College of Agriculture, Food and Environment

Forestry and Natural Resources Extension

Kentucky Forest Sector Economic Contribution Report 2021 - 2022

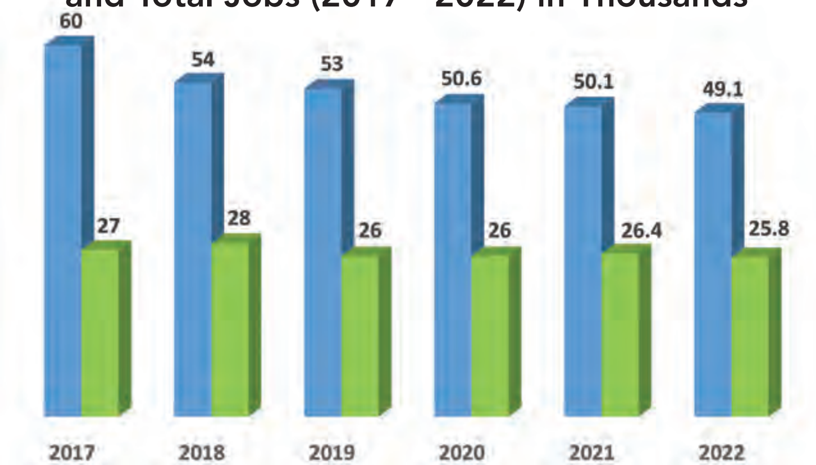
Annual Forest Sector Economic Contribution Estimates

The overall Kentucky forest sector contribution was down 1.3% in 2022 compared to 2021 with an estimated $9.08 billion in direct contributions and a total estimate economic contribution of $13.5 billion (Figure 1). This decrease is largely a result of continued workforce and market challenges. An initiative, Forestry Works Kentucky, is underway to address workforce issues. The downtrend in the forest sector is significant, as it is one of the largest sectors in Kentucky. The economic contributions of this sector are important across the state to both rural and urban communities. Forest industries employed 25,825 people in 2022 with indirect and induced employment resulting in a total of more than 49,109 Kentucky jobs (Figure 2). The direct labor wages for the Kentucky forest sector were $1.8 billion in 2022 with total labor wages reaching $3.2 billion. Kentucky's forest industries continue to grapple with the aftereffects of COVID, issues that have affected exports particularly to China the last several years, and the retirement of a number of key people instrumental in the leadership of forest industries in the Commonwealth.

Source: IMPLAN Data for Kentucky and the Kentucky Forest Products Industry Directory

Figure 1. Kentucky Forest Sector Direct & Total Economic Contribution (2017 - 2022) in Billions

Figure 2. Kentucky Forest Sector Direct and Total Jobs (2017 - 2022) in Thousands



Wood Industry and Master Loggers in Kentucky

A significant percentage of the economic contribution of the forest sector is generated from timber harvested in Kentucky, the majority from family owned woodlands. Loggers are the link between the woodland owners and the downstream industries that produce a wide range of forest products. Therefore the health of the logging sector is vital to maintaining a robust forest industry in Kentucky. Figure 3 shows the concentration of Kentucky Master Loggers (reguired on logging operations) by county and the distribution of wood using industries across the state. In total, 2,272 Kentucky Master Loggers, located in 117 counties, work to harvest timber and deliver it to the 674 wood, paper, and paper-converting industries located in 114 counties throughout Kentucky.

