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# ECONOMIC IMPACT OF THE TIMBER BASED INDUSTRIES IN THE TUG HILL REGION OF NEW YORK

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# Introduction

Accurate information about the economic impact of forest based industries of a region is needed for intelligent planning and policy development by private industry and public decision makers.

This report focuses on the economic impact of the timber based sector in the Tug Hill region of New York State, that area of the state composed of Jefferson, Lewis, Oneida, and Oswego counties. The study was undertaken by the School of Forestry as part of a larger investigation of the impact of New York's forest related activities on the state's economy.

The Temporary State Commission on Tug Hill, a planning group located in Watertown, N.Y., assisted the School of Forestry in this study. Their interest in the project stemmed from a requirement for economic information concerning Tug Hill for utilization in Use and Impact of the Tug Hill Forests part of the five phased report, Tug Hill Forest Project. The Tug Hill Commission offered assistance in providing publicity for the study, developing lists of addresses of area timber based industries and participating in questionnaire follow ups to ensure completions.

The School of Forestry saw this as an ideal opportunity to assist the Tug Hill Commission in their endeavor and collected first hand regional information to use as a check on the U.S. Bureau of the Census published information and for the development of productivity ratios and other input - output relationships.

A series of questionnaires were developed for the major forest related sectors: primary manufacturers (sawmills), secondary (lumber utilizing) manufacturers, and loggers. (See Appendix A for copies of the questionnaires.) It should be stressed that all information received by the School of Forestry was processed in strict confidence. Access to the responses was limited to a small team of researchers, and only total industry figures are reported. In this way, individual firms are afforded protection from being identified.

Objectives of these questionnaires are: (1) to measure sales, employment, and income directly generated in the region by each sector; (2) to determine the linkages between (a) the primary wood-using industry and the region's forest land, and (b) the primary and secondary wood-using industry in the region.

Questionnaires were mailed in accordance with a list of firms for each sector. The lists were developed through the efforts of the Tug Hill Commission and the New York State Department of Environmental Conservation, Regions 6 and 7. Additionally, information was obtained through the Directory of Primary Wood Using Plants in New York State (January 1979, published by NYS DEC). A cover letter was included with each questionnaire explaining the purpose of the study and emphasizing the confidential treatment of the responses.

Questionnaires were mailed out in August 1980. Field visits were made in late August and early September to the sawmills and secondary manufacturers to insure completion of the questionnaire. It was felt that loggers were too

numerous and too difficult to locate with respect to the time span of the field study, therefore, no effort was made to follow-up on the loggers' questionnaires.

For tabluation purposes, the primary manufacturers were divided into two groups: the major sawmills (those utilizing 500,000 or more board feet of timber annually) and the minor sawmills (those utilizing under 500,000 board feet of timber annually). Thus, four distinct categories result: (1) major primary manufacturers; (2) minor primary manufacturers; (3) secondary; and (4) timber harvesters.

There was a poor intial response to the questionnaires, i.e., 6 out of 18 in major primary, 9 out of 34 in the minor primary, and 11 out of 21 in the secondary manufacturers sent back completed questionnaires. To remedy this situation, an abbreviated format of the questionnaires was administered over the phone to the non-respondents in both the primary and secondary sectors (see Appendix for questions).

There are only two integrated wood pulp and paper mills in the region. Both of them, however, are big users of the region's wood and major employers of regional residents. Information about this sector was derived from a number of published sources together with general discussions with a variety of people.

## Results

The tables (Table 1 through 7) on the succeeding pages show the various characteristics of the wood-using industries in the Tug Hill Region. For an explanation of how information in these tables was derived see Appendix B and C.

Of particular note in the tables are the following conclusions:

1. The region's sawmills utilize almost 41 million board feet of sawlogs.
2. Eighty-four percent of the sawlogs originate from forest land within the region.
3. Almost 80 percent of the lumber produced by the region's sawmills remains inside the state for further processing.
4. The logging and primary processing (sawmills) sectors provide employment for 993 people in the region.
5. The wood pulp and paper mills employ an estimated 1100 people in the region.
6. Secondary mills employ 563 regional residents.
7. The total sawmills' output has a market value of over 16 million dollars annually.
8. Secondary mills' output has a market value of over 31 million dollars.
9. The region's forests can be thought of as contributing over 80 million dollars to the regional economy from use of its timber for wood products and paper manufacture. This contribution includes the direct income to regional residents and an indirect, or multiplier, impact.

