



TIMBER SALES' ECONOMIC CONTRIBUTIONS TO MICHIGAN'S ECONOMY IN 2014

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EXECUTIVE SUMMARY

An important role that the Michigan Department of Natural Resources (MDNR), Forest Resources Division (FRD), plays in supporting forest industries is the sale of timber from state forest lands. This report documents that impact in 2014 using FRD data and the commercially available IMPLAN model (a widely used input-output model designed for economic impact analysis).

This report was commissioned to identify how the MDNR's timber sales program complements two goals established at the Governor's 2013 Forest Products Summit: supporting existing industry and encouraging regionally based industry development.

This study was limited to four industries (11 economic sectors), including the following: Forestry, Logging, Primary Solid Wood Products and Wood-based Power, and Primary Paper and Paperboard Products. These industries identify and harvest timber, export wood and perform the first step in manufacturing/processing. The FRD timber sales program contributed significantly to the forest products industries. As background, in fiscal year 2014, State Forest timber sales generated:

- A harvest volume of about 897 thousand cords accounting for 19.5 percent of the statewide harvest,
- \$45.5 million in revenue, and
- Expenses of about \$12.1 million to facilitate these harvests, mostly in personnel costs.
- Therefore, about \$3.76 in revenue was generated for every dollar expended.

The economic impact of FRD timber sales can be described in two categories: impacts related to the volume of timber made available to the local economy (timber harvesting, exporting and processing), and impacts of program staff and materials expenditures (timber harvest support activities). In summary:

- Over 5,900 in total jobs, including approximately 2,200 forest products industry jobs, were supported.
- Twenty-eight private sector jobs were supported by each FRD timber sales job.
- Total labor income was \$334 million, total value added was \$497 million, and total output was \$1.4 billion.
- About 4 percent total jobs and total labor income supported, and 1 percent of total value added was due to the costs for MDNR timber sale support activities, including salaries and wages, travel and vehicle costs, supplies and payments to timber sale contractors.
- Most of the economic contribution from the MDNR timber sale program resulted from the sale and processing of the volume of timber harvested.
- Most of these activities were in northern Michigan.
- Total employment and total value added from MDNR timber sales represented about 16 percent of statewide forest products industry total employment and value added.

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1.0 INTRODUCTION

Forests and forest products industries are central for the transition to a greener and more sustainable economy. And a green goods and services economy relies on the sustainable use of natural resources. Of course, Michigan's forest products industries are tightly bound to forests and the goods and ecosystem services that they provide (e.g., wildlife habitat, watershed protection, etc.).

The contributions of Michigan's forests can increase with expanded emphasis on the use of wood-based products, adoption of modern wood energy technology, and clear linkages to ecosystem services. On April 23, 2013, the Governor's Forest Products Summit was convened to explore ideas and options for growing the state's forest products industries (http://www.mich.gov/dnr/0,4570,7-153-30301_30505_64883---,00.html). The Michigan Department of Natural Resources (MDNR) and the Governor-appointed Timber Advisory Council developed five-year (2018) goals related to the industries; they are:

- Increasing the economic impact of the timber industry on state and regional economies from \$14 billion to \$20 billion;
- Increasing the export of value-added forest products by 50 percent;
- Increasing forest products-related jobs by 10 percent;
- Supporting existing industry; and
- Encouraging regionally based industry development.

An important role that the MDNR Forest Resources Division (FRD) plays in supporting forest industries is the sale of timber from state forest lands. This report documents that contribution in 2014 using FRD data, the commercially available IMPLAN model (a widely used input-output model designed for economic impact analysis), and a spreadsheet-based model using concepts from recently published research on estimating economic contributions of forest industries.

2.0 METHODS

To quantify the MDNR-FRD's economic contributions, data on timber sales and FRD expenditures were combined with modeling based on the commercially available IMPLAN model (IMPLAN Group LLC, www.implan.com). The IMPLAN focuses on the interdependence among various producing and consuming sectors in the economy. The IMPLAN data are compiled and linked by the IMPLAN software (Version 3.1.1001.12); data come from various government agencies including the U.S. Census Bureau, the U.S. Bureau of Labor Statistics, and the U.S. Bureau of Economic Analysis. A base year of 2014 was chosen because the most recent IMPLAN data are from 2014. The MDNR-FRD data from FY2014 were used. The methods address two sets of activities associated with MDNR-FRD timber sales: 1) harvesting timber and processing it in Michigan mills or exporting it out of state, and 2) supporting activities within MDNR-FRD which facilitate timber sales (Figure 1).