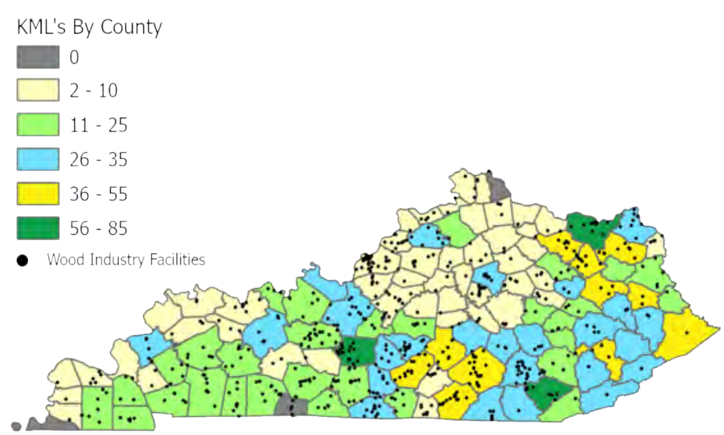


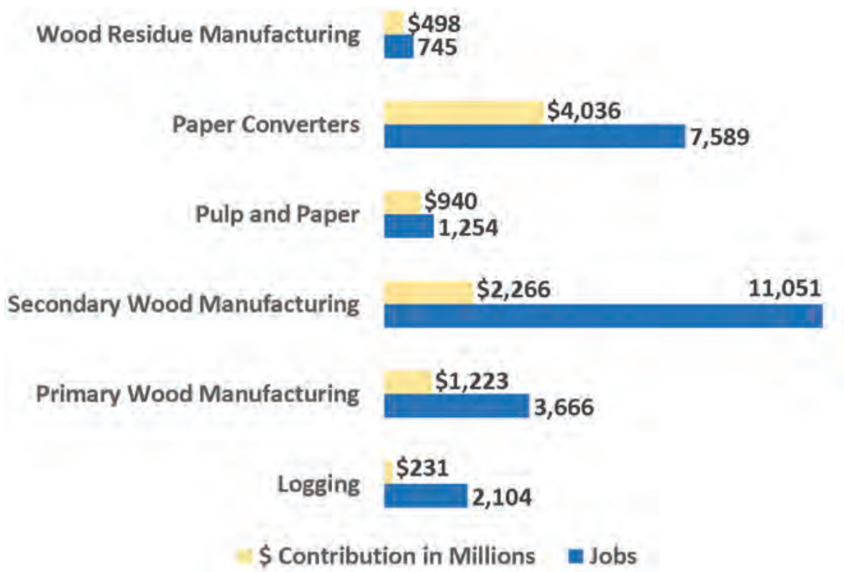
Figure 3. Kentucky Wood Industries and Master Loggers

Source: Kentucky Master Logger Database and Kentucky Forest Products Industry Directory

2021 Forest Sector Economic Contribution Estimates

The forest sector of Kentucky is comprised of six sub-sectors: logging, primary wood manufacturing, secondary wood manufacturing, pulp and paper, paper converters, and wood residue manufacturing. Employment and economic contributions for each sub-sector in 2021 are displayed in Figure 4. The majority of employment in the Kentucky Forest Sector is tied to the logging and primary and secondary wood manufacturing sub-sectors which are the first stages in wood utilization.

Figure 4. Direct Employment and Economic Contributions of Kentucky Forest Sub-Sectors



Total Economic Contribution of Kentucky's Forest Sector

$13 Billion

2022 Forest Sector Economic Contribution Estimates

Table 1. 2022 Kentucky Forest Sector Direct Economic Contributions

Forest Sub-Sector	Millions	% Change from 2021
Logging	$196	-14.74%
Primary Wood Manufacturing	$1,087	-11.05%
Secondary Wood Manufacturing	$2,282	0.67%
Pulp and Paper	$964	2.62%
Paper Converters	$4,036	0.00%
Wood Residue Manufacturing	$514	3.25%

The 2022 estimates varied by sub-sector. Logging was down 14.74%, primary wood manufacturing was down 11.05% compared to 2021. Secondary wood manufacturing was slightly up by 0.67%, pulp and paper was up 2.62%, wood residue manufacturing was up 3.25%, and paper converters remained flat in 2022 (Table 1). The logging and primary sub-sectors have been impacted by volatile markets for logs and lumber as the economy struggles with rising inflation and the slowing U.S. housing market. Labor shortages are still a significant issue for the forest sector, with logging and primary industry having the most difficulty in recruitment and retention of skilled labor.

Figure 4 and Table 1 sources: IMPLAN Data for Kentucky and the Kentucky Forest Products Industry Directory

Timber Output and Prices

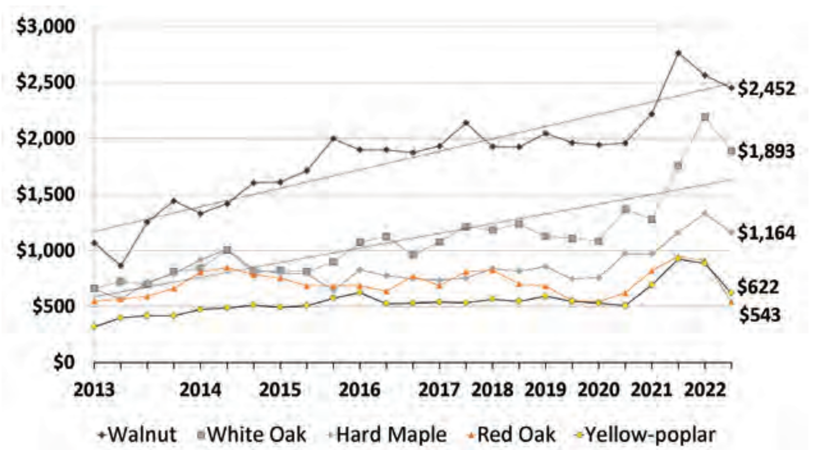
Generally, hardwood markets are down for all species and grades in 2022, in stark contrast from 2021. Statewide averages for delivered log prices decreased by approximately 20.5% for all grades and species. Decreased pricing is tied to a cooling housing market (Table 2), business concern over the potential for a global economic recession, exacerbated by the Ukraine conflict and continued supply chain issues. Along with these broader market concerns, short falls in labor recruitment and retention continue. The latter issue is particularly troubling given that logging and primary industries currently employ an aging workforce.

