The Economic Contribution of Logging and Trucking in Maine[1]

Megan Bailey and Andrew Crawley[2]

University of Maine

February 2023

EDA Center at University of Maine

EDA UMaine Staff Paper 2023 - 109: Technical Report[3]

Table of Contents

Tables and Figures

Executive Summary

Maine's forest products sector is a backbone of the state's economy. Most recently, it was estimated that the forest products industry contributed an estimated $8.1 billion in output to the state's economy in 2019.[4] An essential component of the industry is harvesting and trucking - which directly affects the availability and cost of delivered wood. Over the last decade, researchers have set out to specifically highlight the logging industry's economic role in Maine.[5] The work presented here aims to update and build upon those previous reports.

To better understand the nature of the harvesting industry in Maine, we combined a traditional input-output (IMPLAN) analysis with primary data gathered from member companies of the Professional Logging Contractors of Maine (PLC), an advocacy and training group. The survey asked for information on the number of weeks of operation, harvested acres, harvested totals (sawtimber, pulpwood, and biomass), number (and type) of crews, full-time equivalent employees, and for details on new capital investments for 2021. The firms were also asked about factors affecting their ability to attain maximum production and the future (succession plans) of their businesses. It should be emphasized that 2021 was a unique year, with much of the world and the industry still rebounding from the COVID-19 pandemic, which drastically altered supply chains, and the eruption of the Pixelle Speciality Solutions paper digester.

Survey implementation was done by the Professional Logging Contractors of Maine (PLC). IMPLAN and survey results were analyzed by researchers at the University of Maine.

---

[4] Bailey, M., and Green, S. (2021). The Economic Contribution of Maine's Forest Products Industry: 2019. Technical Report. Prepared for the Maine Forest Products Council.

[5] Bailey, M., Crandall, M., Kizhakkepurakkal, A.R. and Green, S. (2020). The 2017 Statewide Economic Contribution of Maine's Logging and Trucking Industry. Technical report. Prepared for the Professional Logging Contractors of Maine; Crandall, M.S., McCullock, K., Bick, St., and Kizha, A.R., and Green, S. (2016). The Economic Impact of Logging in Maine, 2014. Technical Report. Prepared for the Professional Logging Contractors of Maine.

Key Findings

- 44 percent of the Professional Logging Contractors of Maine's member companies responded to the survey - accounting for 960 full-time equivalent positions in the industry in 2021. The responding firms reported an average of 10 full-time equivalent employees (Table 1).

- On average, survey respondents had 42 operational weeks in 2021 and harvested a combined 119 thousand acres (averaging 1,403 acres per firm).

- The harvesting methods reported among survey respondents were largely mechanized, with whole-tree operation dominating. Fifty-five percent of firm crews reported were whole-tree, 35% were cut-to-length, and 10% were manual/hand-crews (Figure 4).

- Most respondents trucked either all (37%) or a majority (14%) of the material harvested by their firm. Eight percent rarely (less than half the time) trucked their own material and 41% percent contracted with an outside source for all their trucking needs (Table 2).

- Respondents reported a total volume of 2.4 million tons of sawtimber, 2.1 million tons of pulpwood, and 582 thousand tons of biomass in 2021. (Table 3).

- Thirty-nine percent reported that their ability to harvest or sell wood has stayed the same over the last five years, while 33% reported it has decreased, and 28% reported it has increased (Figure 5).

- Respondents felt that inflation and business costs, mill closures, access to qualified labor, market price, timely access to repair parts, and weather are the most important factors affecting their ability to attain maximum production (Table 4).

- When asked about inflation (change in their business costs between September 2020 and September 2022) 67% reported seeing an increase of between 21% and 40%. Sixteen percent reported seeing an increase of over 50% (Table 5).

- Sixty-three percent of firms reported engaging in activities in addition to logging services. The most frequently cited additional activity was road construction or maintenance (Table 6).