Table 1

Quantity and Origin of Sawlogs Utilized by Sawmills
in the Tug Hill Region of New York - 1979

| Origin of logs | Major sawmills | | Minor sawmills | | Total | |
|---|---|---|---|---|---|---|
| | Volume[1/] | Percent | Volume[1/] | Percent | Volume[1/] | Percent |
| Within the region | 28,919 | 84 | 5,549 | 87 | 34,468 | 84 |
| Outside the region | 5,508 | 16 | 829 | 13 | 6,337 | 16 |
| Outside the state | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 34,427 | 100 | 6,378 | 100 | 40,805 | 100 |

1/ Volume in thousand Bd. Ft.

Table 2

Method of Purchasing Sawlogs Utilized by Sawmills in the Tug Hill Region of New York State

| Method of Purchase | Major Sawmills Volume[1/] | Major Sawmills Percent | Minor Sawmills Volume[1/] | Minor Sawmills Percent | Total Volume[1/] | Total Percent |
|---|---|---|---|---|---|---|
| At mill | 32,017 | 93 | 5,804 | 91 | 37,821 | 92 |
| Roadside, truckload by Co. | 1,377 | 4 | 128 | 2 | 1,505 | 4 |
| Stumpage, logged by Co. | 1,033 | 3 | 446 | 7 | 1,479 | 4 |
| Total | 34,427 | 100 | 6,378 | 100 | 40,805 | 100 |

[1/] Volume in thousand board ft.

Table 3

Quantity and distribution of lumber and other primary products of sawmills in the Tug Hill Region of New York - 1979

| Destination of lumber and other primary products | Major Sawmills | | Minor Sawmills | | Total | |
|---|---|---|---|---|---|---|
| | Volume[1/] | Percent | Volume[1/] | Percent | Volume[1/] | Percent |
| Utilized by Firm | 10,428 | 31 | 1,625 | 26 | 12,053 | 30 |
| Sold to users in state | 15,473 | 46 | 4,063 | 65 | 19,536 | 49 |
| Sold to users outside of state | 5,382 | 16 | 563 | 9 | 5,945 | 15 |
| Unknown | 2,355 | 7 | 0 | 0 | 2,355 | 6 |
| Total | 33,638 | 100 | 6,250 | 100 | 39,888 | 100 |

[1/] Volume in thousand Board Feet

Table 4

Estimated Quantity and Origin of Pulpwood Utilized by Wood Pulp and Paper Mills in the Tug Hill Region of New York[1/] - 1979

| Origin of Wood | Quantity (thous. cds) | Percent of total |
|---|---|---|
| Within region | 46.7 | 46 |
| Outside region | 54.5 | 54 |
| Total | 101.2 | 100 |

[1/] Based on data compiled from Nevel, R.L., and J.T. Bows, 1980, Northeastern Pulpwood, 1978, U.S.D.A. Forest Service Resource Bulletin NE-62, Northeast. For. Ex. Sta., Broomall, PA.

Table 5

Number of Employees[1/] (including owner) in Logging and Wood-Using Industries in the Tug Hill Region of New York - 1979

| Sector | Total employees |
|---|---|
| Independent Logger | 260 |
| Major Sawmills[2/] | 623 |
| Minor Sawmills | 148 |
| Total Sawmills | 771 |
| Wood Pulp and Paper Mills[3/] | 1,100 |
| Secondary Mills | 619 |
| Total All Sectors | 3,521 |

[1/] Based on number of full time employees or equivalents.

[2/] Includes mill employees engaged primarily in logging (12) and those engaged primarily in mill's secondary operation (218).

[3/] Based on data obtained from U.S. Dep't of Commerce, County Business Patterns, and estimates of mill employment.

Table 6

Incomes to Employees and Owners in Timber Related Activities in the Tug Hill Region of New York - 1979

| Sector | Income | Income to Regional residents |
|---|---|---|
| Forest Owners (sale of stumpage)[1] | $ 2,068,080 | $ 1,447,650[2] |
| Independent Loggers[3] | 260,000 | 260,000 |
| Major Sawmills | 5,249,550 | 5,249,550 |
| Minor Sawmills | 1,135,600 | 1,135,600 |
| Wood Pulp & Paper Mills[4] | 17,870,000 | 17,870,000 |
| Secondary Mills[5] | 5,897,640 | 5,366,850 |
| Total All Timber Related Activities | $32,480,870 | $31,329,650 |

1/ Assuming an average stumpage price of $60 per MBF (34,468 MBF total sawlogs cut in region x $60/MBF).

2/ Assumes 70 percent of those who own forest land in the region are residents of the region.

3/ Assumes a net income per logger of $10,000.

