College of Agriculture, Food and Environment

Forestry and Natural Resources Extension

Kentucky Forest Sector Economic Contribution Report 2020 - 2021

Annual Forest Sector Economic Contribution Estimates

Kentucky's forest industry, along with many others, continue to face COVID related challenges. This annual report estimates the economic contribution of the overall forest sector across Kentucky in both rural and urban areas. The overall Kentucky forest sector contribution has remained stable over the last couple of years with the sector providing an estimated $9.09 billion in direct contributions in 2021 and a total estimated economic contribution of $13.18 billion (Figure 1). These economic figures are down 5% from 2019 before COVID. The Kentucky forest sector also directly employed nearly 26,000 people in 2021 with indirect and induced employment resulting in a total of more than 50,000 Kentucky jobs (Figure 2). The direct labor wages for the Kentucky forest sector were $1.8 billion in 2021 with total labor wages reaching $3.1 billion.

Figure 1. Kentucky Forest Sector Direct & Total Economic Contribution (2015 - 2021) in Billions

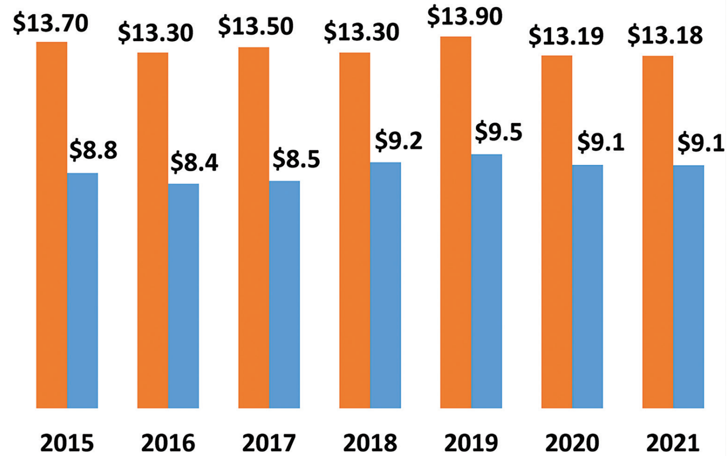
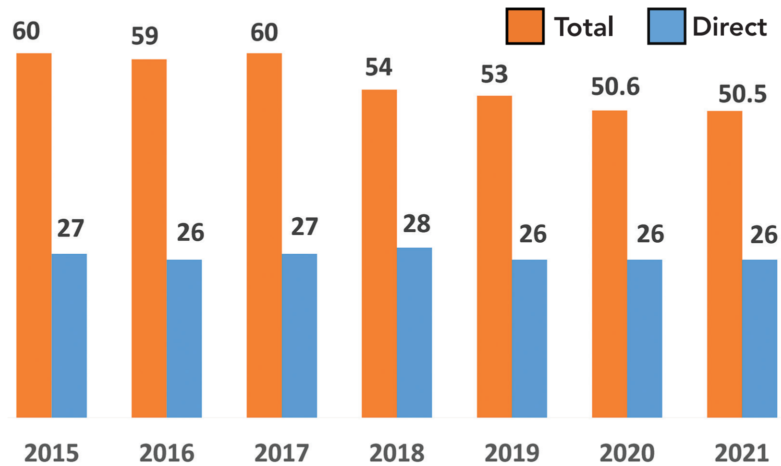


Figure 2. Kentucky Forest Sector Direct and Total Jobs (2015 - 2021) in Thousands



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

Wood Industry and Master Loggers in Kentucky

The Kentucky industry derives most of their wood from family forests in Kentucky. Without loggers to harvest and transport the wood our forest industry would be unable to processes it into the many wood products we use every day and woodland owners would not have a market for their wood. Figure 3 highlights the distribution of these wood using facilities and the concentration of Kentucky Master Loggers (KML) across the state. In total, there are 651 wood, paper, and paper converting manufacturing facilities located in 113 counties who work with the more than 2,195 Kentucky Master Loggers who in turn work with family woodland owners in all 120 counties.