- Respondents reported $21.7 million in new capital investment - 78 percent of which was spent on new equipment (Table 7 and Figure 6).

- Twenty-two percent of respondents reported having a succession plan in place. Of those who reported having a plan, 75% revolved around having family take over the business (Figure 7).

- The estimated overall annual (2021) economic contribution of Maine's logging industry, including multiplier effects, was an estimated $582 million in output, 5.6 thousand jobs, and $312 million in labor income (Table 8).

- The total economic contribution of Maine's logging industry in 2021 was associated with a fiscal impact of $27 million in state and local taxes. This tax impact is equivalent to 5% of the logging sector's total (output) economic contribution.

Survey

A short web-based survey was distributed to all member companies (210) of the Professional Logging Contractors of Maine (PLC) throughout the fall of 2022. The final response rate was 44% (n = 93). This is the same response rate obtained during the 2018 survey effort and slightly lower than the 60% response rate obtained during the 2014 survey effort. Responses came from businesses located in every Maine county except for Sagadahoc (Figure 1).

The survey asked for information on the number of weeks of operation, harvested acres, harvested totals (sawtimber, pulpwood, and biomass), number (and type) of crews, full-time equivalent employees, and for details on new capital investments for 2021. The firms were also asked about factors affecting their ability to attain maximum production and the future (succession plans) of their businesses. The instrument was similar to that used in 2014 and 2018, enabling comparison across years where appropriate.[6]

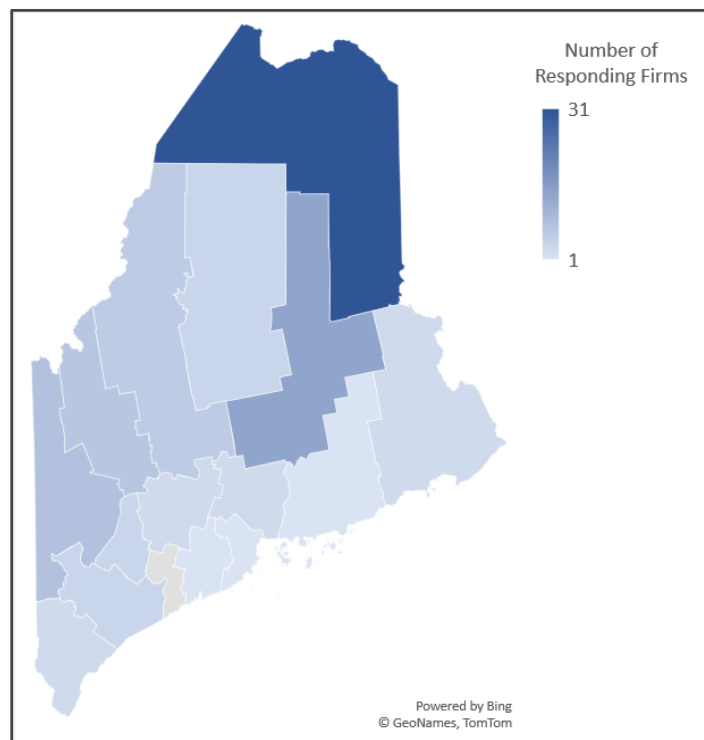*Figure 1 County Logging Business Based In (n = 93).*

---

[6] This comparison should not be taken as a reflection on changes in the industry across Maine as a whole, as the response rates and characteristics of survey respondents varies across years.

