNet foreign flows of factor income.

^eGoods not available in the nation.

Source: IMPLAN Group, LLC, 2021 Data

Appendix C: Total Industry Output, Employment, Labor Income, and Total Value-Added by Agriculture and Forestry Sectors for Tennessee, 2021

Table C.1. Direct Impacts from Agriculture and Forestry^a, Tennessee, 2021

Sector	TIO	Employment	Labor Income	TVA
	(million \$)	(number)	(million \$)	(million \$)
<i>Agricultural Inputs</i>				
<u>Agricultural Chemicals</u>				
Nitrogenous fertilizer	9	7	1	2
Phosphatic fertilizer	6	7	1	2
Fertilizer mixing	19	34	3	6
Pesticide & other agricultural chemical	620	346	100	268
Lime	63	108	11	29
<i>Total --</i>	<i>716</i>	<i>502</i>	<i>115</i>	<i>307</i>
<u>Agricultural Machinery</u>				
Farm machinery & equipment	300	565	44	76
Lawn & garden equipment	1,048	1,877	110	215
<i>Total --</i>	<i>1,348</i>	<i>2,442</i>	<i>153</i>	<i>291</i>
<i>Agricultural Inputs Total --</i>	<i>2,064</i>	<i>2,944</i>	<i>269</i>	<i>598</i>
<i>Primary Agriculture</i>				
Oilseed farming	967	5,398	94	523
Grain farming	1,048	10,696	87	54
Vegetable & melon farming	119	1,755	13	57
Fruit farming	14	309	2	9
Tree nut farming	3	65	0 ^b	2
Greenhouse, nursery, & floriculture production	380	5,118	64	181
Tobacco farming	84	1,849	20	37
Cotton farming	273	3,210	67	107
Sugarcane & sugar beet farming	0	0	0	0
All other crop farming	187	20,432	31	74
Beef cattle farming	591	14,568	31	174
Dairy cattle & milk production	98	438	4	18
Poultry & egg production	696	2,638	26	66
Animal production, except cattle & poultry & eggs	212	5,553	35	141
Commercial fishing	2	479	-3	1
Commercial hunting & trapping	9	204	0 ^b	3
Support activities for agriculture & forestry	220	7,092	237	210
<i>Primary Agriculture Total --</i>	<i>4,903</i>	<i>79,804</i>	<i>709</i>	<i>1,656</i>
<i>Secondary Agriculture</i>				
<u>Foods</u>				
Dog & cat food	795	625	81	352
Other animal food	797	740	65	139
<i>Total --</i>	<i>1,592</i>	<i>1,365</i>	<i>146</i>	<i>491</i>
<u>Grain & Oilseed Milling</u>				
Flour milling	665	548	63	170
Rice milling	67	79	8	19
Malt	0	0	0	0
Wet corn milling	644	402	58	153
Soybean & other oilseed processing	2,442	564	68	484
Fats & oils refining & blending	257	169	15	40
Breakfast cereal	704	603	75	334
<i>Total --</i>	<i>4,780</i>	<i>2,365</i>	<i>287</i>	<i>1,200</i>

Table C.1. Direct Impacts from Agriculture and Forestry^a, Tennessee, 2021

Sector	TIO	Employment	Labor Income	TVA
	(million \$)	(number)	(million \$)	(million \$)
<u>Sugar & Confectionary Products</u>				
Beet sugar	0	0	0	0
Sugar cane mills & refining	76	68	6	25
Nonchocolate confectionery	799	1,407	127	271
Chocolate & confectionery (from cacao beans)	50	75	11	20
Confectionery (from purchased chocolate)	615	1,356	115	226
<i>Total --</i>	<i>1,540</i>	<i>2,906</i>	<i>258</i>	<i>543</i>
<u>Fruit & Vegetable Preserving & Specialty Foods</u>				
Frozen fruits, juices & vegetables	404	572	52	168
Frozen specialties	923	2,368	204	318
Canned fruits & vegetables	1,024	1,175	182	526
Canned specialties	94	101	10	34
Dehydrated food products	5	9	1	2
<i>Total --</i>	<i>2,450</i>	<i>4,225</i>	<i>448</i>	<i>1,048</i>
<u>Dairy Products</u>				
Cheese	940	871	62	133
Dry, condensed, & evaporated dairy product	443	352	38	135
Fluid milk	1,084	1,413	125	261
Creamery butter	0	0	0	0
Ice cream & frozen dessert	179	374	37	63
<i>Total --</i>	<i>2,645</i>	<i>3,010</i>	<i>262</i>	<i>592</i>
<u>Animal Slaughtering & Processing</u>				
Poultry processing	2,806	8,691	578	717
Animal, except poultry, slaughtering	1,102	1,759	136	160
Meat processed from carcasses	1,037	2,026	158	161
Rendering & meat byproduct processing	119	289	25	28
<i>Total --</i>	<i>5,065</i>	<i>12,764</i>	<i>898</i>	<i>1,065</i>
<u>Seafood product Preparation & Packaging</u>				
	23	48	4	6
<u>Bakeries & Tortillas</u>				
Bread & bakery product, except frozen	1,224	6,710	353	631
Frozen cakes & other pastries	413	3,557	156	254
Cookie & cracker	1,287	2,815	256	527
Dry pasta, mixes, & dough	330	484	41	140
Tortilla	37	130	10	14
<i>Total --</i>	<i>3,291</i>	<i>13,697</i>	<i>816</i>	<i>1,567</i>
<u>Other Foods</u>				
Roasted nuts & peanut butter	105	228	15	19
Other snack food	1,937	2,654	240	936
Coffee & tea	946	1,386	110	269
Flavoring syrup & concentrate	15	7	1	9
Mayonnaise, dressing, & sauce	452	660	56	158
Spice & extract	44	72	5	12
All other food	516	1,090	95	165
<i>Total --</i>	<i>4,015</i>	<i>6,097</i>	<i>524</i>	<i>1,567</i>