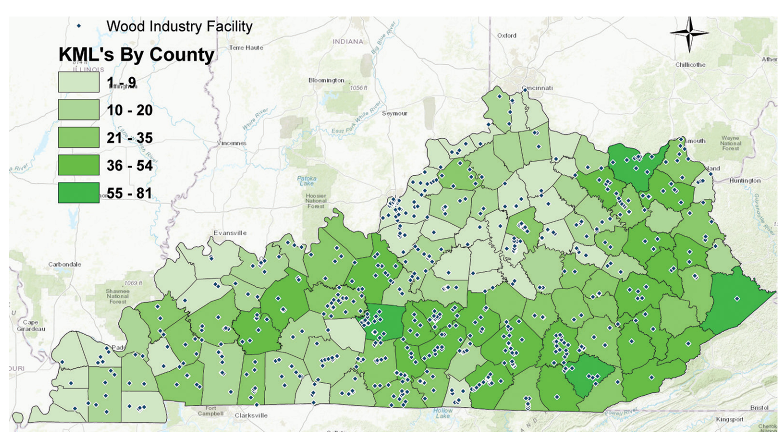


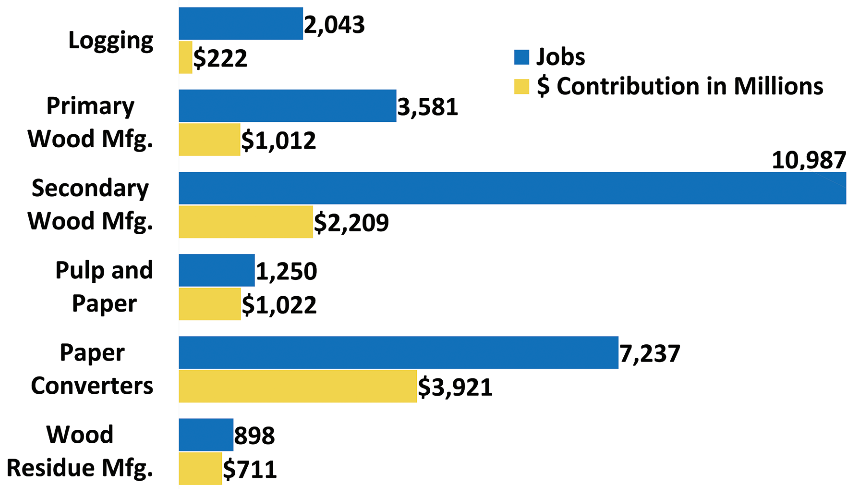
Figure 3. Kentucky Wood Industries and Master Loggers

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

2020 Forest Sector Economic Contribution Estimates

The Kentucky forest sector 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 of the sub-sectors in 2020 are displayed in Figure 4.

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



Total Economic Contribution of Kentucky's Forest Sector

$13 Billion

2021 Forest Sector Economic Contribution Estimates

Table 1: 2021 Kentucky Forest Sector Direct Economic Contribution Estimates

Forest Sub-sector	Millions	% Change from 2020
Logging	$211	-5.21%
Primary Wood Manufacturing	$959	-5.21%
Secondary Wood Manufacturing	$2,251	1.93%
Pulp and Paper	$1,004	-1.74%
Paper Converters	$3,921	0.0%
Wood Residue Manufacturing	$740	4.15%

The 2021 estimates varied by sub-sector. Logging and primary wood manufacturing were down 5.21% and pulp and paper were down 1.74% in comparison to 2020. Secondary wood manufacturing was up 1.93% and wood residue was up 4.15% while paper converters remained flat in 2021 (Table 1). The primary and secondary industries have been impacted by short supply of logs due to less loggers active in the woods. Labor shortages, significantly impacted by COVID, have affected all sectors of the forest products industry and has been partly to blame for the logging sector lagging.

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

Timber Output and Prices

Overall, hardwood markets are up for all grades and species. This creates an improved market situation although labor shortages, availability of trucking and inflation have created challenges in 2021 for many loggers and mills. Statewide delivered log prices increased by approximately 29.5% for all grades and species. Demand has continued to outpace production for hardwood products. This has kept prices climbing and competition strong. Increased prices are tied to strong housing, remodel, and bourbon markets. The demand for white oak is specifically tied to the increasing bourbon market that outpaced production. Markets are anticipated to remain strong until production meets demand. This is difficult to determine with the fluctuation in US and world economies not to mention what is going on in Europe with the Russian war against Ukraine.