Table 2. Kentucky Delivered Log Prices From 1st Half 2022 - 2nd Half 2022

Species	Quality	2022 1&2 Quarters	2022 3&4 Quarters	% Change
Hard Maple	High	$1,333	$1,164	-14.5%
	Medium	$785	$725	-8.2%
	Low	$385	$327	-17.7%
Red Oak	High	$910	$543	-67.5%
	Medium	$591	$418	-41.4%
	Low	$357	$289	-23.4%
Soft Maple	High	$723	$610	-18.6%
	Medium	$473	$433	-9.2%
	Low	$297	$261	-13.9%
Black Walnut	High	$2,566	$2,452	-4.6%
	Medium	$1,432	$1,463	2.1%
	Low	$630	$600	-5.0%
White Oak	High	$2,193	$1,893	-15.8%
	Medium	$1,046	$1,077	2.9%
	Low	$496	$373	-33.0%
Yellow-poplar	High	$886	$621	-42.7%
	Medium	$558	$437	-27.7%
	Low	$323	$248	-30.2%

Delivered Log Summary
Hardwood log values decreased significantly in 2022. The downtrend manifested itself across all species in Kentucky. Data from the top five species shows this occurred across all grades, with only two minor exceptions for mid-grade black walnut and white oak logs (Figure 5).

Figure 5: Delivered Log Prices ($ per MBF) High Quality Logs



White Oak high- and low-quality grade lumber log pricing decreased compared to 2021. In constrast, medium-quality logs increased an average of approximately 3%. This is in contrast to prices paid for white oak stave logs (Figure 6). High- and low-quality white oak lumber logs decreased from the record high prices experienced in 2021, but they are still elevated considerably compared to pricing in 2020 and prior. The demand of white oak for many uses in products including veneer, stave, and grade lumber will keep competition and pricing strong for this species.

Black walnut followed a similar trend as white oak, with high- and low-quality lumber logs decreasing slightly in value, and medium-quality logs increasing by 2% from 2021 to 2022. Black walnut is our most valuable species and average prices are still elevated compared to prices paid in 2020 and prior.

Hard maple experienced reductions in pricing ranging from 8-17% across all log qualities from 2021 through the end of 2022.

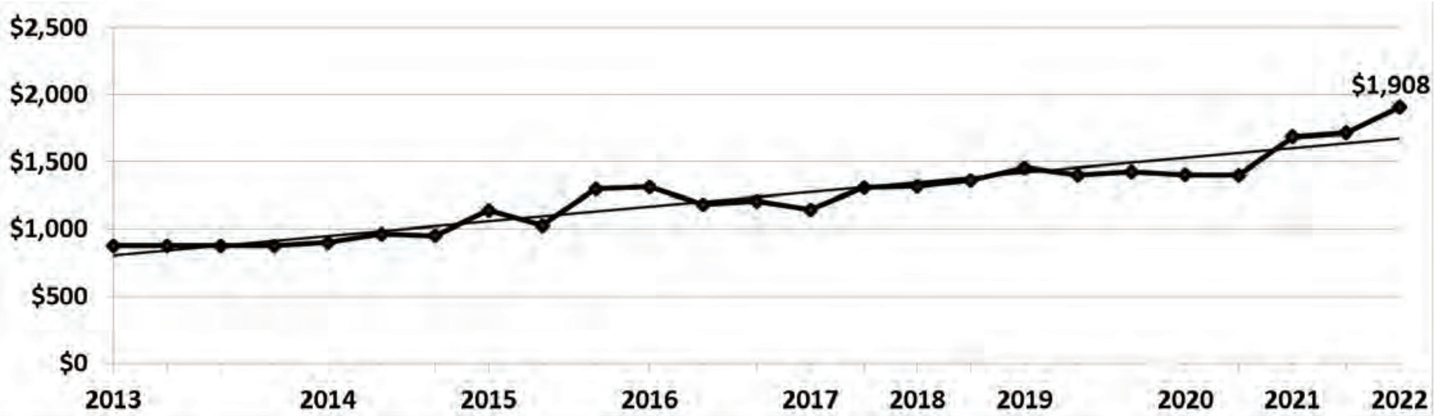
Yellow-poplar values continue to track lower in 2022, decreasing between 27.7- 42.7% for high- and low-quality logs respectively, for Kentucky's most abundant tree species.

Red oak domestic and export market demand continues to remain weak. Lackluster markets for flooring, cabinets, and millwork associated with housing starts and home remodeling due to the slowing housing market are partially to blame. The railroad tie market is still healthy, which has provided a consistent market for red oak logs.

Stave Log Prices

Strong competition for stave logs continues, in response to the ever increasing demand driven by the "bourbon boom." New log yards, stave drying yards, and equipment and technology upgrades to increase production of barrels have all been important investments to help meet the growing demand for bourbon. Markets are averaging over $1.91 per board foot (Figure 6) statewide with logs ranging from $1 to $2.87/bdft. Unlike most other commodities, stave logs experienced a 10% increase throughout 2022. The market for stave logs is expected to remain strong in 2023 due to intense competition for high-quality white oak logs for a variety of products and uses. The strong market for white oak continues to be an opportunity for both loggers and landowners.