Employment

The PLC divides its member companies into four classes based on the size of their annual operation (by tons harvested or number of employees).[7] As in the 2014 and 2018 studies, a majority of survey respondents (56%) were firms located in Class sizes III and IV (Figure 2).
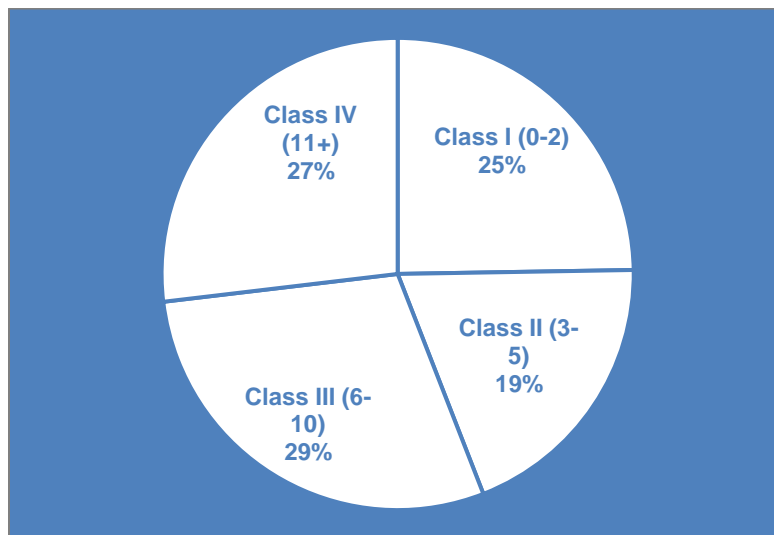
Figure 2 Number of Full-Time Equivalent Employees (n = 93)

According to the County Business Patterns from the US Census, Maine's logging sector is heavily dominated by small businesses, with 70% of employing establishments in the industry employing fewer than 5 people.[8] Additionally, according to the Nonemployer Statistics from the US Census, 1,628 nonemployer entities in the logging and harvest sector were reported in Maine in 2019. These entities are overwhelmingly (94%) sole proprietorships.

---

[7] Class I - 25,000 tons and under or 0-2 employees, Class II – 25,0001 tons to 50,000 tons or 3-5 employees, Class III – 50,001 tons to 100,000 tons or 6-10 employees, Class IV – 100,001 tons and above or 11 or more employees.

[8] Class I: 0-4 employees, Class II: 5-9 employees, Class III: 10-19 employees, Class IV: 20-49 employees, Class V: 50-99 employees. Please note, more size categories exist but are not included here as none of Maine's logging firms reported having more than 99 employees in 2019.
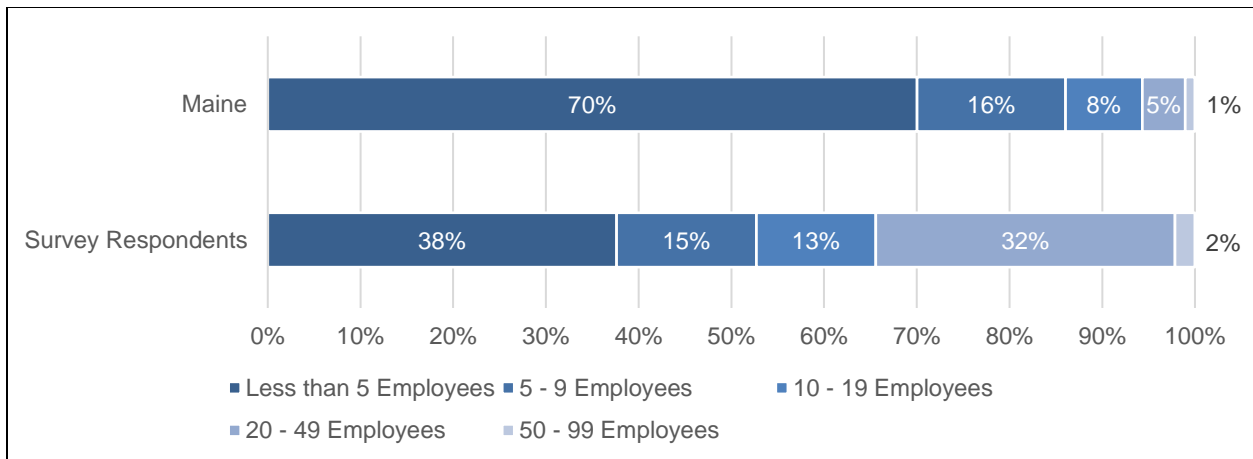
Figure 3 Logging Industry Employment.