Table 2: Kentucky Delivered Log Prices 2020 - 2021 (MBF)

Species	Quality	2020 3&4 Quarters	2021 3&4 Quarters	% Change
Ash	High	$502	$570	11.9%
	Medium	$370	$415	10.7%
	Low	$222	$318	30.2%
Cherry	High	$468	$616	24.0%
	Medium	$338	$470	28.2%
	Low	$217	$297	27.0%
Hickory	High	$521	$564	7.6%
	Medium	$361	$458	21.1%
	Low	$213	$339	37.1%
Hard Maple	High	$971	$1,208	19.6%
	Medium	$502	$740	32.2%
	Low	$291	$390	25.4%
Red Oak	High	$622	$949	34.5%
	Medium	$364	$634	42.6%
	Low	$240	$389	38.4%
Soft Maple	High	$453	$603	25.0%
	Medium	$331	$433	23.6%
	Low	$229	$309	25.9%
Black Walnut	High	$1,961	$2,766	29.1%
	Medium	$1,130	$1,663	32.0%
	Low	$399	$746	46.5%
White Oak	High	$1,369	$1,759	22.2%
	Medium	$689	$1,055	34.7%
	Low	$332	$498	33.4%
Yellow-poplar	High	$508	$925	45.1%
	Medium	$351	$628	44.1%
	Low	$211	$374	43.6%

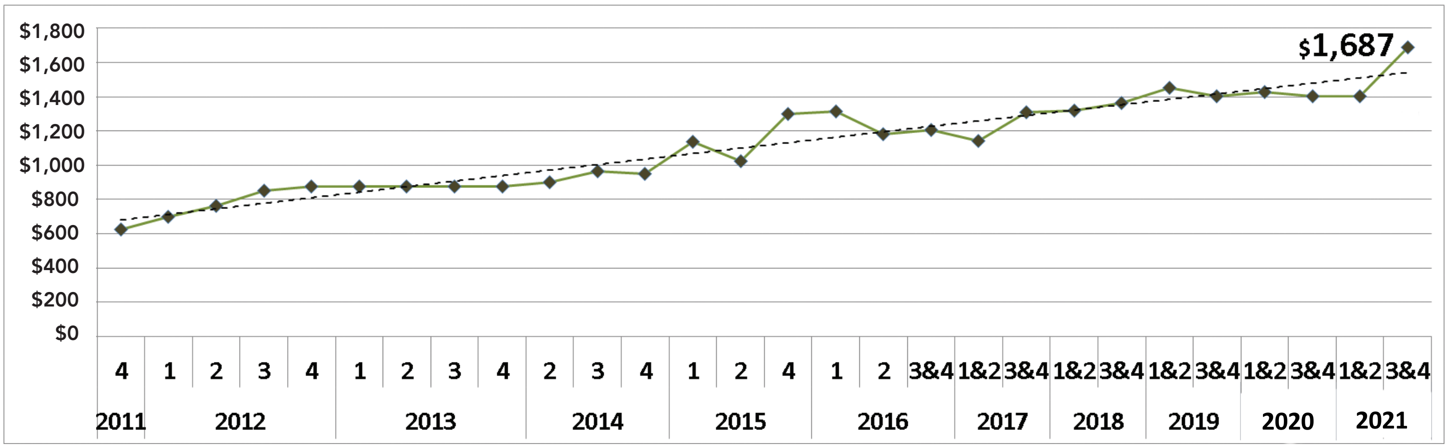
Delivered Log Summary

Ash volume continues to decline due to the emerald ash borer. Standing dead trees have been further degraded by ambrosia beetles. This will continue until all of Kentucky is impacted. **Hickory** is experiencing favorable markets across log qualities in 2021 with the largest increase associated with low quality logs. **Maples** experienced strong increases in prices across all log qualities. **Red oak** domestic and export demand is still weak, although pricing has improved. Strong railway tie log and hardwood flooring markets have provided much of the price improvement for red oak. **Yellow-poplar** demand has doubled its value from 2020, with values close to red oak. High and medium quality yellow-poplar logs experienced record highs in 2021 with average value increases between 43.6-45.1% across all log qualities. We have heard reports from some lumber producers that poplar pricing has started to soften slightly and this is reflected in lumber pricing. **White oak** log prices continue to remain strong. This is due to the demand for the species across all qualities, with an especially strong continued demand for high quality stave logs associated with elevated bourbon whiskey production. Demand and competition between stave, veneer, and grade lumber logs across the region resulted in historically high prices and reduced supplies of white oak in 2021 for many facilities. **Chestnut oak**, (which is not listed in the table) is also in high demand, driven by the demand for white oak. **Black walnut** prices paid for high quality logs are historically high resulting in continued sellers' market for this species. Price increases were significant for medium quality 32%, and low quality walnut logs increasing 46.5%. Table 2 shows the delivered prices for factory lumber logs of various commercially important species across Kentucky from the end of 2020 and how those prices changed compared to the end of 2021.