Table C.1. Direct Impacts from Agriculture and Forestry^a, Tennessee, 2021

Sector	TIO	Employment	Labor Income	TVA
	(million \$)	(number)	(million \$)	(million \$)
<u>Beverages</u>				
Bottled & canned soft drinks & water	2,392	3,385	265	766
Breweries	430	1,378	51	157
Wineries	167	570	22	49
Distilleries	1,900	2,199	157	974
<i>Total --</i>	<i>4,889</i>	<i>7,532</i>	<i>496</i>	<i>1,946</i>
<u>Tobacco Products</u>	3,837	1,006	100	2,971
<u>Textile Mills</u>				
Fiber, yarn, & thread mills	465	1,379	85	100
Broadwoven fabric mills	23	76	6	8
Narrow fabric mills & schiffli machine embroidery	12	68	3	3
Nonwoven fabric mills	470	1,011	82	127
Knit fabric mills	35	151	7	9
Textile & fabric finishing mills	180	589	33	41
Fabric coating mills	122	340	26	31
<i>Total --</i>	<i>1,307</i>	<i>3,613</i>	<i>243</i>	<i>319</i>
<u>Textile Products Mills</u>				
Carpet & rug mills	34	106	6	8
Curtain & linen mills	25	127	6	6
Textile bag & canvas mills	151	801	44	51
Rope, cordage, twine, tire cord & tire fabric mills	138	571	36	48
Other textile product mills	143	872	42	48
<i>Total --</i>	<i>490</i>	<i>2,476</i>	<i>133</i>	<i>161</i>
<u>Apparel</u>				
Hosiery & sock mills	56	538	27	26
Other apparel knitting mills	22	202	8	8
Cut & sew apparel contractors	137	1,325	79	70
Men's & boy's cut & sew apparel	303	2,141	139	109
Women's & girl's cut & sew apparel	17	89	3	4
Other cut & sew apparel	22	175	8	8
Apparel accessories & other apparel	24	170	11	10
<i>Total --</i>	<i>581</i>	<i>4,639</i>	<i>276</i>	<i>234</i>
<u>Leather & Allied Products</u>				
Leather & hide tanning & finishing	24	122	5	3
Footwear	19	175	5	5
Other leather & allied product	19	161	7	6
<i>Total --</i>	<i>62</i>	<i>458</i>	<i>16</i>	<i>14</i>
Secondary Agriculture Total --	36,566	66,202	4,906	13,724
Agriculture Total --	43,533	148,950	5,883	15,978
<u>Forestry Inputs</u>				
<u>Sawmill, Woodworking, & Paper Machinery</u>	47	173	16	16
<u>Timber</u>				
Forestry, forest products, & timber tract production	28	295	20	22
Commercial logging	291	2,825	185	185

Table C.1. Direct Impacts from Agriculture and Forestry^a, Tennessee, 2021

Sector	TIO	Employment	Labor Income	TVA
	(million \$)	(number)	(million \$)	(million \$)
Total --	320	3,120	206	207
Forestry Inputs Total --	366	3,293	222	223
Primary Forestry				
Sawmills	880	2,436	126	280
Wood preservation	79	99	6	34
Pulp mills	29	45	6	10
Paper mills	1,499	1,612	195	639
Paperboard Mills	1,009	1,076	160	412
Primary Forestry Total --	3,495	5,267	493	1,376
Secondary Forestry				
<u>Veneer, Plywood, & Engineered Wood Products</u>				
Veneer & plywood	28	102	5	9
Engineered wood member & truss	417	1,214	93	189
Reconstituted wood product	173	273	22	84
Total --	619	1,589	120	282
<u>Wood Windows & Doors & Millwork</u>				
Wood windows & door	530	1,852	128	233
Cut stock, resawing lumber, & planning	149	371	30	87
Other millwork, including flooring	339	1,272	74	153
Total --	1,018	3,495	232	472
<u>Wood Containers & Pallets</u>				
	472	2,539	136	179
<u>Manufactured Homes (Mobile Homes)</u>				
Manufactured home (mobile home)	889	2,974	255	453
Prefabricated wood building	102	371	24	49
Total --	991	3,344	279	502
<u>All Other Miscellaneous Wood Products</u>				
	97	422	21	38
<u>Paperboard Containers</u>				
	3,118	5,662	507	866
<u>Paper Bags & Coated & Treated Paper</u>				
	1,120	2,012	223	454
<u>Stationery Products</u>				
	359	777	78	118
<u>Other Converted Paper Products</u>				
Sanitary paper product	588	545	55	267
All other converted paper product	236	665	44	78
Total --	824	1,210	99	345
<u>Wood Kitchen Cabinets & Countertops</u>				
	302	1,804	99	132
<u>Household & Institutional Furniture</u>				
Upholstered household furniture	812	4,490	236	234
Nonupholstered wood household furniture	71	451	22	25
Other household nonupholstered furniture	99	272	19	29
Institutional furniture	123	662	34	33