Note: Information is from the County Business Patterns from the U.S. Census and a Professional Logging Contractors of Maine survey of logging businesses (n = 93)

As in 2014 and 2018, the majority of 2021 respondent employees work in the woods, on average 6 per firm; an additional average of 1 employee per firm provides office support, 2 employees provide trucking support, and 1 provides mechanical support (Table 1). It is notable that the average number of wood-based employees per firm, as calculated from survey responses, is half of what it was in 2014.[9]

---

[9] Bailey, M., Crandall, M., Kizhakkepurakkal, A.R. and Green, S. (2020). The Statewide Economic Contribution of Maine's Logging and Trucking Industry. Technical report. Prepared for the Professional Logging Contractors of Maine.

Table 1 Full-Time Equivalent Employees: 2014 – 2021 (n = varies)

	2014 (n = 55)[a]			2018 (n = 66)[a]			2021 (n = 93)[b]		
	Avg.	Percent	Max.	Avg.	Percent	Max.	Avg.	Percent	Max.
In-Woods	12	54%	46	7	54%	45	6	56%	33
Support	2	12%	8	2	15%	10	1	13%	20
Trucking	6	25%	25	3	23%	20	2	22%	15
Mechanics	2	9%	9	1	8%	10	1	9%	10
Total	22			13			10		

Note: Information is from [a] Bailey, M., Crandall, M., Kizhakkepurakkal, A.R. and Green, S. (2020). The Statewide Economic Contribution of Maine's Logging and Trucking Industry. Technical report. Prepared for the Professional Logging Contractors of Maine and [b] a Professional Logging Contractors of Maine survey of logging businesses.

Using information from the Quarterly Census on Employment and Wages, in Maine the industry saw a 15% decline in total number of jobs, while the jobs in the industry nationally dropped 9%, between 2014 and 2021.[10] Average annual earnings in 2021 were $65 thousand per job.[11]

---

[10] Retrieved from Lightcast 2022.4 – QCEW Employees, Non-QCEW Employees, and Self-Employed

[11] Retrieved from Lightcast 2022.4 – Lightcast proprietary employment data.

Crew Types and Trucking

Harvesting in Maine remains mechanized, requiring skilled workers (Figure 4). Survey respondents employed a total of 212 crews in 2021, 55% of which were whole-tree operations.[12] A lesser proportion (35%) of crews used cut-to-length system (harvesters and forwarders delivering log-lengths to the landing) while even fewer, 10%, relied on chainsaws and cable skidders (hand crews). This distribution of crew types follows a similar pattern as to what was reported by the 2014 and 2018 survey respondents.
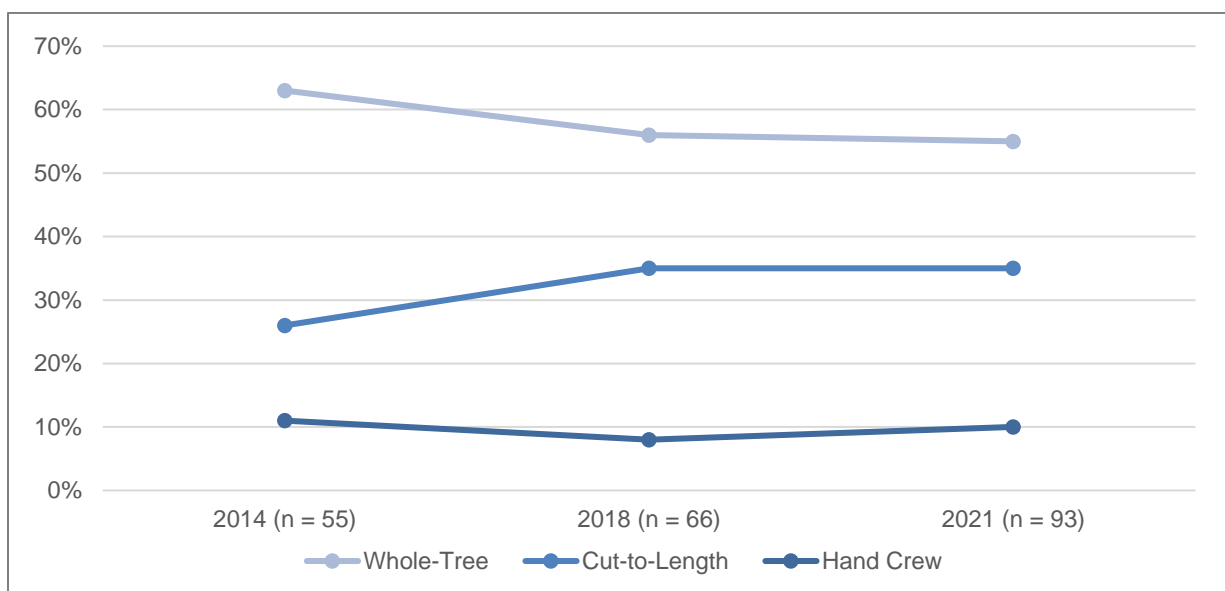
Figure 4 Logging Firm Crew Types, 2014 – 2021 (n = varies).