Stave Log Prices

Competition for stave logs continues to grow, increasing the value of high and medium quality white oak logs as well. To meet this growing demand several new yards have been established to receive stave logs. Markets are averaging over $1.69/bdft (Figure 5) with logs ranging $1 to $2.50 per board foot. Unlike 2020 and the first half of 2021, where prices were flat throughout the year, stave logs experienced a 21% increase in the second half of 2021. The market for white oak logs is expected to remain strong in 2022. As mentioned previously, intense competition for high quality white oak logs reduced stave log inventories for many facilities, causing price increases. Statewide stave logs are averaging over $1.40/bdft (Figure 5). The market for white oak logs is expected to remain strong in 2022 indicating continued opportunities for landowners and loggers.

Figure 5: Delivered Stave Log Prices in Kentucky 2011 - 2020 by Quarter ($MBF) Doyle



Railroad Tie Log Prices

Railroad tie logs remain another important timber product in Kentucky. Hardwood railroad tie logs, that experienced a soft market and losses in value in 2019 and 2020, rallied in 2021 with a 26.5% increase in value from the end of 2020 to the end of 2021, and non-oak hardwood tie logs increasing 23.8% over the same period (Figure 6). The statewide average for oak tie logs is $558/MBF, and for non-oak tie logs it is $442/MBF. While there is a strong overall upward trend in prices, there has been significant variation across the state and from month to month. Normal maintenance and replacement of railway ties are ongoing and demand and strong pricing is anticipated.

Figure 6: Delivered Tie Log Prices in Kentucky 2009 - 2021 ($MBF) Doyle

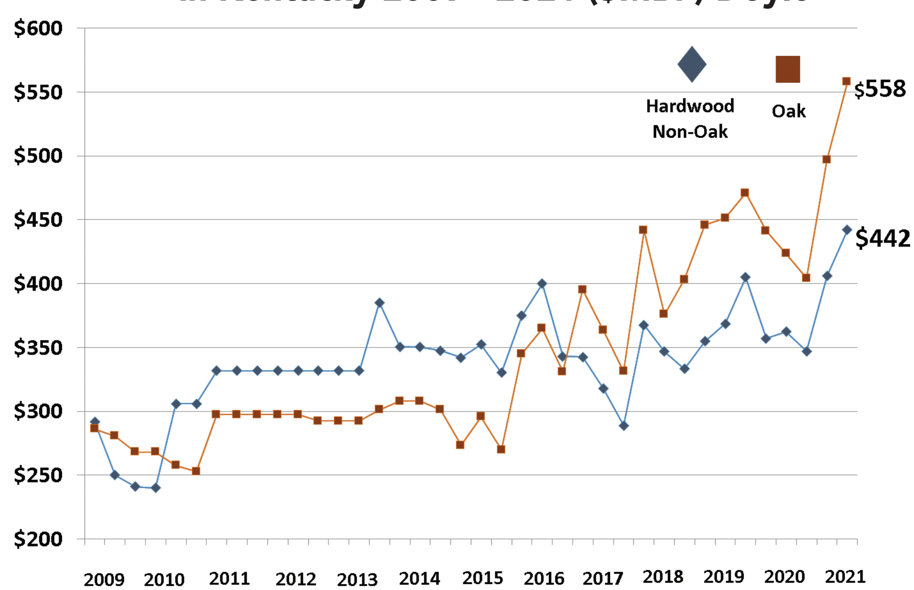


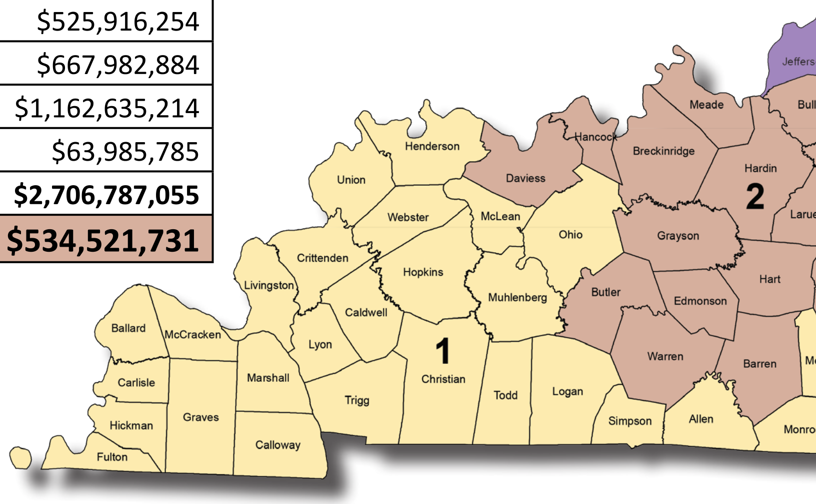
Figure 5, 6 and Table 2 sources: Kentucky Division of Forestry's Delivered Log Price Data (MBF = 1,000 board feet)