Figure 6: Delivered Stave Log Prices in Kentucky 2013-2022 by Quarter ($MBF) Doyle



Railroad Tie Log Prices

Railroad tie logs remain an important timber product in Kentucky. The market for hardwood railroad tie logs has remained strong in terms of purchasing, although we have seen statewide price decreases in 2022 compared to 2021. Oak railway ties experienced a 29% decrease in year to year in 2022, while non-oak tie logs decreased by only 6% statewide during the last year. The statewide average for non-oak railroad tie logs is $423/MBF while oak tie log average $457/MBF. Normal maintenance and replacement of railway ties are ongoing, which is anticipated to keep pricing steady into 2023.

Figure 7: Delivered Tie Log Prices in Kentucky 2009-2022 ($/MBF) Doyle

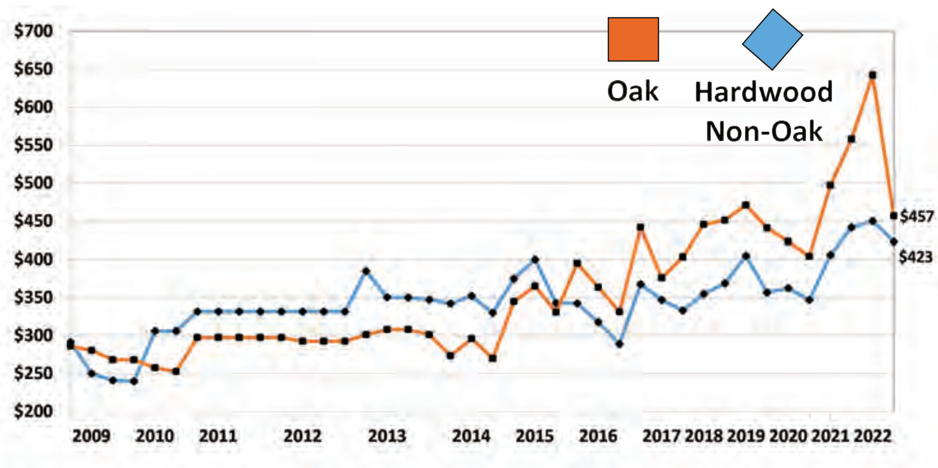


Figure 5, 6, 7 and Table 2 sources: Kentucky Division of Forestry's Delivered Log Price Data (MBF = 1,000 board feet)

Kentucky Forest Sector Economic Co

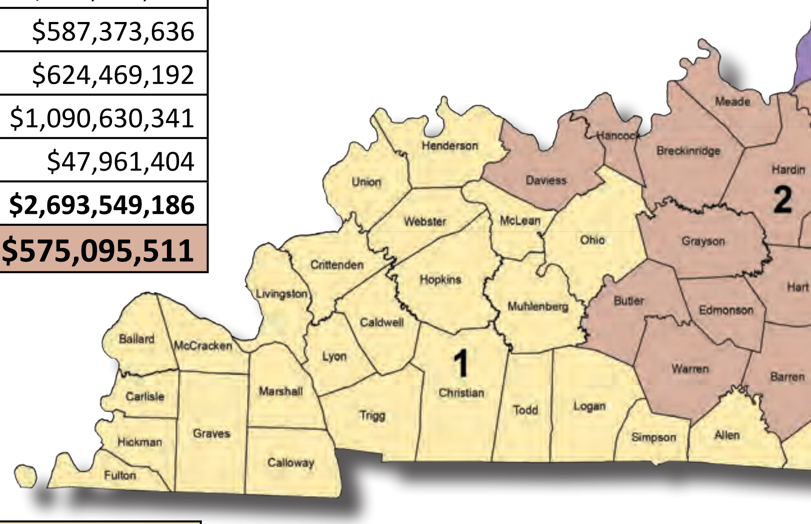
The map shows the Kentucky Congressional Districts and the accompanying tables (values adjusted for 2022) for the 2021 year. They highlight the direct and total contributions that the Kentucky forest sector contributes to each of those districts. New congressional district lines were adopted in 2022.