Note: Information is from Bailey, M., Crandall, M., Kizhakkepurakkal, A.R. and Green, S. (2020). The Statewide Economic Contribution of Maine's Logging and Trucking Industry. Technical report. Prepared for the Professional Logging Contractors of Maine, and a Professional Logging Contractors of Maine survey of logging businesses.

Trucking is an essential part of the forest products industry that is often difficult to account for. Many truckers (an occupation) work for multiple industries while others are employed exclusively in, or for, the forest products sector. Table 1 suggest that 20-25 percent of the employees of responding logging firms may be truckers by occupation.

---

[12] Feller-buncher fells, grapple skidder delivers the whole tree to the landing, and stroke delimbers processing at the landing.

Table 2 Proportion of Trucking Done Within Firm, 2014 – 2021 (n = varies)

	Contracted Outside Source for Hauling	Rarely Hauled (<50%)	Hauled often (50%)	Hauled All Harvested Material
2014 (n = 55)[a]	24%	13%	37%	26%
2018 (n = 66)[a]	38%	3%	22%	37%
2021 (n = 92)[b]	41%	8%	14%	37%

Note: Information is from [a] Bailey, M., Crandall, M., Kizhakkepurakkal, A.R. and Green, S. (2020). The Statewide Economic Contribution of Maine's Logging and Trucking Industry. Technical report. Prepared for the Professional Logging Contractors of Maine, and [b] a Professional Logging Contractors of Maine survey of logging businesses.

Results presented in Table 2 show how frequently respondents hauled their harvested material themselves (versus contracting with an outside source). In 2021, 37% of respondents hauled all their harvested material, versus 41% who reported contracting with an outside source for their hauling. On average, respondents reporting owning 2 trucks with log trailers (n = 93), and an average of 1 truck with a chip trailer (n = 92).

Operation, Harvest, and Markets

Responding firms reported an average of 42 weeks of operation in 2021 (n = 93), and they harvested a total of 119 thousand acres (n = 91). Table 3, below, summarizes the total harvest amounts (in tons) by type (sawtimber, pulpwood, and biomass).[13] Forty-eight percent of the reported harvest was in the form of sawtimber, 41% as pulpwood, and 12% as biomass. These proportions are similar to what was seen in 2014 and 2018.