Kentucky Forest Sector Economic Co

The map shows the Kentucky Congressional Districts and the accompanying tables highlight the direct and total contributions that the Kentucky forest sector contributes to each of those districts.

Congressional District #3. 2021 Kentucky Forest			
	Jobs		
Forest Sub-sector	Direct	Total	
Logging	43	59	
Primary Wood Mfg.	143	289	
Secondary Wood Mfg.	1,410	2,099	
Pulp and Paper	0	0	
Paper Converters	1,177	2,172	
Wood Residue Mfg.	134	283	
Totals	**2,907**	**4,902**	**$1**
Total La			

Congressional District #2. 2021 Kentucky Forest Sector Economic Contributions				
	Jobs		Contributions	
Forest Sub-sector	**Direct**	**Total**	**Direct**	**Total**
Logging	410	649	$40,402,524	$56,341,563
Primary Wood Mfg.	635	893	$187,056,184	$229,925,355
Secondary Wood Mfg.	2,343	2,911	$433,178,037	$525,916,254
Pulp and Paper	660	1,259	$554,667,639	$667,982,884
Paper Converters	1,513	2,528	$991,102,830	$1,162,635,214
Wood Residue Mfg.	112	230	$49,233,071	$63,985,785
Totals	**5,673**	**8,470**	**$2,255,640,285**	**$2,706,787,055**
Total Labor Income: $534,521,731				



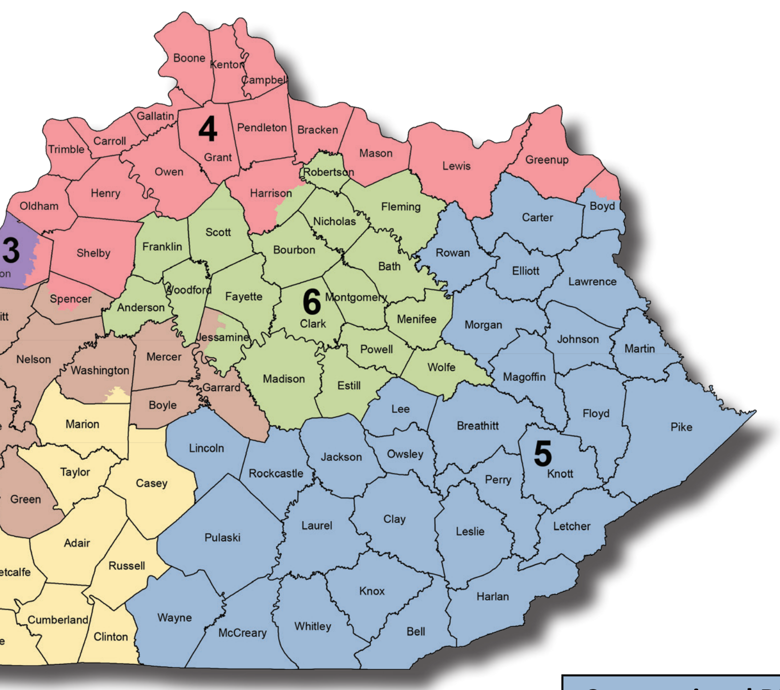
Congressional District #1. 2021 Kentucky Forest Sector Economic Contributions				
	Jobs		Contributions	
Forest Sub-sector	**Direct**	**Total**	**Direct**	**Total**
Logging	395	595	$49,509,720	$68,597,347
Primary Wood Mfg.	1,030	1,449	$261,723,528	$331,620,228
Secondary Wood Mfg.	2,965	3,858	$598,485,901	$739,138,904
Pulp and Paper	398	762	$314,326,055	$386,094,447
Paper Converters	737	1,222	$401,737,233	$486,635,059
Wood Residue Mfg.	265	897	$269,548,596	$361,528,068
Totals	**5,790**	**8,783**	**$1,895,331,032**	**$2,373,614,053**
Total Labor Income: $525,640,304				