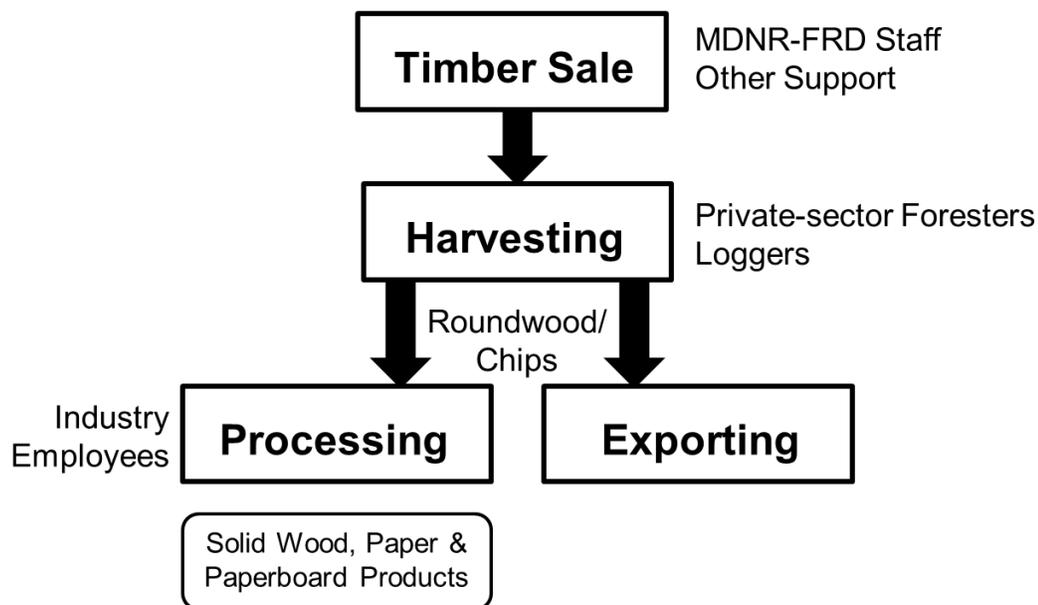


Figure 1 Economic Linkages Between MDNR-FRD Timber Sales, Harvesting, Processing & Exporting.

2.1 ESTIMATING CONTRIBUTIONS FROM TIMBER HARVESTING, EXPORTING AND PROCESSING

In previous Michigan studies, thirty-one IMPLAN sectors were identified as forest products sectors (see, for example, MDNR 2016a). They were aggregated into seven larger industries for ease of communication and analysis. The industries were: Forestry, Logging, Primary Solid Wood Products and Wood-based Power, Secondary Solid Wood Products, Wood Furniture, Primary Paper and Paperboard Products, and Secondary Paper and Paperboard Products.

In examining the economic contributions of a harvested production input (e.g., roundwood/chips), the economic sectors include harvesting and the initial or primary processing step (Figure 1). The MDNR-FRD staff payroll and other support expenses are used to facilitate the timber sales. Consulting and industry foresters and loggers are involved in harvesting the timber. Roundwood and chips flow to the processing facilities (e.g., solid wood products and paper & paperboard products) or to export markets. Thus, from an economic activity standpoint, private-sector foresters and loggers are suppliers to the primary processing facilities (e.g., sawmills) and to U.S. and international export markets. Demands from these facilities and markets determine the contributions of overall forestry and logging industries' activities.

As a consequence, four industries (11 sectors) were used in this study: Forestry, Logging, Primary Solid Wood Products and Wood-based Power, and Primary Paper and Paperboard Products (Table 1). These industries manage timber sales, harvest timber, export wood and perform the first step in manufacturing/processing. Economic measures for these industries include employment, labor income, value added, output or sales and others (see Appendix for definitions). The economic values were calculated in 2014 dollars, but reported in 2016 (current) dollars.

Table 1 Aggregated Forest Products Industries and IMPLAN Component Sectors.