Table 3 Harvested total (Sawtimber, Pulpwood and Biomass) in tons (n = varies)

	Total	Average	Median	Percent
Sawtimber (n = 61)	2,406,126	39,445	13,600	48%
Pulpwood (n = 82)	2,074,902	25,616	11,130	41%
Biomass (n = 85)	582,480	6,934	0	12%

Note: Information is from a Professional Logging Contractors of Maine survey of logging businesses.

When asked about how their ability to sell or harvest wood has changed over the last five years, 39% felt it has stayed the same, 33% reported it has decreased, and 28% felt it has increased (Figure 5). Notably, 78% of responding firms (n = 91) said that they feel there are sufficient markets for the wood that they harvest.
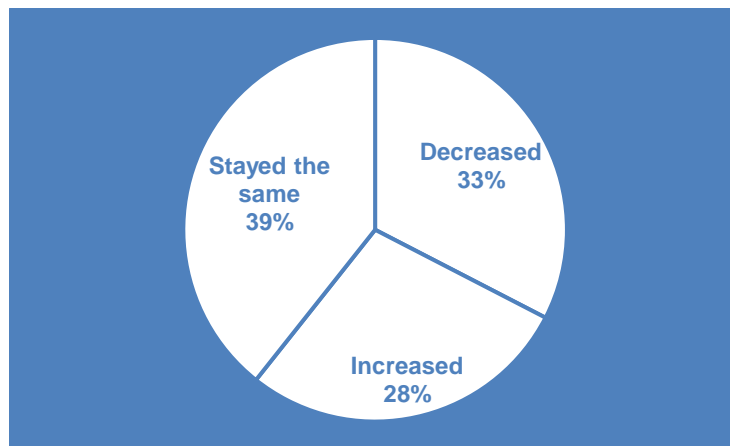

Figure 5 How Has Your Ability to Harvest or Sell Wood Changed Over the Last Five Years? (n = 89)

---

[13] The 2021 Wood Processors Report (prepared by the Maine Forest Service) has not been released and therefore we are unable to compare harvest totals to Maine as a whole.

Firms were asked to identify the importance of various production factors on their ability to attain maximum production. They rated each factors importance on a scale from 1 – 5, where 1 means 'never considered' and 5 means 'very important consideration.' Most respondents cited inflation and business costs, mill closures, access to qualified labor, market price, timely access to repair parts and weather as being important factors (Table 4).

Table 4 Factors Affecting Ability to Attain Maximum Production (n = varies)

Production Factor	Percent of Firms Identifying that the Production Factor is an Important Consideration
Weather Conditions (n = 93)	56%
Road Conditions (n = 93)	45%
Mechanical Problems (n = 93)	44%
Access to Qualified Service Technicians (n = 93)	49%
Timely Access to Repair Parts (n = 92)	67%
Mill Quotas (n = 93)	42%
Market Price (n = 92)	73%
Tract Size (n = 90)	36%
Movement of Equipment (n = 92)	46%
Regulations (n = 91)	42%
Access to Qualified Labor (n = 92)	72%
Mill Closures (n = 93)	79%
Inflation and Business Costs (n = 93)	87%

Note. Information is from a Professional Logging Contractors of Maine survey of logging businesses respondents were asked to rate each factor on a scale from 1 (never considered) to 5 (very important consideration) – results here are the percent of respondents who indicated that the factor is an important (answered a 4 or 5) consideration.

When asked about inflation (change in their business costs between September 2020 and September 2022) 67% reported seeing an increase of between 21% and 40%. Sixteen percent reported seeing an increase of over 50% (Table 5).

Table 5 Estimate of Total Increase in Business Costs from 2020 (n = 93)

Percent Increase	Percent of Firms
11% - 20%	7%
21% - 30%	32%
31% - 40%	35%
41% - 50%	9%
51% - 60%	11%
61% - 70%	5%
Unknown	2%

Note. Information is from a Professional Logging Contractors of Maine survey of logging businesses.