Table C.1. Direct Impacts from Agriculture and Forestry^a, Tennessee, 2021

Sector	TIO	Employment	Labor Income	TVA
	(million \$)	(number)	(million \$)	(million \$)
<i>Total --</i>	<i>1,106</i>	<i>5,875</i>	<i>311</i>	<i>320</i>
<u>Office Furniture</u>				
Wood office furniture	14	65	3	4
Custom architectural woodwork & millwork	76	473	26	24
Showcase, partition, shelving, & locker	275	1,292	87	108
<i>Total --</i>	<i>365</i>	<i>1,829</i>	<i>116</i>	<i>136</i>
<u>Other Furniture Related Products</u>				
Mattress	248	648	34	61
Blind & shade	2	12	1	1
<i>Total --</i>	<i>250</i>	<i>660</i>	<i>35</i>	<i>61</i>
<i>Secondary Forestry Total --</i>	<i>10,640</i>	<i>31,218</i>	<i>2,255</i>	<i>3,906</i>
<i>Forestry Total --</i>	<i>14,501</i>	<i>39,778</i>	<i>2,970</i>	<i>5,505</i>
<i>Agriculture & Forestry Total --</i>	<i>58,034</i>	<i>188,728</i>	<i>8,853</i>	<i>21,483</i>
<i>Construction --</i>	<i>40,002</i>	<i>247,736</i>	<i>18,888</i>	<i>19,142</i>
<i>Finance --</i>	<i>29,039</i>	<i>122,382</i>	<i>9,636</i>	<i>15,667</i>
<i>Government --</i>	<i>57,274</i>	<i>473,027</i>	<i>34,275</i>	<i>44,541</i>
<i>Insurance --</i>	<i>30,082</i>	<i>67,495</i>	<i>6,065</i>	<i>12,453</i>
<i>Manufacturing --</i>	<i>133,274</i>	<i>257,660</i>	<i>22,579</i>	<i>40,416</i>
<i>Mining --</i>	<i>2,777</i>	<i>5,758</i>	<i>377</i>	<i>1,118</i>
<i>Miscellaneous --</i>	<i>10,566</i>	<i>82,957</i>	<i>4,551</i>	<i>4,532</i>
<i>Real Estate --</i>	<i>68,898</i>	<i>141,637</i>	<i>6,424</i>	<i>46,215</i>
<i>Retail Trade --</i>	<i>43,472</i>	<i>369,211</i>	<i>16,170</i>	<i>26,890</i>
<i>Services --</i>	<i>266,759</i>	<i>1,906,275</i>	<i>125,302</i>	<i>161,860</i>
<i>Transportation --</i>	<i>22,108</i>	<i>130,544</i>	<i>8,740</i>	<i>10,312</i>
<i>Utilities --</i>	<i>5,769</i>	<i>4,463</i>	<i>616</i>	<i>2,737</i>
<i>Wholesale Trade --</i>	<i>51,983</i>	<i>130,668</i>	<i>13,065</i>	<i>29,464</i>
<i>Total Economy --</i>	<i>820,036</i>	<i>4,128,541</i>	<i>275,541</i>	<i>436,829</i>

^aTotals may not add due to rounding.

^bValues of zero are nonzero values less than 1.

**Appendix D. Total Impacts from the Agriculture and Forestry Sectors, Tennessee,
2021**

Table D.1. Total Impacts from Agriculture and Forestry^a, Tennessee, 2021

Sector	TIO (million \$)				Employment (number)				Labor Income (million \$)				TVA (million \$)			
	Type I	Indirect	Type Sam	Total	Type I	Indirect	Type Sam	Total	Type I	Indirect	Type Sam	Total	Type I	Indirect	Type Sam	Total
<i>Agricultural Inputs</i>																
<i>Agricultural Chemicals</i>																
Nitrogenous fertilizer	1.50	13	1.70	15	3.11	22	4.49	32	2.26	2	2.88	3	1.91	5	2.34	6
Phosphatic fertilizer	1.40	8	1.61	9	2.24	16	3.19	22	1.83	1	2.33	2	1.73	3	2.16	4
Fertilizer mixing	1.35	25	1.58	29	1.79	60	2.49	84	1.63	5	2.08	7	1.61	10	2.02	12
Pesticide & other ag chemicals	1.25	776	1.45	897	2.91	1,009	4.89	1,693	1.51	151	1.93	192	1.30	348	1.57	420
Lime	1.45	91	1.69	106	1.87	203	2.63	285	1.68	18	2.14	23	1.49	43	1.78	52
<i>Total --</i>		<i>913</i>		<i>1,056</i>		<i>1,310</i>		<i>2,116</i>		<i>178</i>		<i>226</i>		<i>408</i>		<i>493</i>
<i>Agricultural Machinery</i>																
Farm machinery & equipment	1.38	415	1.60	480	1.84	1,037	2.48	1,403	1.84	81	2.35	103	1.76	134	2.27	172
Lawn & garden equipment	1.34	1,408	1.52	1,588	1.75	3,287	2.29	4,300	2.04	223	2.60	284	1.84	395	2.33	502
<i>Total --</i>		<i>1,823</i>		<i>2,068</i>		<i>4,325</i>		<i>5,703</i>		<i>304</i>		<i>387</i>		<i>529</i>		<i>674</i>
<i>Agricultural Inputs Total --</i>		<i>2,736</i>		<i>3,125</i>		<i>5,635</i>		<i>7,819</i>		<i>481</i>		<i>614</i>		<i>937</i>		<i>1,167</i>
<i>Primary Agriculture</i>																
Oilseed farming	1.27	1,230	1.41	1,366	1.19	6,447	1.34	7,207	1.75	165	2.23	211	1.25	652	1.40	732
Grain farming	1.67	1,752	1.88	1,973	1.26	13,464	1.37	14,701	3.12	272	3.98	347	7.42	401	9.85	532
Vegetable & melon farming	1.38	165	1.55	185	1.10	1,930	1.16	2,045	1.94	25	2.48	32	1.39	80	1.60	92
Fruit farming	1.20	16	1.35	18	1.03	318	1.07	329	1.44	2	1.84	3	1.15	10	1.28	11
Tree nut farming	1.18	3	1.32	3	1.02	66	1.06	68	1.38	0 ^b	1.76	1	1.13	2	1.25	2
Greenhouse, nursery, & floriculture production	1.31	498	1.51	576	1.09	5,565	1.17	5,999	1.51	96	1.92	123	1.33	241	1.58	287
Tobacco farming	1.40	117	1.67	140	1.07	1,983	1.14	2,111	1.46	28	1.86	36	1.44	53	1.81	67
Cotton farming	1.27	348	1.53	418	1.09	3,515	1.22	3,909	1.31	87	1.67	111	1.34	144	1.73	186
Sugarcane & sugar beet farming	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0
All other crop farming	1.46	274	1.69	317	1.01	20,734	1.03	20,974	1.70	53	2.16	68	1.56	115	1.91	141
Beef cattle farming	1.34	795	1.46	866	1.05	15,363	1.08	15,763	2.82	88	3.60	112	1.56	272	1.81	314
Dairy cattle & milk production	1.55	152	1.70	167	1.42	623	1.61	703	5.00	18	6.37	23	2.42	43	2.89	52
Poultry & egg production	1.52	1,058	1.65	1,150	1.43	3,767	1.62	4,277	4.37	113	5.57	144	3.43	225	4.25	279
Commercial fishing	1.44	3	0.52	1	1.01	483	0.98	471	0.90	-3	1.16	-3	1.40	2	0.36	0 ^b
Animal production, except cattle, poultry, & eggs	1.18	250	1.36	288	1.03	5,693	1.06	5,903	1.29	46	1.66	59	1.13	159	1.29	182