IMPLAN Sector	SECTOR NAME
	Forestry
15	Forestry, forest products, and timber tract production
19	Support activities for forestry*
	Logging
16	Commercial logging
	Primary Solid Wood Products and Wood-based Power
47	Electric power generation – Biomass
134	Sawmills
135	Wood preservation
136	Veneer and plywood manufacturing
138	Reconstituted wood product manufacturing
	Primary Paper and Paperboard Products
146	Pulp mills
147	Paper mills
148	Paperboard mills

The conceptual framework for analyzing timber sales contributions was based partially on a recent *Journal of Forestry* article (Sorenson et. al. 2016) and partially on the USDA Forest Service’s earlier contribution analysis approach (pers. Comm., Susan Winter, USDA Forest Service). The general approach they proposed was to use regional direct response coefficients (DRCs) relating the number of jobs created per unit volume of timber processed by industry sector. For this study, DRCs were developed using unpublished 2014 Michigan-specific timber production and import data from a timber product output survey and IMPLAN-based employment data for economic sectors (Table 1). Michigan mill types were linked to IMPLAN sectors (Table 2). Estimates of exports were based on averaging data from recent published timber product output reports (Piva and Weatherspoon 2010, Haugen et. al. 2014, and Haugen 2016).

The DRCs were multiplied by the volume of roundwood/chips processed by Michigan mills (excluding exported roundwood/chips, but including imported roundwood/chips) to yield direct jobs created. In addition, the relationships between exported roundwood/chips and the Forestry and Logging industries were estimated. The employment estimates by sector were expanded to other economic measures using ratios from IMPLAN analyses; final calculations were made in a spreadsheet using a number of analysis steps (Figure 2). Aside from the exported roundwood/chips, Forestry and Commercial Logging activities were treated as indirect activities (i.e., inputs) associated with timber processing (e.g., sawmills). Economic measures for indirect activities were derived from detailed IMPLAN reports for the processing sectors.

Table 2. Links between IMPLAN Sections & Timber Product Output Mill Types.

IMPLAN SECTOR NAME	MILL TYPE
Primary Solid Wood Products and Wood-based Power	
Electric Power Generation - Biomass	Energy
Sawmills	Sawmill
Wood preservation	Wood preservation
Veneer and plywood manufacturing	Veneer & plywood
Reconstituted wood product manufacturing	Reconstituted wood product
Primary Paper and Paperboard Products	
Pulp mills and Paper mills	Paper
Paperboard Mills	Corrugated board

1. Create new model (or old, if already started).
2. For 2014 data, do analysis (event year) in 2014.
3. Create New Activity (e.g., Sawmills) with Industry Change Activity Type and Activity Level 1.00.
4. Create a New Event (e.g., Sawmills) with Event Year set at 2014.
5. Select sector (e.g., 134 Sawmills) and set Industry Sales at \$1,000,000.
6. Enter "Next."
7. Select New Scenario; level 1.00.
8. Enter Name (e.g., Sawmill Multipliers).
9. Select Activity (e.g., Sawmills).
10. Analyze Single Region.
11. View Results in 2016 Dollars.
12. Export Results to Excel.
13. Export All Impact Detail files to derive relationships between direct and indirect effects for all economic measures and estimate processing sector effects.
14. Estimate the indirect Forestry and Logging effects for the processing sectors in Excel worksheet using sectoral production functions.

Figure 2. Steps for Estimating Effects by Sector from IMPLAN for Use in Timber Contribution Analysis.

The IMPLAN results were combined with roundwood/chips volumes and DRCs within a spreadsheet model. The spreadsheet model was calibrated using employment data for the statewide timber processed including imports prior to estimating the economic contributions of FY2014 MDNR-FRD harvests. Direct, indirect and induced effects were estimated for employment, labor income, value added and output (MDNR 2016a)

2.2 ESTIMATING CONTRIBUTIONS FROM MDNR-FRD SUPPORT ACTIVITIES

The MDNR-FRD staff identified cost categories and cost totals that supported the timber sales program in 2014. These accounting data provided a first step in estimating economic contributions. These expenses or costs represented only a portion of MDNR-FRD's overall budget. For example, forest fire protection and efforts related to forest health, forest certification, private lands forestry and urban and community forestry are not associated directly with timber sales and are excluded from this analysis.