Congressional District #6. 2021 Kentucky Fore		
	Jobs	
Forest Sub-sector	**Direct**	**Total**
Logging	197	393
Primary Wood Mfg.	404	715
Secondary Wood Mfg.	991	1,493
Pulp and Paper	2	4
Paper Converters	993	1,967
Wood Residue Mfg.	79	122
Totals	**2,666**	**4,694**
Total Labor Income	**$293,952,464**	
Total		

ntributions by Congressional Districts

Sector Economic Contributions	
Contributions	
Direct	Total
$4,388,176	$6,031,320
$65,623,295	$94,357,951
$318,292,800	$443,518,037
$0	$0
$584,518,695	$771,278,549
$98,595,618	$127,673,365
,071,418,584	**$1,442,859,221**
abor Income: $362,811,853	

Congressional District #4. 2021 Kentucky Forest Sector Economic Contributions				
	Jobs		Contributions	
Forest Sub-sector	**Direct**	**Total**	**Direct**	**Total**
Logging	515	701	$31,064,968	$44,565,202
Primary Wood Mfg.	273	408	$69,772,536	$94,238,597
Secondary Wood Mfg.	890	1,224	$182,203,504	$240,436,736
Paper Converters	2,763	4,718	$1,379,711,604	$1,738,475,745
Wood Residue Mfg.	258	701	$270,739,149	$340,605,773
Pulp and Paper	156	338	$123,979,326	$160,834,792
Totals	**4,855**	**8,090**	**$2,057,471,088**	**$2,619,156,844**
Total Labor Income: $541,878,824				



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 2021 was...

$4,743,540,544

est Sector Economic Contributions	
Contributions	
Direct	Total
$30,300,928	$49,116,555
$131,595,633	$186,563,972
$187,611,092	$268,885,433
$1,303,083	$1,728,109
$538,363,553	$700,345,000
$12,910,134	$19,088,292
$902,084,423	**$1,225,727,360**
Labor Income: $293,952,464	

Congressional District #5. 2021 Kentucky Forest Sector Economic Contributions				
	Jobs		Contributions	
Forest Sub-sector	**Direct**	**Total**	**Direct**	**Total**
Logging	376	703	$54,993,527	$80,239,228
Primary Wood Mfg.	910	1,355	$243,073,533	$314,396,198
Secondary Wood Mfg.	2,624	3,596	$532,491,956	$678,096,866
Pulp and Paper	13	27	$9,735,285	$12,314,107
Paper Converters	55	92	$25,959,757	$31,763,079
Wood Residue Mfg.	86	191	$39,101,075	$50,395,272
Totals	**4,064**	**5,964**	**$905,355,133**	**$1,167,204,748**
Total Labor Income	**$315,951,021**			
Total Labor Income: $315,951,021				

Forest Sector Taxes Paid 2020 in Millions

The Kentucky forest sector pays taxes at the County, State, and Federal levels. The table below highlights the amount of taxes paid by each of Kentucky's forest sub-sectors at each level of governance. The figures in Table 3 are for the 2020 tax year. 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 2021 tax year are not yet available.

Table 3: Forest Sector Taxes Paid in 2020 in Millions

Forest Sub-sector	County Taxes Paid	State Taxes Paid	Federal Taxes Paid	Total Taxes Paid
Logging	$0.53	$10.08	$37.14	$51.34
Primary Wood Manufacturing	$1.05	$20.63	$63.45	$92.84
Secondary Wood Manufacturing	$2.10	$42.69	$174.29	$233.43
Pulp and Paper	$1.35	$26.84	$45.04	$84.57
Paper Converters	$4.76	$92.89	$180.57	$316.79
Wood Residue Manufacturing	$0.25	$6.02	$35.84	$43.60
TOTALS	**$10.02**	**$199.14**	**$536.34**	**$822.57**