Table D.1. Total Impacts from Agriculture and Forestry^a, Tennessee, 2021

Sector	TIO (million \$)				Employment (number)				Labor Income (million \$)				TVA (million \$)			
	Type I	Indirect	Type Sam	Total	Type I	Indirect	Type Sam	Total	Type I	Indirect	Type Sam	Total	Type I	Indirect	Type Sam	Total
Commercial hunting & trapping	1.46	12	1.58	13	1.10	223	1.13	229	1502.38	1	1908.73	2	1.72	5	1.95	6
Support activities for ag & forestry	1.03	227	1.91	420	1.00	7,118	1.16	8,198	1.01	239	1.29	305	1.02	213	1.56	328
Primary Agriculture Total --		6,901		7,902		87,293		92,889		1,233		1,573		2,617		3,210
Secondary Agriculture																
<u>Foods</u>																
Dog & cat food	1.21	964	1.34	1,068	2.42	1,512	3.36	2,102	1.62	131	2.06	167	1.21	428	1.39	490
Other animal food	1.38	1,099	1.53	1,217	3.54	2,618	4.44	3,288	2.30	149	2.92	190	1.89	262	2.40	333
<i>Total --</i>		<i>2,063</i>		<i>2,285</i>		<i>4,131</i>		<i>5,391</i>		<i>280</i>		<i>357</i>		<i>690</i>		<i>823</i>
<u>Grain & Oilseed Milling</u>																
Flour milling	1.62	1,076	1.82	1,210	6.11	3,353	7.50	4,110	2.65	168	3.38	214	1.88	320	2.35	400
Rice milling	1.51	102	1.69	114	4.39	348	5.26	417	1.95	15	2.48	19	1.57	29	1.96	36
Malt	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0
Wet corn milling	1.60	1,033	1.79	1,156	7.87	3,161	9.61	3,860	2.68	155	3.42	197	1.91	291	2.39	364
Soybean & other oilseed processing	1.26	3,088	1.33	3,251	8.13	4,587	9.77	5,512	3.02	204	3.84	260	1.70	823	1.90	920
Fats & oils refining & blending	1.27	325	1.38	354	3.15	531	4.13	696	2.40	37	3.05	47	1.87	74	2.30	92
Breakfast cereal	1.23	865	1.37	965	2.20	1,330	3.14	1,894	1.68	126	2.13	160	1.23	410	1.40	469
<i>Total --</i>		<i>6,488</i>		<i>7,049</i>		<i>13,309</i>		<i>16,488</i>		<i>705</i>		<i>898</i>		<i>1,947</i>		<i>2,281</i>
<u>Sugar & Confectionary Products</u>																
Beet sugar	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0
Sugar cane mills & refining	1.30	99	1.44	110	2.49	170	3.39	231	2.38	14	3.03	17	1.50	37	1.76	43
Nonchocolate confectionery	1.35	1,078	1.57	1,256	1.86	2,613	2.57	3,623	1.77	225	2.25	286	1.54	416	1.93	523
Chocolate & confectionery from cacao beans	1.32	66	1.58	78	2.93	219	3.91	293	1.52	16	1.94	21	1.41	29	1.79	37
Confectionery from purchased chocolate	1.32	810	1.55	955	1.73	2,344	2.34	3,167	1.60	183	2.03	233	1.44	326	1.82	413
<i>Total --</i>		<i>2,053</i>		<i>2,400</i>		<i>5,346</i>		<i>7,314</i>		<i>438</i>		<i>557</i>		<i>809</i>		<i>1,015</i>
<u>Fruit & Vegetable Preserving & Specialty Foods</u>																
Frozen fruits, juices & vegetables	1.32	535	1.51	612	2.10	1,199	2.87	1,641	1.90	98	2.42	125	1.41	236	1.68	283
Frozen specialties	1.31	1,207	1.55	1,432	1.76	4,155	2.29	5,433	1.40	284	1.78	362	1.36	433	1.78	567
Canned fruits & vegetables	1.23	1,256	1.43	1,463	1.87	2,203	2.87	3,375	1.43	261	1.82	332	1.22	644	1.46	767
Canned specialties	1.14	107	1.26	118	1.61	162	2.23	225	1.44	14	1.83	18	1.19	41	1.39	47