Personnel costs were first summed by cost category:

- 58200 - FMD STATE FOREST INVENTORY,
- 58600 - FMD TIMBER SALE PREP,
- 58601 - FMD TIMBER SALE PREP,
- 58615 - FMD TSALE PROGRAM SUPPORT & DEVELOPMENT, and
- 58630 - FMD TIMBER SALE CONTRACT ADMIN.

Inventory tasks included data collection, prescription development, public review, daily use of inventory system, activity tracking and inventory updates. Timber sale preparation involved staff time in the field and office related to sale layout, volume estimation and data processing, preparation of sale proposals, and time spent working with sale preparation contractors. Program support and development covered Lansing sales review, program of work development, issuing contracts, and secretarial support. Contract administration dealt with sale administration and inspections in the field.

Personnel costs covered salaries and wages, longevity, overtime, fringe benefits, and retirement/FICA/Medicaid. When using the Labor Income Change activity in IMPLAN, all of these costs to the agency are involved in contribution analysis; they represent total compensation for the employees. The IMPLAN accounts for benefits and taxes prior to making estimates of effects. Only induced effects were estimated with this approach, and number of employees and compensation were added to the results as direct effects to yield total effects.

Other support costs included: personnel travel (lodging and meals), fleet costs (for vehicles used), supplies (contractual services/supplies/materials, other supplies, and other miscellaneous costs), paint supplies, and timber sale contract services. Each type of support activity was matched with an IMPLAN sector (Table 3). Supplies were modelled as a retail sector in IMPLAN. Retail margins (e.g., sales receipts minus cost of goods sold) were applied to convert retail-level prices paid into appropriate producer values. Paint supplies were treated as an industry sector with wholesale margins applied. Fleet costs (paid to state government motor pool) and contractor costs were modelled as 100 percent Michigan supplied. Regional purchase coefficients for other sectors were based on IMPLAN values; that is, a portion of the supplies could be purchased outside of Michigan.

Table 3. MDNR-FRD Support Activities & Associated IMPLAN Sectors, 2014.

MDNR-FRD Support Activities	IMPLAN Sector/Activity
Salaries and Wages	Activity: Labor Income Change
Travel-Lodging	499-Hotels and motels, including casino hotels
Travel-Meals	501-Full-service restaurants
Vehicle Costs	442-Automotive equipment rental and leasing
Supplies	406-Retail - Miscellaneous store retailers
Supplies-Paint	177-Paint and coating manufacturing
Timber Sale Contractors	19-Support activities for agriculture and forestry

The Automotive Equipment Rental and Leasing sector (IMPLAN Sector 442) was used to represent a public sector support activity. Hence, direct private-sector effects were excluded from the final results. Indirect and induced effects that support the rental activity effects were tallied and reported in 2016 dollars. Steps for estimating support effects included MDNR-FRD data compilation and IMPLAN calculations (Figure 3).

1. Compile MDNR-FRD cost data that supports timber sales and harvests.
2. Identify IMPLAN sectors associated with MDNR-FRD costs.
3. Use the IMPLAN model from Figure 1.
4. For 2014 data, do analysis (event year) in 2014.
5. Create New Activity (i.e., Salaries & Wages) with Labor Income Change Activity Type and Activity Level 1.00.
6. Create a New Event (i.e., Salaries & Wages) with Event Year set at 2014.
7. Select sector (i.e., Salaries & Wages) and set Industry Sales at compiled level.
8. Enter "Next."
9. Select New Scenario; level 1.00.
10. Enter Name (i.e., Salaries & Wages Impacts).
11. Select Activity (i.e., Salaries & Wages).
12. Analyze Single Region.
13. View Results in 2016 Dollars.
14. Export Results to Excel.
15. Export All Impact Detail files to Excel.
16. Follow a similar process (steps 5-15) for other support activities. Create New Activity (i.e., Timber Sale Support Activities) with Industry Change Activity Type and Activity Level 1.00. Create a New Event (i.e., TS Support Activities) with Event Year set at 2014. Select sectors (e.g., 19, 177, etc.) and set Industry Sales at compiled levels. Adjust margins and RPCs as needed. Create a New Scenario (i.e., TS Support Activities Impacts). Analyze Single Region. View Results in 2016 Dollars. Export Results to Excel. Export All Impact Detail files to Excel.
17. Compile and report IMPLAN results.