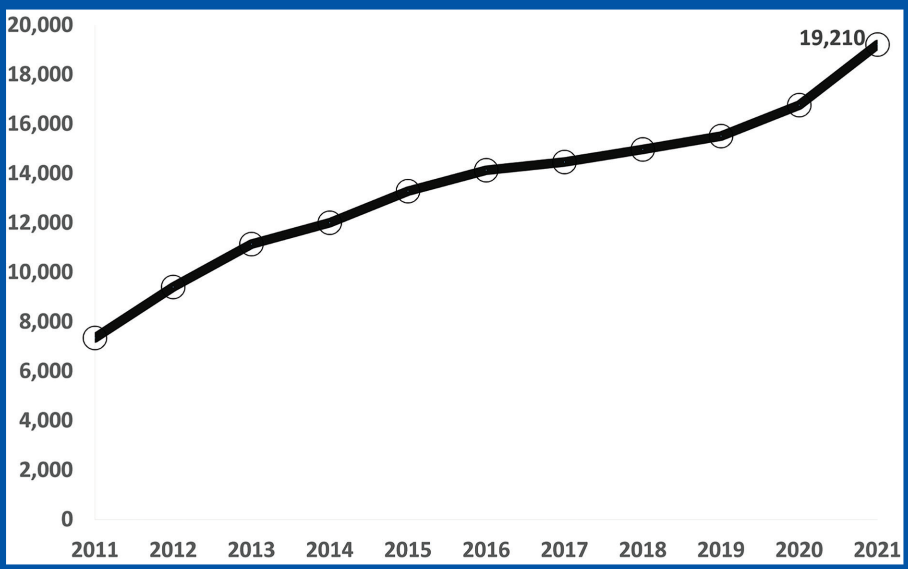
Source: IMPLAN Data for Kentucky

Housing Starts and Kentucky's Forests

Housing starts are typically used as a major economic indicator (Figure 7) because they provide an important snapshot of the U.S. economy and because of their impact on the Kentucky forest sector. Wood products from Kentucky can be found throughout homes including a significant use for floors, cabinets, moldings, furniture and much more. The U.S. housing market reached 19.21 million in 2021 which is more than double the amount of housing starts in 2011 but remains below the high of 24.88 million in 2005.

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

Figure 7: US Housing Starts In Thousands (2011 - 2021)



Impact of One Harvested Acre In Kentucky: $22,397

The diagram shows how wood flows from landowners through the forest industry supply chain. Each step along the way, 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.

Landowner Receives: $1,033

The majority of Kentucky's woodlands are privately owned by families. The US 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 thousand other joint ownerships.

Logging $871

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.

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.

Sawmill & Chipping $3,966

Pulp & Paper $4,153

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

Secondary Wood $9,312

Wood Residue $3,061

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.

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.

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

Kentucky Forest Sector Exports

Figure 8: Kentucky Wood-Related Exports 2016 - 2021

Kentucky exported an estimated $293 million in wood related exports in 2021 which is a $17 million increase from 2020 (Figure 8). Despite modest gains in 2021, wood related exports remain lower than the recent peak in 2018. Wood barrel exports decreased by $6 million while oak lumber and hardwood lumber increased $3 million and $6 million, respectively. Oaks remain extremely important to the Kentucky forest industry and once again lead the way when it comes to exports. Three of the top 5 wood related exports are comprised of oaks led by wood barrels at $106 million. Oak lumber was next at $56 million followed by hardwood lumber at $19 million. Oak logs returned to the top 5 wood related exports at $10 million while adhesive paper made its debut in the top 5 at $18 million (Figure 9). Kentucky's barrels remain in high demand around the world; the United Kingdom imported more than $38 million in oak barrels followed by Japan at $16 million and Ireland importing over $14 million (Figure 11).

Asia replaced Europe as the leading destination for Kentucky wood related exports in 2021 at more than $108 million (Figure 10). Europe was the second leading destination for Kentucky wood related exports at $93 million in 2021. North America (Canada and Mexico) represented the third largest importer of Kentucky wood products at $73 million. The rest of the world imported more than $17 million in wood-related products.

Figure 9: Top 5 Kentucky Wood-Related Exports in Millions (2021)

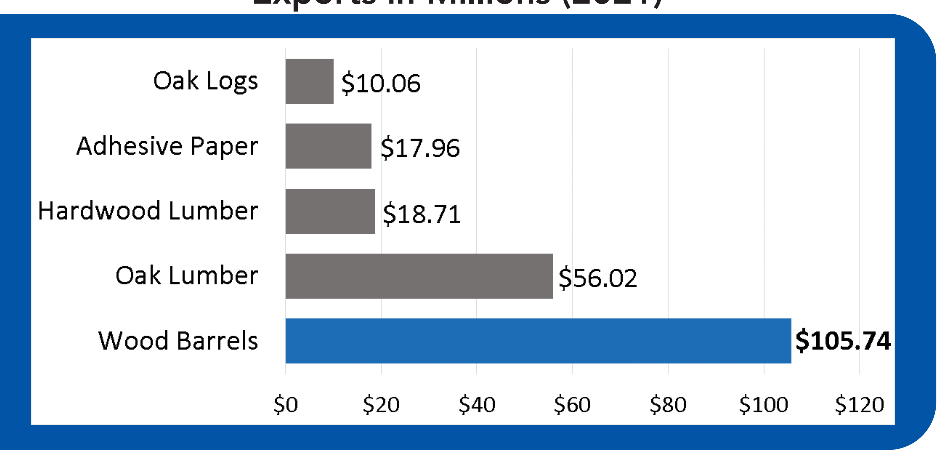


Figure 10: Kentucky Wood-Related Export Destinations in Millions (2021)