Other Business Activities

Sixty-three percent of firms reported engaging in activities in addition to logging services (n = 88). The most frequently cited additional activity was road construction or maintenance (42%) and the least cited additional activity was arborist services (5%).

Table 6 Other Business Activities (n = 88)

Other Business Activities	Percent of Firms
Road Construction or Maintenance	42%
Log Yard/Concentration Yard Operations	15%
Land Acquisition and Management	22%
Recreational Trail Construction or Maintenance	9%
Arborist Services	5%
Pre-Commercial Thinning Operations	7%
Land Clearing for Development	33%
Land Use Conversion Activities	16%
Construction Services	27%
Other	24%

Note. Information is from a Professional Logging Contractors of Maine survey of logging businesses

Capital Expenditures

Each responding firm was asked to list the amount of new capital investment over the last year – differentiating between investment in new and used equipment. Table 4 shows that of those who reported purchasing new equipment in 2021, the average purchase was $394 thousand, while the average for used equipment was $93,695. In total, logging firms reported spending $21 thousand in 2021.

Table 7 New Capital Investment (n = varies)

	Total	Average	Maximum	Median
New Equipment (n = 41)	$16,962,017	$394,466	$2,750,000	$305,000
Used Equipment (n = 36)	$4,778,450	$93,695	$650,000	$64,000
Total 2021 Investment [a]	$21,740,467			
Total 2018 Investment (n = 33) [b]	$24,914,057			
Total 2014 Investment (n = 33) [c]	$26,344,281			

Note: These summary statistics only include the results for those who reported making a purchase – those who said they didn't spend anything on new or used equipment are not included here; 2014 and 2018 total investment figures are inflated to 2021 dollars.

Sources: [a] Professional Logging Contractors of Maine survey of logging businesses, [b] Bailey, M., Crandall, M., Kizhakkepurakkal, A.R. and Green, S. (2020). The Statewide Economic Contribution of Maine's Logging and Trucking Industry. Technical report. Prepared for the Professional Logging Contractors of Maine; and [c] Crandall, M.S., McCullock, K., Bick, St., and Kizha, A.R., and Green, S. 2016. The Economic Impact of Logging in Maine, 2014. Report prepared for the Professional Logging Contractors of Maine.

Figure 5, below, shows all 2021 respondents (even those who noted they did not purchase any new or used equipment) who answered the question – and gives a clearer picture of the distribution of investment.
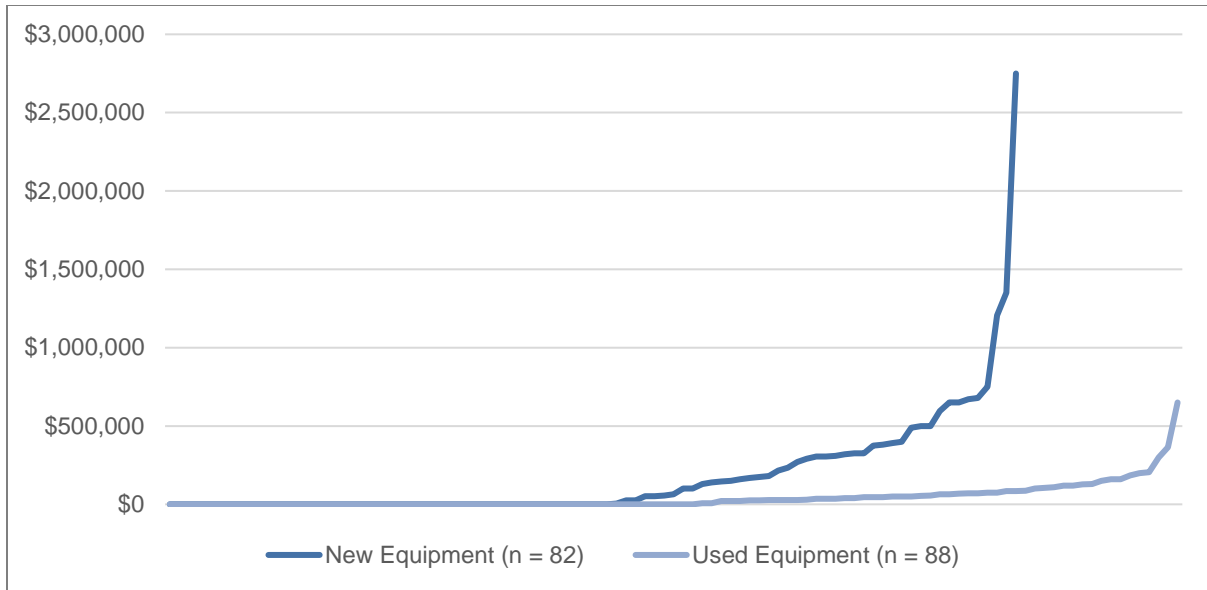
Figure 6. New Capital Investment, 2021 (n = varies)