Table D.1. Total Impacts from Agriculture and Forestry^a, Tennessee, 2021

Sector	TIO (million \$)				Employment (number)				Labor Income (million \$)				TVA (million \$)			
	Type I	Indirect	Type Sam	Total	Type I	Indirect	Type Sam	Total	Type I	Indirect	Type Sam	Total	Type I	Indirect	Type Sam	Total
Dehydrated food products	1.21	6	1.37	7	1.52	13	2.04	18	1.53	1	1.95	1	1.30	2	1.57	3
<i>Total --</i>		<i>3,110</i>		<i>3,632</i>		<i>7,733</i>		<i>10,692</i>		<i>658</i>		<i>837</i>		<i>1,356</i>		<i>1,667</i>
<u>Dairy Products</u>																
Cheese	1.29	1,209	1.41	1,326	2.44	2,126	3.20	2,791	2.39	148	3.04	188	1.97	262	2.49	332
Dry, condensed, & evaporated dairy products	1.30	576	1.44	640	2.68	943	3.70	1,301	2.12	80	2.70	101	1.48	200	1.76	237
Fluid milk	1.34	1,451	1.52	1,642	2.22	3,136	2.99	4,219	1.92	241	2.44	306	1.67	437	2.11	551
Creamery butter	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0
Ice cream & frozen dessert	1.28	229	1.52	271	1.56	585	2.21	828	1.46	54	1.85	69	1.39	88	1.79	114
<i>Total --</i>		<i>3,464</i>		<i>3,879</i>		<i>6,790</i>		<i>9,138</i>		<i>522</i>		<i>664</i>		<i>987</i>		<i>1,233</i>
<u>Animal Slaughtering & Processing</u>																
Poultry processing	1.38	3,870	1.62	4,542	1.54	13,374	1.98	17,179	1.46	846	1.86	1,077	1.56	1,120	2.12	1,520
Animal, except poultry, slaughtering	1.73	1,911	1.95	2,151	8.03	14,123	8.80	15,484	2.22	302	2.82	384	3.18	508	4.08	651
Meat processed from carcasses	1.43	1,484	1.63	1,695	3.62	7,340	4.22	8,539	1.68	267	2.14	339	2.30	370	3.08	496
Rendering & meat byproduct processing	1.57	187	1.90	226	2.20	634	2.97	857	2.00	50	2.54	63	2.22	62	3.06	85
<i>Total --</i>		<i>7,452</i>		<i>8,615</i>		<i>35,470</i>		<i>42,060</i>		<i>1,465</i>		<i>1,863</i>		<i>2,060</i>		<i>2,752</i>
<u>Seafood Product Prep & Packaging</u>	1.26	29	1.46	34	1.91	91	2.45	117	1.62	6	2.06	7	1.59	9	2.07	12
<u>Bakeries & Tortillas</u>																
Frozen cakes & other pastries	1.20	497	1.56	645	1.10	3,915	1.34	4,756	1.20	187	1.52	238	1.17	298	1.52	387
Bread & bakery product, except frozen	1.29	1,577	1.60	1,957	1.26	8,479	1.58	10,633	1.36	479	1.72	609	1.28	806	1.64	1,032
Cookies & crackers	1.30	1,677	1.55	1,994	1.62	4,569	2.26	6,362	1.56	399	1.98	507	1.38	728	1.74	916
Dry pasta, mixes, & dough	1.30	430	1.48	489	1.98	960	2.68	1,298	1.84	75	2.34	95	1.35	189	1.61	225
Tortilla	1.29	47	1.58	58	1.38	180	1.84	240	1.37	13	1.75	17	1.38	19	1.84	26
<i>Total --</i>		<i>4,228</i>		<i>5,143</i>		<i>18,103</i>		<i>23,289</i>		<i>1,153</i>		<i>1,467</i>		<i>2,041</i>		<i>2,585</i>
<u>Other Foods</u>																
Roasted nuts & peanut butter	1.44	151	1.68	175	2.55	582	3.16	719	1.97	31	2.51	39	2.24	42	3.01	56
Other snack food	1.27	2,466	1.44	2,786	3.80	10,072	4.48	11,884	1.68	403	2.13	513	1.28	1,195	1.48	1,386