Figure 3. Steps for Estimating Effects of MDNR-FRD Support Activities from IMPLAN for Use in Timber Contribution Analysis.

After all contributions were estimated, they were compiled and reported in total by forest industry and by MDNR-FRD support activity. The contributions of other agency activities (e.g., fire protection, payments in lieu of taxes, etc.) are beyond the scope of this report.

3.0 ECONOMIC CONTRIBUTIONS OF MICHIGAN'S FOREST PRODUCTS INDUSTRIES

In FY2014, 70.9 MMCF (approximately 897 thousand cords¹) were harvested from Michigan state forests. These harvests generated \$44.7 million in revenue for the state, and the state spent \$12.1 million in activities, mostly personnel costs, that facilitated these harvests. Thus, \$3.70 in revenue was generated for every dollar spent. These net returns (\$32 million) do not reflect the multi-year investments required to manage timber resources (e.g., forest inventory) that eventually lead to timber sales.

The \$12.1 million was only a portion of MDNR-FRD's \$37.4 million budget for FY2014. The other costs cover MDNR-FRD's broader mandate of forest management which includes forest cultivation, land surveys, forest certification, planning, equipment, and a variety of management and support activities needed for sustainable forest management. The timber sales program is a piece of the overall mandate, and it can be examined in a partial analysis of FRD's economic contributions. A broader analysis could include all of FRD's expenses and personnel and all of its benefits, including dispersed recreation on the forests and environmental benefits.

The net returns do not reflect the significant economic contributions of the MDNR-FRD timber sales program. The remainder of this section addresses those contributions. This section is divided into two parts, the contributions of: 1) the harvested timber that was processed by Michigan mills or exported, and 2) the support activities within MDNR-FRD which facilitated the timber sales.

¹897,000 cords is the estimated volume of timber from contracts where stumpage payments were made during FY14 with the volume being estimated from the payment. For comparison, Michigan Department of Natural Resources (2016b) reported 885,143 cords, calculated from an estimated volume of timber within a payment unit that had been completed during the fiscal year.

This section is divided into three parts, the contributions of: 1) the timber harvesting on state forests, exporting harvested roundwood/chips and processing roundwood/chips in Michigan mills, 2) the support activities within MDNR-FRD facilitating the timber sales and 3) the overall MDNR-FRD timber sales program economic contributions.

3.1 CONTRIBUTIONS FROM TIMBER HARVESTING, EXPORTING AND PROCESSING

Following Sorenson and others (2016), direct response coefficients were derived from IMPLAN employment data and unpublished 2014 Michigan forest industry timber product output survey data (Table 4). After accounting for exports, MDNR-FRD statistics on volume harvested in FY2014 were allocated to different sectors within industries. In Michigan, 363.7 MMCF were allocated; 70.9 MMCF were harvested from state forests. Initial jobs/MMCF figures were multiplied by the MMCF values to estimate direct jobs by mill type. These estimates were used as a starting point for assessing economic contributions of the harvesting activities. Each mill type was associated with an economic sector within IMPLAN, and sectors were aggregated into industries for this report. Hence, volume harvested, exported and processed drives the estimates of economic contributions.

Table 4. Direct Response Coefficients (DRCs) Relating Jobs to Volume Harvested or Exported (jobs/MMCF harvested; 1 cord = 79 cubic ft) and Volume Harvested from State Forests (MMCF) and Processed by Forest Products Industries, 2014.

Industry	DRCs (Jobs/MMCF)	Volume (MMCF)
Forestry-Wood Exports	4.3	7.07
Logging-Wood Exports	24.9	
Primary Solid Wood Products and Wood-Based Power	20.9	38.88
Primary Paper and Paperboard Products	21.5	24.93

Note: Wood exports generate direct Forestry and Logging jobs. Most Forestry and Logging jobs are indirectly created by activities in the processing industries.