Note: the figure includes those who reported that they did not spend any money on new or used equipment in 2021

Future of the Business

Firms were asked to identify whether they have a succession plan, and if so, to describe what their plan entails. Twenty-two percent of respondents (n = 91) reported having a plan in plan. The plans mostly revolved around having family take the business over (75%), but others are planning to sell or close.

Figure 7 Summary of Succession Plans (n = 91)

Economic Contribution Analysis

The logging industry contributes directly to the Maine economy through both day-to-day operations (e.g., direct sales, wages, employment of workers) and indirect effects. In addition to day-to-day operations (direct impacts), every dollar that is spent on local purchases throughout Maine's economy and is used by other businesses and organizations to pay their employees, taxes, and purchase more goods and services. This 'multiplier effect' is a crucial component to consider when studying the total economic contribution of the logging industry to the state of Maine. These effects are estimated using an input-output (IMPLAN) model of the Maine economy.

Table 8 Total Annual Economic Contribution of Maine's Logging and Trucking Industries, 2021

	Direct Impact	Multiplier Effects	Total Impact
Output	$273,897,428	$308,612,366	$582,509,793
Employment	3,054	2,548	5,602
Labor Income	$197,544,936	$115,036,724	$312,581,660

Notes: Direct output, employment and labor income figures were estimated using information from Lightcast (2022.4) and the 2021 Maine IMPLAN model; multiplier effects are estimating using the 2021 economic impact (IMPLAN) model of the Maine economy; only trucking contributions associated with the logging industry, as estimated by the Maine IMPLAN model, are included here; values are in 2023 dollars.

When considering these multiplier effects, Maine's logging industry contributed an estimated 582 million in total output and over 5.6 thousand full-and-part-time jobs to the state economy in 2021 (Table 9).

The total economic contribution of Maine's logging industry in 2021 was associated with a fiscal impact of $27 million in state and local taxes. This tax impact is equivalent to 5% of the logging sector's total (output) economic contribution.

Appendix

A Note on the Data and Methods

This study utilized the 2021 IMPLAN regional economic model for Maine. The model accounts for over 500 industries to estimate regional and industry-specific economic impacts. This includes data on transactions occurring between local businesses, spending patterns for households, and transactions occurring between local businesses and the rest of the world. IMPLAN uses data from County Business Patterns from the U.S. Census Bureau, Regional Economic Information System and the Bureau of Economic Analysis as well as the ES-202 statistics from the Bureau of Labor Statistics.

This study also utilized data obtained from Lightcast (version 2022.4). Lightcast is a proprietary data source that employs data from a variety of federal and state sources. The Lightcast data pulled for this study relied on data from the Quarterly Census of Employment and Wages, County Business Patterns, Current Employment Statistics, BEA State and Local Personal Income reports, the National Industry-Occupation Employment Matrix (NIOEM), the American Community Survey, Nonemployer Statistics, and the Maine Department of Labor. Their projections are informed by NIOEM and long-term industry projections published by individual states.