Congressional District #3. 2022 Kentucky Forest		
	Jobs	
Forest Sub-sector	**Direct**	**Total**
Logging	44	58
Primary Wood Mfg.	170	337
Secondary Wood Mfg.	1,222	1,767
Pulp and Paper	0	0
Paper Converters	1,249	2,393
Wood Residue Mfg.	113	216
Totals	**2,798**	**4,771**

Total La

Congressional District #2. 2022 Kentucky Forest Sector Economic Contributions				
	Jobs		Contributions	
Forest Sub-sector	**Direct**	**Total**	**Direct**	**Total**
Logging	385	592	$40,147,121	$57,128,998
Primary Wood Mfg.	666	943	$232,577,709	$285,985,615
Secondary Wood Mfg.	2,485	3,068	$482,452,871	$587,373,636
Pulp and Paper	658	1,194	$508,106,232	$624,469,192
Paper Converters	1,513	2,465	$906,238,565	$1,090,630,341
Wood Residue Mfg.	101	179	$36,378,029	$47,961,404
Totals	**5,808**	**8,441**	**$2,205,900,527**	**$2,693,549,186**

Total Labor Income: $575,095,511



Congressional District #1. 2022 Kentucky Forest Sector Economic Contributions				
	Jobs		Contributions	
Forest Sub-sector	**Direct**	**Total**	**Direct**	**Total**
Logging	461	665	$50,356,585	$71,312,962
Primary Wood Mfg.	967	1,389	$298,146,610	$378,778,273
Secondary Wood Mfg.	2,974	3,802	$608,955,239	$755,874,891
Pulp and Paper	361	661	$262,050,091	$327,800,335
Paper Converters	887	1,402	$446,594,535	$546,811,657
Wood Residue Mfg.	225	668	$207,114,713	$282,918,422
Totals	**5,875**	**8,587**	**$1,873,217,774**	**$2,363,496,539**

Total Labor Income: $539,874,209

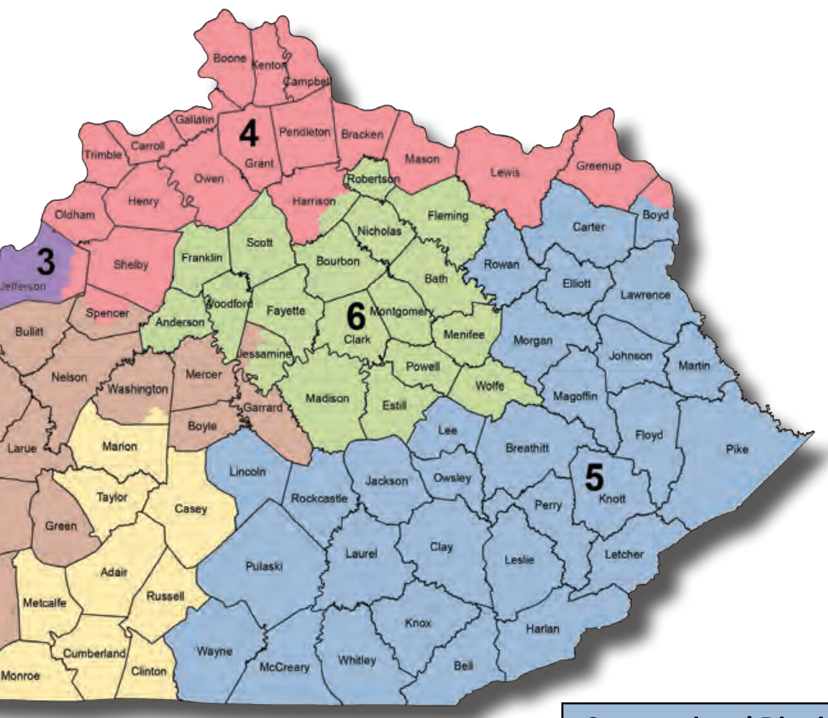
Congressional District #6. 2022 Kentucky Fore		
	Jobs	
Forest Sub-sector	**Direct**	**Total**
Logging	246	431
Primary Wood Mfg.	354	603
Secondary Wood Mfg.	926	1,361
Pulp and Paper	2	5
Paper Converters	1,086	2,113
Wood Residue Mfg.	75	120
Totals	**2,689**	**4,633**

Total

ntributions by Congressional Districts

Sector Economic Contributions	
Contributions	
Direct	Total
$4,222,206	$5,932,204
$89,251,280	$127,532,363
$280,335,289	$393,804,570
$0	$0
$653,442,352	$899,204,047
$69,249,168	$91,751,582
,096,500,295	**$1,518,224,767**
abor Income: $367,966,510	

Congressional District #4. 2022 Kentucky Forest Sector Economic Contributions				
	Jobs		Contributions	
Forest Sub-sector	**Direct**	**Total**	**Direct**	**Total**
Logging	176	252	$18,742,878	$26,830,461
Primary Wood Mfg.	262	391	$80,720,854	$107,995,920
Secondary Wood Mfg.	824	1,089	$169,492,720	$221,620,732
Paper Converters	226	455	$165,262,629	$218,206,397
Wood Residue Mfg.	2,837	4,806	$1,457,800,649	$1,874,055,606
Pulp and Paper	182	421	$156,001,104	$199,692,647
Totals	**4,507**	**7,414**	**$2,048,020,835**	**$2,648,401,762**
Total Labor Income: $540,024,715				



Did you know?

Value added represents sales (receipts, operating income, plus inventory change) minus inputs (consumption of goods and services purchased or imported) and is a measure of an industry's contribution to the GDP. The total value added by the Kentucky Forest Sector in 2022 was...