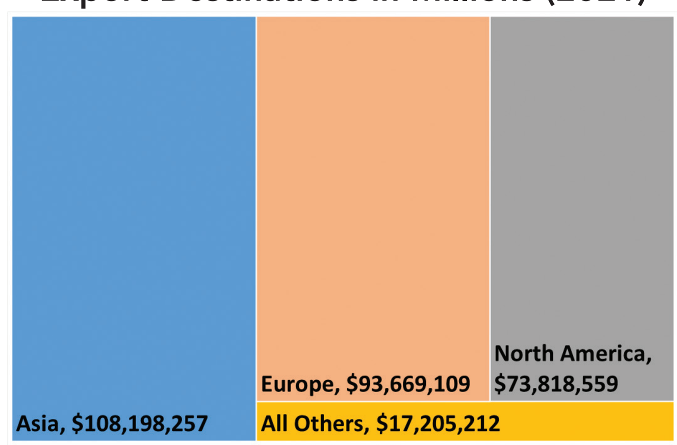
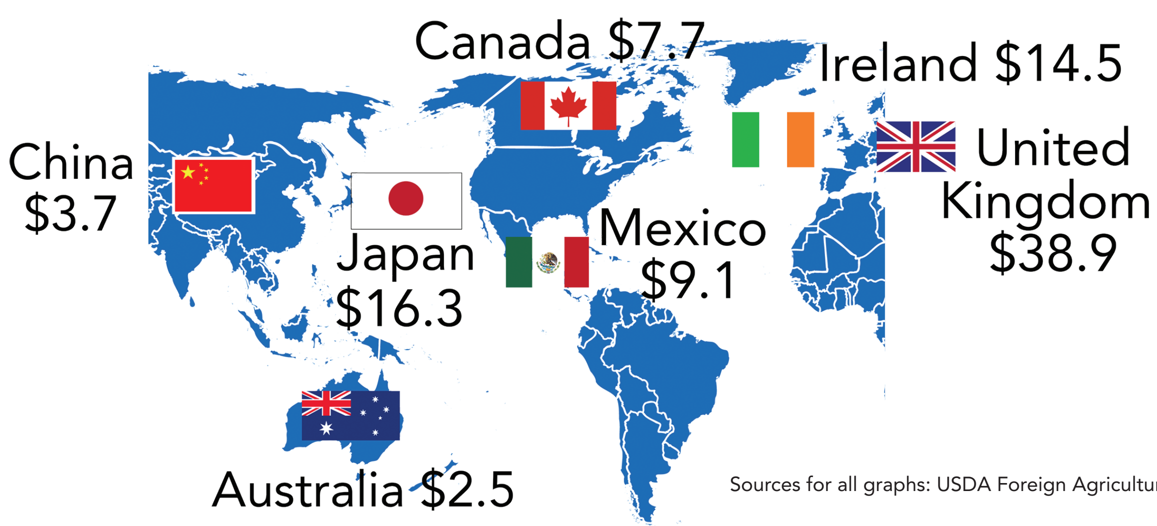


Figure 11: Top 7 Importers of Kentucky Barrels by Country in 2021 in Millions



Sources for all graphs: USDA Foreign Agricultural Service

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 (2015-2020) and software. 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 2015-2017 estimates were assessed using matrix-inversion approach (Henderson and Evans 2017), while the 2018-2019 contributions were assessed using input-output model customization approach within IMPLAN (Parajuli et al. 2018).

However, 2020 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, for 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 use 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 2020 IMPLAN data was adjusted to provide 2021 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.

For more information, please visit http://forestry.ca.uky.edu/economic-report.

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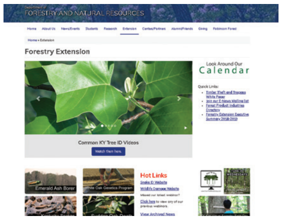

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