The IMPLAN-based ratios relating direct employment to indirect and induced employment were applied to generate indirect and induced employment by sector. Using an identical approach, the relationships between direct employment and other economic measures (e.g., output) were used to calculate other direct, indirect and induced effects. Forestry and Logging industries' contributions are calculated as both direct and indirect effects. As inputs into the production of primary wood products, Forestry and Logging sectors are derived as indirect effects from those industries. For exports, the Forestry and Logging sectors are treated as direct effects; as exports increase, logging and forestry increase based on the volume of wood harvested. Direct employment in the primary wood products industries, including Forestry and Logging, was added to the indirect employment in the Forestry and Logging sectors to determine total employment in wood products industries identified in Table 1.

Over 1,300 (792 + 542) direct primary forest products industries jobs were associated with the MDNR-FRD timber sales program in 2014 (Table 5). The forest products industries' job total, including Forestry and Logging, was 2,192 (1,541 + 85 + 566). The latter includes direct Forestry and Logging industries jobs associated with wood exports and indirect Forestry and Logging industries jobs generated by supplying roundwood/chips to primary processing industries. The total (direct + indirect + induced) contribution, in terms of jobs, was 5,688. In other words, the state forest harvesting activities supported 5,688 private sector jobs in Michigan. These jobs include the direct industry jobs, along with jobs from industry suppliers (indirect) and jobs in local communities where industries and suppliers' employees spend their money. Total labor income, in 2016 dollars, was \$319.4 million (Table 6). Total value added was \$490.8 million (Table 7), and total output or sales was \$1.4 billion (Table 8). Statewide, there were 13,389 direct jobs in these industries; state forest timber sales supported 16.4% of those jobs in 2014.

In addition to the 2,192 forest products industries jobs, labor income for these industries was \$134.8 million in 2014. Value added was \$197.0 million, and economic output was \$793.4 million. The starting point for these effects was the \$45.5 million in state forest timber sales.

Table 5. Employment (Jobs) Generated from MDNR-FRD Timber Harvested & Processed in Michigan or Exported by Industry, 2014.

Industry	Employment			Total
	Direct	Indirect	Induced	
Forestry-Wood Exports	31	2	87	44
Forestry-Input to Primary Production	-	85	-	-
Logging-Wood Exports	176	33	54	283
Logging-Input to Primary Production	-	566	-	-
Primary Solid Wood Products and Wood-Based Power	792	773	710	2,772
Primary Paper and Paperboard Products	542	1,096	821	2,590
TOTAL	1,541	2,556	1,592	5,688

Note: Indirect effects are reported for Forestry and Logging industries and added to direct effects to provide an estimate of forest products industries' effects. The indirect effects for Forestry and Logging industries are included in the totals reported for primary processing industries. The "-" in the Total column for indirect effects highlights that these effects are not double-counted in the totals.

Table 6. Labor Income (in thousands of 2016 dollars) Generated from MDNR-FRD Timber Harvested & Processed in Michigan or Exported by Industry, 2014.

Industry	Labor Income			Total
	Direct	Indirect	Induced	
Forestry-Wood Exports	936	86	314	1,460
Forestry-Input to Primary Production	-	2,600	-	-
Logging-Wood Exports	6,683	1,210	2,331	10,822
Logging-Input to Primary Production	-	21,662	-	-
Primary Solid Wood Products and Wood-Based Power	47,071	45,902	30,700	142,130
Primary Paper and Paperboard Products	55,833	68,790	35,235	164,944
TOTAL	\$110,524	\$140,250	\$68,581	\$319,355

Note: See table note in Table 5.

Table 7. Value Added (in thousands of 2016 Dollars) Generated from MDNR-FRD Timber Harvested & Processed in Michigan or Exported by Industry, 2014.

Industry	Value Added			Total
	Direct	Indirect	Induced	
Forestry-Wood Exports	1,169	140	551	2,012
Forestry-Input to Primary Production	-	3,302	-	-
Logging-Wood Exports	8,969	1,935	4,086	15,735
Logging-Input to Primary Production	-	29,843	-	-
Primary Solid Wood Products and Wood-Based Power	62,354	68,254	53,808	209,045
Primary Paper and Paperboard Products	91,393	103,193	61,753	263,958
TOTAL	\$163,885	\$206,668	\$120,197	\$490,750

Note: See table note in Table 5.