$4,898,751,109

est Sector Economic Contributions	
Contributions	
Direct	Total
$26,493,241	$44,666,444
$120,779,361	$170,267,014
$187,867,509	$267,669,812
$1,695,483	$2,298,972
$564,348,314	$756,530,368
16,470,157	23,833,720
$917,654,066	**$1,265,266,328**
Labor Income: $300,160,780	

Congressional District #5. 2022 Kentucky Forest Sector Economic Contributions				
	Jobs		Contributions	
Forest Sub-sector	**Direct**	**Total**	**Direct**	**Total**
Logging	482	804	$56,875,428	$83,426,477
Primary Wood Mfg.	842	1,229	$266,022,469	$337,621,469
Secondary Wood Mfg.	2,693	3,550	$552,802,926	$697,490,373
Pulp and Paper	40	76	$27,097,124	$34,615,079
Paper Converters	17	28	$7,935,076	$9,789,097
Wood Residue Mfg.	74	140	$29,055,173	$37,789,660
Totals	**4,148**	**5,827**	**$939,788,195**	**$1,200,732,154**
Total Labor Income: $302,547,891				

Forest Sector Taxes Paid in 2021

The Kentucky forest sector pays taxes at the county, state, and federal levels. Table 3 highlights the amount of taxes paid by each of Kentucky's forest sub-sectors. Examples of the taxes paid include: sales tax, property tax, motor vehicle license, social insurance taxes (such as Social Security) and custom duty taxes. Estimates for the 2022 tax year are not yet available.

Table 3: Forest Sector Taxes Paid in 2021 (Millions)

Forest Sub-sector	County/Local Taxes Paid	State Taxes Paid	Federal Taxes Paid	Total Taxes Paid
Logging	$4.92	$11.27	$33.60	$49.78
Primary Wood Manufacturing	$13.18	$29.45	$74.76	$117.39
Secondary Wood Manufacturing	$24.10	$56.07	$185.80	$265.97
Pulp and Paper	$12.71	$27.73	$52.81	$93.25
Paper Converters	$52.15	$112.98	$229.17	$394.30
Wood Residue Manufacturing	$7.37	$15.76	$26.61	$49.74
TOTALS	**$114.43**	**$253.25**	**$602.75**	**$970.43**

Source: IMPLAN Data for Kentucky

Housing Starts and Kentucky's Forests

Wood products from Kentucky can be found throughout homes including a significant use for floors, cabinets, moldings, furniture and much more. Housing starts are a major economic indicator, because they provide an important snapshot of the U.S. economy especially for wood products. Housing starts began the year strong but declined over 2022 (Figure 8). While the overall number of 18.667 million housing starts was down from 2021, the number remains much higher than the 2008 recession.

Source: U.S. Census Bureau and U.S. Department of Housing and Urban Development

Figure 8: US Housing Starts In Thousands

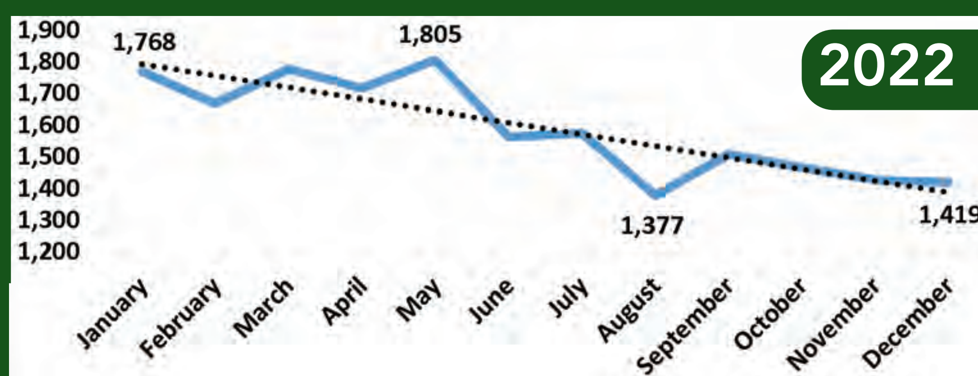
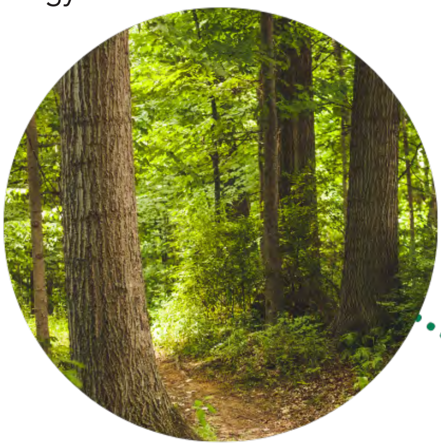


Figure 9: US Housing Starts In Thousands (2006 - 2022)

Impact of One Harvested Acre In Kentucky: $21,899

The diagram shows how wood flows from landowner woodlands through the forest industry supply chain and each economic contribution along the way. Each step, from the woodlands to the final wood-using industry, contributes to the economy. All the wood harvested in Kentucky is transformed into useful products and energy and less than half the volume of wood grown each year is harvested.