Table D.1. Total Impacts from Agriculture and Forestry^a, Tennessee, 2021

Sector	TIO (million \$)				Employment (number)				Labor Income (million \$)				TVA (million \$)			
	Type I	Indirect	Type Sam	Total	Type I	Indirect	Type Sam	Total	Type I	Indirect	Type Sam	Total	Type I	Indirect	Type Sam	Total
Coffee & tea	1.36	1,287	1.55	1,466	4.00	5,539	4.73	6,552	2.05	225	2.60	287	1.65	444	2.04	550
Flavoring syrup & concentrate	1.19	18	1.27	19	2.98	20	4.06	27	2.28	2	2.90	2	1.17	10	1.26	11
Mayonnaise, dressing, & sauce	1.25	564	1.41	635	2.13	1,404	2.75	1,812	1.61	91	2.04	115	1.34	212	1.62	255
Spice & extract	1.44	64	1.65	73	6.86	497	7.58	549	2.13	12	2.71	15	1.83	21	2.29	27
All other food	1.37	708	1.62	834	2.05	2,234	2.70	2,946	1.66	158	2.11	201	1.57	260	2.03	335
<i>Total --</i>		<i>5,258</i>		<i>5,988</i>		<i>20,348</i>		<i>24,489</i>		<i>921</i>		<i>1,172</i>		<i>2,185</i>		<i>2,620</i>
<u>Beverages</u>																
Bottled & canned soft drinks & water	1.29	3,082	1.45	3,462	1.84	6,240	2.48	8,390	1.81	480	2.30	610	1.46	1,119	1.76	1,345
Breweries	1.35	579	1.52	653	1.52	2,093	1.82	2,509	1.82	93	2.32	118	1.43	225	1.71	268
Wineries	1.39	231	1.59	266	1.49	847	1.83	1,041	1.96	43	2.49	55	1.71	84	2.12	105
Distilleries	1.26	2,396	1.39	2,641	1.92	4,213	2.55	5,602	1.97	310	2.50	394	1.27	1,235	1.42	1,381
<i>Total --</i>		<i>6,288</i>		<i>7,021</i>		<i>13,394</i>		<i>17,542</i>		<i>926</i>		<i>1,177</i>		<i>2,663</i>		<i>3,099</i>
<u>Tobacco Products</u>	1.14	4,357	1.19	4,575	3.69	3,712	4.92	4,946	2.75	275	3.50	350	1.09	3,230	1.13	3,359
<u>Textile Mills</u>																
Fiber, yarn, & thread mills	1.38	640	1.60	746	2.15	2,959	2.58	3,556	1.57	133	1.99	169	1.75	176	2.38	238
Broadwoven fabric mills	1.31	30	1.59	36	1.43	108	1.91	144	1.36	8	1.72	10	1.43	11	1.93	15
Narrow fabric mills & schiffli machine embroidery	1.31	16	1.60	19	1.19	80	1.48	100	1.35	4	1.71	6	1.48	5	2.08	7
Nonwoven fabric mills	1.27	598	1.47	692	1.50	1,513	2.02	2,045	1.44	119	1.83	151	1.47	186	1.91	242
Knit fabric mills	1.34	47	1.59	56	1.31	198	1.64	248	1.52	11	1.93	14	1.62	15	2.19	20
Textile & fabric finishing mills	1.33	239	1.57	282	1.44	849	1.85	1,092	1.63	54	2.08	69	1.78	72	2.41	98
Fabric coating mills	1.30	159	1.55	189	1.41	478	1.91	649	1.47	38	1.87	49	1.59	49	2.18	67
<i>Total --</i>		<i>1,730</i>		<i>2,021</i>		<i>6,186</i>		<i>7,835</i>		<i>368</i>		<i>468</i>		<i>514</i>		<i>687</i>
<u>Textile Product Mills</u>																
Carpet & rug mills	1.28	44	1.48	51	1.28	136	1.66	176	1.44	9	1.83	11	1.52	12	2.06	16
Curtain & linen mills	1.33	33	1.59	40	1.26	159	1.55	197	1.50	8	1.91	11	1.64	11	2.25	14
Textile bag & canvas mills	1.30	196	1.62	243	1.31	1,052	1.64	1,317	1.36	59	1.73	75	1.46	74	2.01	102
Rope, cordage, twine, tire cord & tire fabric mills	1.38	189	1.67	229	1.42	810	1.82	1,037	1.42	51	1.80	64	1.52	72	2.02	96