4/ Based on data from U.S. Dep't of Commerce, County Business Patterns and estimates based on statewide averages.

5/ Of the estimated 619 people engaged in secondary manufacturing in the region 56, or 9 percent were reported to reside outside the region.

Table 7

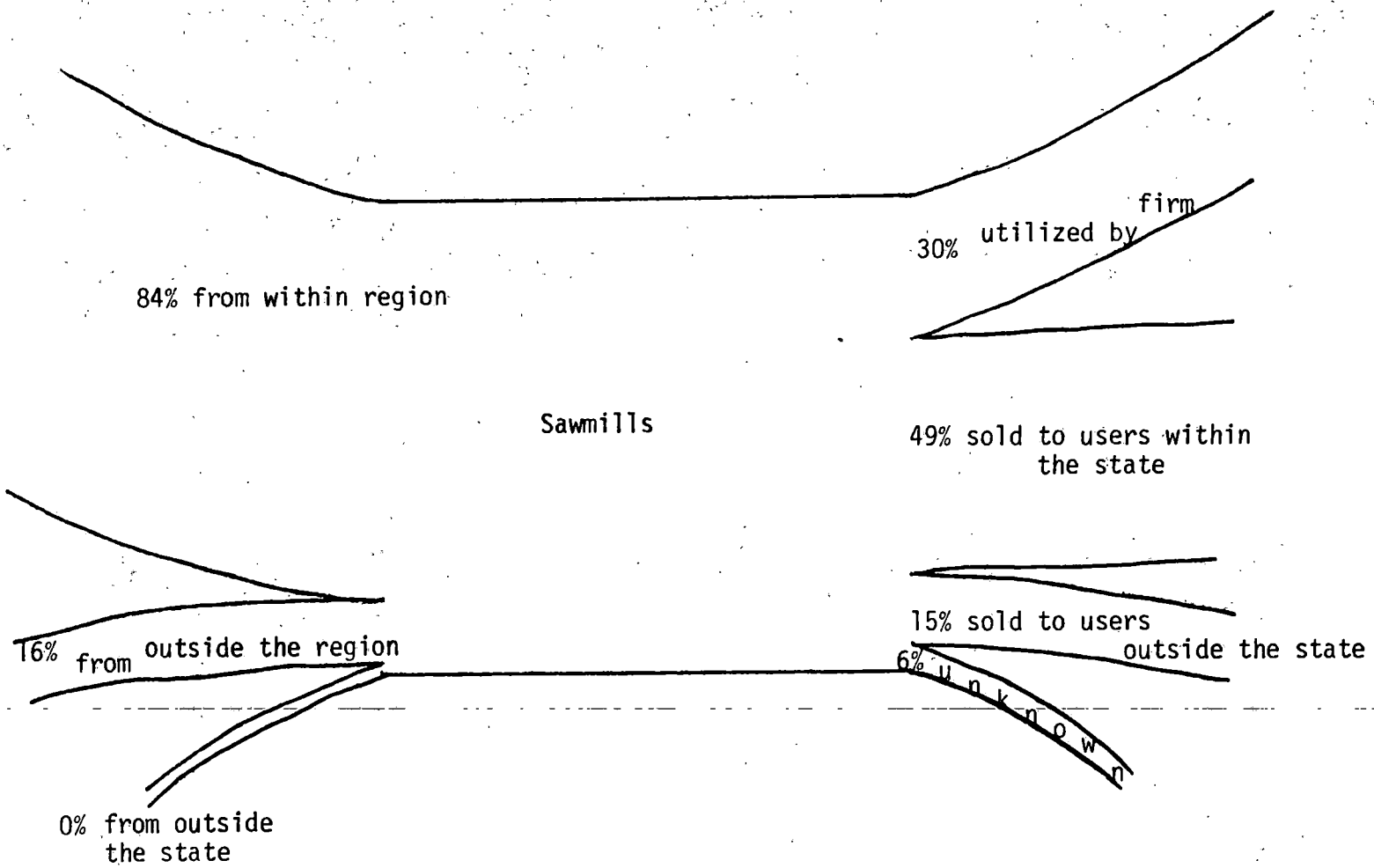
Regional Economic Impact of the Wood-Using Industries
in the Tug Hill Region of New York - 1979

| Sector | Direct regional income | Indirect[1] regional income | Total regional income | Due to region's forest resource | |
|---|---|---|---|---|---|
| | | | | Percent | Income |
| Forest Owners | 1,447,650 | 5,240,490 | 6,688,140 | 100 | 6,688,140 |
| Loggers | 260,000 | 941,200 | 1,201,200 | 88 | 1,057,060 |
| Major Sawmills | 5,249,550 | 19,003,370 | 24,252,920 | 84 | 20,372,450 |
| Minor Sawmills | 1,135,600 | 4,110,870 | 5,246,470 | 87 | 4,564,430 |
| Wood Pulp & Paper Mills | 17,870,000 | 64,689,400 | 82,559,400 | 46 | 37,977,320 |
| Secondary Milk | 5,366,850 | 19,428,000 | 24,794,850 | 42[1] | 10,413,840 |