On average each harvested woodland acre in Kentucky generates $1,033 for the owner. The majority of Kentucky's woodlands are privately owned by families. The U.S. Forest Service estimates there are 136,000 woodland ownerships in Kentucky with over 80,000 owned jointly by spouses; there are an estimated 31,000 individual owners and more than 21,000 other joint ownerships.

One Harvested Acre
$1,033

Logging firms are typically family operated small businesses and are a critical link in harvesting and transporting wood to sawmills. Without loggers, most family woodland owners would have no means of getting their timber to market.

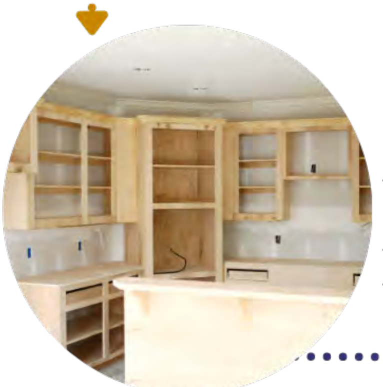
Logging
$814

Kentucky's sawmills, also mostly family operated, process harvested wood into useful products such as lumber and crossties. In addition to lumber, wood chips are also manufactured to be used in the paper industry.

Sawmilling & Chipping
$4,498

Kentucky's paper industry uses wood chips from trees lacking lumber potential to create high quality paper products.

Pulp & Paper
$3,988



Kentucky's secondary wood industries add significant value to processed wood by creating cabinets, flooring, staves, and much more that are utilized in homes and offices across the state and nation.

Secondary Wood
$9,439

Wood not used in sawmills is utilized in the wood residue industry to create useful products such as mulch and charcoal, ensuring no harvested wood is wasted.

Wood Residue
$2,127

Source: IMPLAN Data for Kentucky and the Kentucky Forest Products Industry Directory

Kentucky Forest Sector Exports

Kentucky wood related exports climbed to $352 million in 2022, an increase of $60 million from 2021 export levels (Figure10). Wood barrel exports are responsible for much of that increase as their export level climbed more than $40 million in 2021 to a total of $148.9 million. The 2022 wood-related exports are still below the recent high of $382 million in 2018. Three of the top wood-related exports from Kentucky come from oak trees: oak barrels, oak lumber, and oak logs.

Lumber exports, including oak and non-oak, reached nearly $100 million in 2022. Adhesive paper and oak logs made up the remaining top wood-related exports at $18 million and $13 million, respectively (Figure 11). The demand for Kentucky's barrels continues to grow domestically and internationally. The United Kingdom led the way in barrel imports at $56.6 million, followed by Japan at $24.7 million, and Ireland at $22.16 million (Figure 12).

Europe was once again the leading destination for Kentucky wood-related exports in 2022 at more than $133 million. Asia was the second leading destination for Kentucky wood-related exports at $120.1 million in 2021. North America (Canada and Mexico) represented the third largest importer of Kentucky wood products at $78.6 million, while the rest of the world imported more than $20 million in wood-related products.