Table D.1. Total Impacts from Agriculture and Forestry^a, Tennessee, 2021

Sector	TIO (million \$)				Employment (number)				Labor Income (million \$)				TVA (million \$)			
	Type I	Indirect	Type Sam	Total	Type I	Indirect	Type Sam	Total	Type I	Indirect	Type Sam	Total	Type I	Indirect	Type Sam	Total
Other textile product mills	1.47	210	1.81	259	1.40	1,221	1.72	1,502	1.48	63	1.88	80	1.69	82	2.30	111
Hosiery & sock mills	1.27	71	1.74	97	1.11	594	1.38	743	1.20	33	1.53	42	1.30	34	1.90	49
Other apparel knitting mills	1.18	26	1.54	33	1.07	217	1.29	260	1.16	10	1.47	12	1.25	10	1.81	15
<i>Total --</i>		769		953		4,189		5,231		232		295		295		404
Apparel																
Cut & sew apparel contractors	1.22	168	1.75	240	1.11	1,474	1.42	1,883	1.16	91	1.47	116	1.24	87	1.86	130
Men's & boy's cut & sew apparel	1.24	377	1.68	509	1.18	2,536	1.53	3,285	1.20	167	1.52	212	1.37	150	2.09	228
Women's & girl's cut & sew apparel	1.38	24	1.65	28	1.43	126	1.72	152	1.77	6	2.26	7	1.94	7	2.66	10
Other cut & sew apparel	1.40	31	1.81	40	1.26	220	1.55	272	1.41	12	1.79	15	1.64	12	2.36	18
Apparel accessories & other apparel	1.28	30	1.73	41	1.25	213	1.61	274	1.22	13	1.55	17	1.39	13	2.05	20
<i>Total --</i>		630		858		4,570		5,866		288		367		269		406
Leather & Allied Products																
Leather & hide tanning & finishing	1.31	31	1.54	37	1.24	151	1.50	182	1.51	7	1.92	9	2.28	7	3.34	10
Footwear	1.59	30	1.96	37	1.25	220	1.48	260	1.70	9	2.16	11	2.22	11	3.06	15
Other leather & allied products	1.51	29	1.92	37	1.25	201	1.52	246	1.50	10	1.91	13	1.86	11	2.62	16
<i>Total --</i>		90		110		572		688		26		33		30		42
Secondary Agriculture Total --		48,009		54,564		143,944		181,087		8,265		10,511		19,083		22,985
Agriculture Total --		57,646		65,590		236,871		281,794		9,979		12,698		22,637		27,362
Forestry Inputs																
<u>Sawmill, woodworking, & paper machinery</u>	1.49	69	1.94	91	1.71	296	2.40	415	1.65	26	2.10	33	1.83	29	2.61	42
Timber																
Forestry, forest products, & timber tract production	1.13	32	1.79	51	1.29	381	1.65	487	1.14	23	1.45	30	1.13	25	1.63	36
Commercial logging	1.21	351	1.81	528	1.29	3,657	1.65	4,651	1.16	214	1.48	274	1.20	222	1.76	326
<i>Total --</i>		383		579		4,038		5,138		237		304		247		363
Forestry Inputs Total --		453		669		4,334		5,553		264		337		276		404
Primary Forestry																
Sawmills	1.54	1,357	1.84	1,622	2.22	5,404	2.83	6,895	2.59	327	3.31	417	1.95	546	2.51	703
Wood preservation	1.30	102	1.43	113	2.01	199	2.62	260	2.40	13	3.05	17	1.36	46	1.55	53

Table D.1. Total Impacts from Agriculture and Forestry^a, Tennessee, 2021

Sector	TIO (million \$)				Employment (number)				Labor Income (million \$)				TVA (million \$)			
	Type I	Indirect	Type Sam	Total	Type I	Indirect	Type Sam	Total	Type I	Indirect	Type Sam	Total	Type I	Indirect	Type Sam	Total
Pulp mills	1.37	40	1.64	48	2.11	94	3.10	138	1.60	10	2.04	12	1.55	16	2.01	20
Paper mills	1.35	2,023	1.55	2,321	2.37	3,818	3.41	5,489	1.88	367	2.40	468	1.41	903	1.69	1,079
Paperboard Mills	1.40	1,410	1.63	1,649	2.64	2,841	3.89	4,187	1.83	293	2.34	374	1.49	613	1.83	754
Primary Forestry Total --		4,932		5,752		12,356		16,969		1,009		1,288		2,123		2,609
Secondary Forestry																
<u>Veneer, Plywood, & Engineered Wood Products</u>																
Veneer & plywood	1.40	40	1.69	48	1.72	175	2.16	220	1.96	10	2.50	13	1.71	15	2.24	20
Engineered wood member & truss	1.35	561	1.61	672	1.49	1,815	2.01	2,439	1.47	138	1.88	176	1.38	260	1.72	325
Reconstituted wood products	1.24	214	1.40	243	1.68	457	2.27	619	1.62	36	2.07	45	1.24	104	1.44	121
<i>Total --</i>		<i>815</i>		<i>963</i>		<i>2,447</i>		<i>3,278</i>		<i>183</i>		<i>234</i>		<i>379</i>		<i>466</i>
<u>Wood Windows & Doors & Millwork</u>																
Wood windows & door	1.34	710	1.62	861	1.43	2,646	1.89	3,492	1.46	187	1.86	238	1.39	324	1.77	413
Cut stock, resawing lumber, & planing	1.27	189	1.50	224	1.53	567	2.06	763	1.44	43	1.83	55	1.22	106	1.46	127
Other millworks, including floors	1.38	467	1.65	560	1.47	1,872	1.88	2,396	1.56	116	1.99	147	1.41	215	1.77	270
<i>Total --</i>		<i>1,366</i>		<i>1,645</i>		<i>5,084</i>		<i>6,651</i>		<i>346</i>		<i>441</i>		<i>645</i>		<i>810</i>
<u>Wood Containers & Pallets</u>																
	1.40	660	1.73	817	1.31	3,326	1.66	4,210	1.44	195	1.83	249	1.52	272	2.04	365
<u>Manufactured Homes (Mobile Homes)</u>																
Manufactured homes (mobile homes)	1.24	1,102	1.53	1,361	1.32	3,931	1.81	5,385	1.26	321	1.61	409	1.24	560	1.57	714
Prefabricated wood buildings	1.31	134	1.58	162	1.39	514	1.81	670	1.42	35	1.81	44	1.32	65	1.66	81
<i>Total --</i>		<i>1,236</i>		<i>1,522</i>		<i>4,445</i>		<i>6,056</i>		<i>356</i>		<i>453</i>		<i>625</i>		<i>795</i>
<u>All Other Miscellaneous Wood Products</u>																
	1.42	139	1.71	167	1.47	620	1.85	778	1.70	35	2.17	45	1.55	59	1.99	75
<u>Paperboard Containers</u>																
	1.38	4,313	1.61	5,014	1.85	10,455	2.54	14,394	1.72	870	2.19	1,108	1.70	1,474	2.18	1,889
<u>Paper Bags & Coated & Treated Paper</u>																
	1.25	1,398	1.47	1,645	1.52	3,060	2.21	4,450	1.38	307	1.76	391	1.31	594	1.63	740