Table 8. Output or Sales (in thousands of 2016 dollars) Generated from MDNR-FRD Timber Harvested & Processed in Michigan or Exported by Industry, 2014.

Industry	Output			Total
	Direct	Indirect	Induced	
Forestry-Wood Exports	1,958	269	981	3,413
Forestry-Input to Primary Production	-	5,180	-	-
Logging-Wood Exports	16,171	3,425	7,271	28,087
Logging-Input to Primary Production	-	52,986	-	-
Primary Solid Wood Products and Wood-Based Power	277,041	143,436	95,769	560,226
Primary Paper and Paperboard Products	440,029	217,207	109,911	779,908
TOTAL	\$735,199	\$422,504	\$213,932	\$1,371,634

Note: See table note in Table 5.

3.2 CONTRIBUTIONS FROM MDNR-FRD SUPPORT ACTIVITIES

In addition to the economic effects of harvesting, exporting and processing state forest timber, the MDNR-FRD support activities also contribute to the overall effects of the timber sales program. Data compiled by MDNR-FRD staff provided the starting point for estimating economic contributions of timber-harvest support activities. Personnel costs were associated with forest inventory, timber sale preparation, program support and development, and timber sale administration (Table 9). Total personnel costs were \$10.7 million. In total, 211 MDNR-FRD employees were involved in these activities. Many of these employees had other non-sale responsibilities, so the total reflected some part-time effort.

Other support costs included personnel travel costs for meals and lodging, fleet costs (funds are paid to cover costs of vehicle rental, maintenance and gasoline), various supplies, and private forestry contractors; these costs totaled \$1.4 million in FY 2014 (Table 10). Total support costs in FY2014 were \$12.1 million.

Table 9. MDNR-FRD Timber Sale Personnel Support Costs by Cost Category, FY2014.

COST CATEGORIES	SALARIES & WAGES	FRINGE BENEFITS	RETIREMENT/ FICA/MEDICAID	TOTAL
State Forest Inventory	\$1,818,756	\$399,208	\$1,132,433	\$3,350,397
Timber Sale Prep	\$2,023,634	\$435,476	\$1,268,367	\$3,727,477
Tsale Program Support & Development	\$1,364,620	\$324,504	\$853,105	\$2,542,228
Timber Sale Contract Admin	\$569,667	\$130,992	\$355,376	\$1,056,035
TOTAL	\$5,776,677	\$1,290,180	\$3,609,281	\$10,676,138

Table 10. Other MDNR-FRD Timber Sale Support Costs by Cost Category, FY2014.

OTHER SUPORT COSTS	2014 Dollars
Travel-Lodging	\$18,432
Travel-Meals	\$9,339
Vehicle Costs	\$508,005
Supplies	\$279,458
Supplies-Paint	\$75,811
Timber Sale Contractors	\$527,250
TOTAL	\$1,418,295

Economic contributions associated with personnel and other timber sale support costs were considerably less than the contributions from the timber sales (Table 11).

Table 11. Economic Contributions of Personnel & Other Timber Sale Support Costs Measured in Jobs & 2016 Dollars, FY2014.

DIRECT CONTRIBUTIONS	Employment	Labor Income	Value Added	Output
MDNR-FRD Personnel	211.0	10,676,138	0	0
Lodging/Meals	0.2	3,818	4,453	8,624
Transportation	0.0	0	0	0
Supplies	3.3	94,111	116,063	176,546
Contractors	11.4	330,127	407,872	549,930
Subtotal	225.9	11,104,194	528,387	735,100
INDIRECT CONTRIBUTIONS				
MDNR-FRD Personnel	0.0	0	0	0
Lodging/Meals	0.0	997	1,681	3,107
Transportation	1.2	64,405	109,442	192,150
Supplies	0.4	19,328	33,673	59,791
Contractors	0.5	24,679	38,355	75,768
Subtotal	2.1	109,409	183,151	330,816
INDUCED CONTRIBUTIONS				
MDNR-FRD Personnel	70.8	3,064,293	5,370,201	9,558,442
Lodging/Meals	0.0	1,330	2,330	4,147
Transportation	1.2	51,619	90,463	161,004
Supplies	0.7	31,218	54,711	97,367
Contractors	2.3	97,543	170,950	304,226
Subtotal	75.0	3,246,003	5,688,655	10,125,186
TOTAL CONTRIBUTIONS				
MDNR-FRD Personnel	281.8	13,740,431	5,370,201	9,558,442
Lodging/Meals	0.2	6,145	8,464	15,879
Transportation	2.4	116,023	199,905	353,154
Supplies	4.4	144,657	204,447	333,704
Contractors	14.1	452,350	617,177	929,924
Total	302.9	14,459,606	6,400,194	11,191,102