Sources for all graphs: USDA Foreign Agricultural Service

Figure 10: Kentucky Wood-Related Exports 2017 - 2022

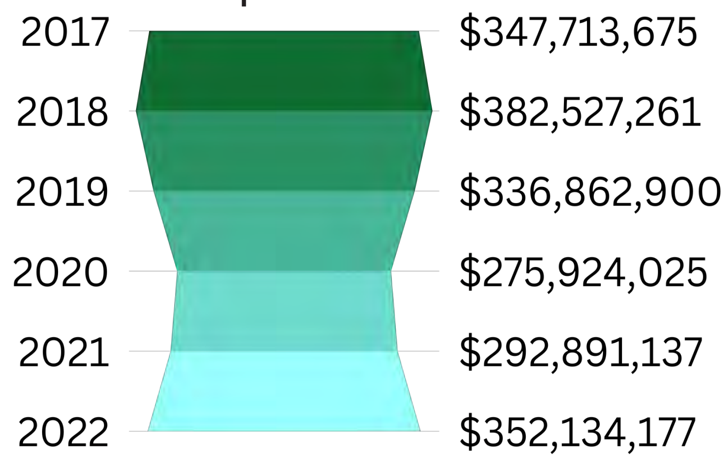
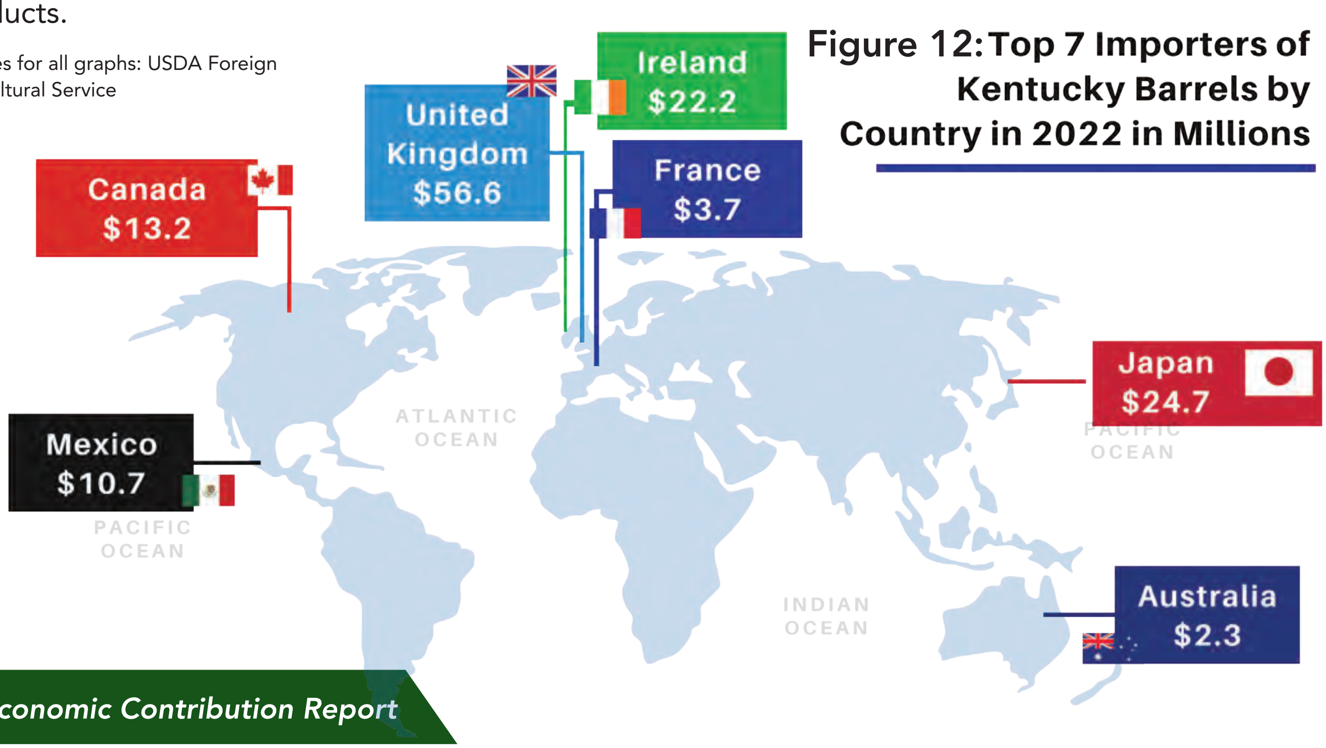


Figure 11: Top 5 Kentucky Wood-Related Exports in Millions (2022)

Figure 12: Top 7 Importers of Kentucky Barrels by Country in 2022 in Millions



Data and Methodology

The estimates of the annual economic contribution of Kentucky's forest sector in this report come from a variety of data sources. Economic contribution estimates were assessed using IMPLAN database (2021) and software. All contributions estimates are in 2021 dollar-year values. IMPLAN is an input-output economic modeling database and software widely used to assess economic contributions and impacts. Direct economic contribution refers to the economic activity directly associated with an industry or sector. Total economic contribution sums up industry's direct, indirect, and induced effects. The 2021 economic contributions were assessed using the latest IMPLAN Pro (online tool version). While the economic contribution for the forest sector was conducted for all the forest-related industries, forest sub-sectors' contributions were estimated by aggregation of related forest sub-sector industries following IMPLAN Industry aggregation procedure. For example, the logging sub-sector is comprised of forestry, forest products, and timber tract production (IMPLAN industry code 15) and commercial logging (IMPLAN industry code 16).

Congressional districts are composed of combined zip codes (and partial zip codes), and they are not distinct economic units that levy taxes and trade with other regions like counties or states do. IMPLAN Pro Online Tool uses very different methods for calculating trade flows for zip codes and those at county or state-level analyses. Therefore, the sum of all congressional districts' contributions may not be equal to the state-level (aggregate).

The 2021 IMPLAN data was adjusted to provide 2022 estimates based on annual employment from the Kentucky Forest Products Industry Directory maintained by the University of Kentucky Department of Forestry and Natural Resources Extension and the Kentucky Division of Forestry (KDF). The availability of current employment data in the directory also allowed adjustments of other sources of information. Data from KDF through its Delivered Log and Product Prices is also essential for this report, as is the Forest Inventory Analysis provided jointly by KDF and the USDA Forest Service. USDA Foreign Agricultural Service, Kentucky Master Logger Program, and Kentucky Forest Industries Association members also provided data used in this report.

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