Table D.1. Total Impacts from Agriculture and Forestry^a, Tennessee, 2021

Sector	TIO (million \$)				Employment (number)				Labor Income (million \$)				TVA (million \$)			
	Type I	Indirect	Type Sam	Total	Type I	Indirect	Type Sam	Total	Type I	Indirect	Type Sam	Total	Type I	Indirect	Type Sam	Total
<u>Stationery Products</u>	1.34	479	1.60	574	1.64	1,272	2.32	1,803	1.51	117	1.92	149	1.53	180	2.00	236
<u>Other Converted Paper Products</u>																
Sanitary paper products	1.24	727	1.37	808	2.02	1,100	2.85	1,552	1.81	100	2.30	127	1.27	339	1.45	386
All other converted paper products	1.38	325	1.64	387	1.60	1,063	2.12	1,412	1.74	77	2.22	98	1.58	124	2.05	161
<i>Total --</i>		<i>1,053</i>		<i>1,195</i>		<i>2,164</i>		<i>2,964</i>		<i>176</i>		<i>225</i>		<i>463</i>		<i>548</i>
<u>Wood Kitchen Cabinets & Countertops</u>	1.30	392	1.64	496	1.23	2,221	1.55	2,802	1.30	128	1.66	163	1.35	178	1.81	240
<u>Household & Institutional Furniture</u>																
Upholstered household furniture	1.42	1,157	1.77	1,441	1.33	5,959	1.68	7,558	1.50	353	1.91	450	1.79	417	2.51	586
Nonupholstered wood household furniture	1.36	97	1.70	121	1.25	563	1.55	699	1.39	30	1.77	38	1.53	38	2.12	52
Other household nonupholstered furniture	1.40	139	1.67	166	1.68	457	2.22	605	1.70	33	2.17	42	1.72	49	2.26	65
Institutional furniture	1.40	173	1.73	214	1.34	890	1.69	1,118	1.48	50	1.88	64	1.76	59	2.48	83
<i>Total --</i>		<i>1,566</i>		<i>1,941</i>		<i>7,869</i>		<i>9,979</i>		<i>466</i>		<i>594</i>		<i>563</i>		<i>786</i>
<u>Office Furniture</u>																
Wood office furniture	1.43	20	1.71	24	1.42	92	1.76	114	1.68	5	2.14	6	1.82	7	2.43	9
Custom architectural woodwork & millwork	1.36	103	1.73	132	1.26	598	1.60	757	1.33	35	1.69	45	1.57	38	2.26	55
Showcase, partition, shelving, & locker	1.27	350	1.60	438	1.24	1,604	1.63	2,102	1.27	110	1.61	140	1.34	145	1.83	197
<i>Total --</i>		<i>473</i>		<i>594</i>		<i>2,294</i>		<i>2,972</i>		<i>150</i>		<i>191</i>		<i>190</i>		<i>261</i>
<u>Other Furniture Related Products</u>																
Mattresses	1.42	353	1.66	411	1.78	1,152	2.28	1,479	2.12	72	2.70	92	1.88	115	2.45	149
Blind & shades	1.52	4	1.85	4	1.41	17	1.77	22	1.68	1	2.14	1	2.19	1	3.04	2
<i>Total --</i>		<i>356</i>		<i>415</i>		<i>1,169</i>		<i>1,500</i>		<i>73</i>		<i>93</i>		<i>116</i>		<i>151</i>
Secondary Forestry Total --		14,246		16,987		46,425		61,839		3,403		4,335		5,738		7,362
Forestry Total --		19,631		23,409		63,115		84,360		4,676		5,960		8,138		10,376
Agriculture & Forestry Total --		77,277		88,999		299,986		366,154		14,655		18,658		30,775		37,738

Table D.1. Total Impacts from Agriculture and Forestry^a, Tennessee, 2021

Sector	TIO (million \$)				Employment (number)				Labor Income (million \$)				TVA (million \$)			
	Type I	Indirect	Type Sam	Total	Type I	Indirect	Type Sam	Total	Type I	Indirect	Type Sam	Total	Type I	Indirect	Type Sam	Total
Construction --		58,256		78,370		330,830		443,999		24,632		31,466		28,900		40,812
Finance --		42,981		54,845		196,591		263,234		14,713		18,744		22,931		29,957
Government --		67,134		97,104		510,881		679,186		37,229		47,412		49,158		66,907
Insurance --		57,815		68,837		162,042		223,956		13,667		17,412		24,488		31,016
Manufacturing --		181,370		211,653		447,668		617,782		37,477		47,766		63,970		81,905
Mining --		4,256		5,034		12,637		17,011		961		1,226		1,932		2,393
Miscellaneous --		17,227		22,707		118,611		149,395		6,792		8,654		7,921		11,166
Real Estate --		95,981		108,448		236,171		292,108		12,143		15,520		60,109		67,492
Retail Trade --		62,716		81,458		473,327		578,666		23,136		29,504		36,952		48,051
Services --		375,426		508,821		2,493,267		3,243,064		164,589		209,914		219,788		298,788
Transportation --		33,760		44,431		194,738		254,707		13,189		16,815		16,782		23,101
Utilities --		7,525		8,380		9,051		13,857		1,057		1,348		3,494		4,001
Wholesale Trade --		76,763		95,295		265,900		370,020		22,940		29,236		43,202		54,177

^aTotals may not add due to rounding.

^bValues of zero are nonzero values less than 1.

^cNegative values.



RR 23-001-A

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