Nonetheless, they were important contributions, especially in northern communities where MDNR-FRD employees' direct and induced spending supports local economies. For example, direct employment for timber sales support was 225.9 jobs (including 211 MDNR-FRD jobs), and direct labor income was \$11.1 million. These contributions were based mostly on the employment of MDNR-FRD staff. In comparison, there were over 1,500 direct jobs and \$110.5 million in direct labor income associated with harvesting, exporting and processing timber (Tables 5 and 6). Total contributions of personnel and other support activities were 302.9 jobs, \$14.5 million in labor income, \$6.4 million in total value added and \$11.2 million in output.

3.3 OVERALL MDNR-FRD TIMBER SALES PROGRAM ECONOMIC CONTRIBUTIONS

The economic contributions of the MDNR-FRD timber sales program were significant in 2014 relative to the \$12.1 million expenditure on personnel and other support costs (Table 12). By combining results in sections 3.1 and 3.2, we find almost 6,000 jobs were supported by the program in 2014. Ninety-six percent of these were private-sector jobs, and just over 200 jobs were in the MDNR-FRD providing program management. Total labor income was \$334 million, and total value added was \$497 million. Total output exceeded \$1.3 billion. Timber harvesting, exporting and processing accounted for 95-99 percent of employment, labor income, total value added and output for the overall program. These figures highlight the role of the sales program in supporting significant private-sector economic activities.

Table 12. Economic Contributions of Timber Sale Support & Timber Harvesting, Exporting & Processing Measured in Jobs & thousands of 2016 Dollars, FY2014.

DIRECT CONTRIBUTIONS	Employment	Labor Income	Value Added	Output
Timber sale support	225.9	11,104	528	735
Timber harvesting, exporting and processing	1,540.5	110,524	163,885	735,199
Subtotal	1,766.4	121,629	164,413	735,934
INDIRECT CONTRIBUTIONS				
Timber sale support	2.1	109	183	331
Timber harvesting, exporting and processing	2,555.6	140,250	206,668	422,504
Subtotal	2,557.7	140,360	206,851	422,835
INDUCED CONTRIBUTIONS				
Timber sale support	75.0	3,246	5,689	10,125
Timber harvesting, exporting and processing	1,591.9	68,581	120,197	213,932
Subtotal	1,666.9	71,827	125,886	224,057
TOTAL CONTRIBUTIONS				
Timber sale support	302.9	14,460	6,400	11,191
Timber harvesting, exporting and processing	5,688.1	319,355	490,750	1,371,634
Total	5,991.0	333,815	497,150	1,382,825

Source: Table 5-8 and Table 11.

4.0 REFERENCES CITED

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5.0 APPENDIX

Table 13. Terms Used to Describe Economic Impacts & Contributions.

Term	Description
Output	The dollar measure of production within an area; it is also viewed as sales.
Employment	The number of full-time and part-time jobs associated with an industry. Jobs = the annual average of monthly jobs in that industry. Each job represents twelve months of employment.
Labor income	The dollar total of employee compensation and proprietor income; the latter is associated with self-employed individuals.
Value added	The sum labor income, other property income (e.g., rents and profits) and indirect business taxes (e.g., excise and sales taxes). It is the difference between an industry's total output and the cost of its intermediate inputs. The sum of value added for all economic sectors within the state equals the Gross State Product.
Direct effects	The economic activities (e.g., output, employment, labor income, and value added) associated with an industry or sector in the study area. These can describe the current economic sectors or changes to those sectors.
Indirect effects	The impact of local industries purchasing goods and services from other industries leading to others' outputs, employment and labor income.
Induced effects	The impact of labor income (employee compensation and proprietor income) via goods and services purchased due to the direct and indirect spending by industries.
Total effects	Sum of direct, indirect and induced effects.

Source: www.implan.com/