1/ Using an indirect income multiplier of 3.62 see Appendix for explanation

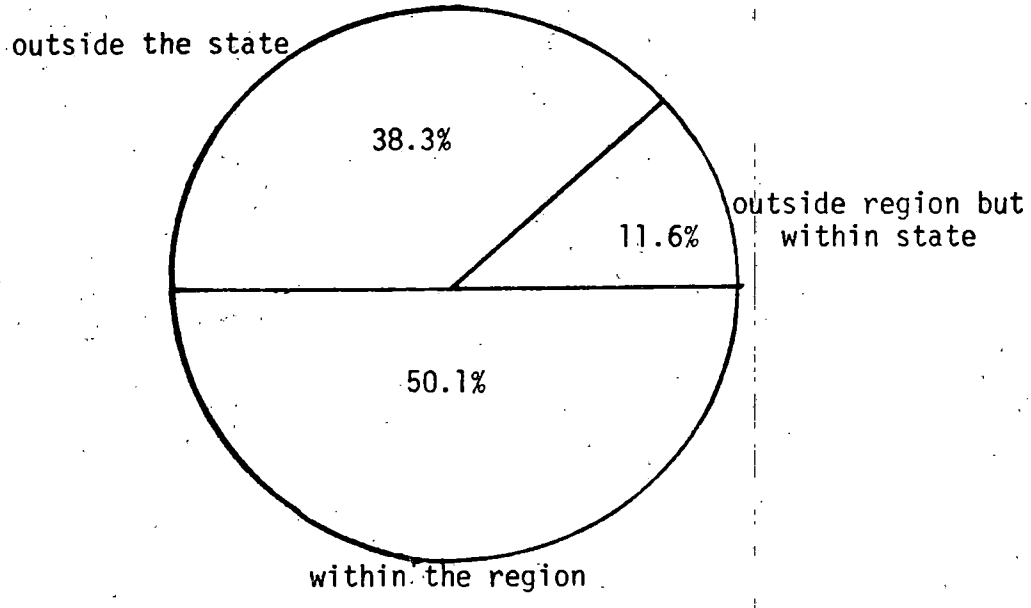
2/ Only 50% of the secondary mills' wood input came from the region. Since only 84% of the major sawmills' logs comes from within the region, 84% of 50% or 42% of secondary wood input is due to regions' forests.

Figure 1.




Flow of wood into and out of the region's sawmills - Tug Hill Region, 1979.

Figure 2.




Distribution of wood raw materials purchased by the region's secondary mills by geographic origin - Tug Hill Region, 1979

# APPENDICES

APPENDIX A . . . . Questionnaires

APPENDIX B . . . . Analysis of Data

APPENDIX C . . . . Calculation of Multiplier

STATE UNIVERSITY OF NEW YORK

# COLLEGE OF ENVIRONMENTAL SCIENCE AND FORESTRY

SYRACUSE CAMPUS
SYRACUSE, NEW YORK 13210

August 1, 1980

Dear Sir:

Your firm has been selected to be included in a study to determine the economic impact of forestry in the four county region of Jefferson, Lewis, Oneida, and Oswego counties. The School of Forestry in conjunction with the Tug Hill Study Commission is presently undertaking this important economic impact project.

In order that we may compile some key facts concerning your region in 1979, we ask that you please fill out the enclosed questionnaire. Please be advised that all information will remain strictly confidential. We are looking for "total" figures for all the wood-using industries in your area. We are not analyzing your particular operation. If more information concerning a certain question is required, we will contact you by the address given at the beginning of the questionnaire.

If you discover that exact 1979 figures for a certain question are unobtainable from your records, we ask that you please answer the question to the best of your ability, relying on your experience and knowledge of your company.

We are providing you with an envelope to return this questionnaire by mail. If necessary, I will be in touch with you during the middle of August and will be available to visit your firm to assist you in the completion and/or pick up the questionnaire. However, it would greatly reduce our travel costs and expenses if you could mail back the questionnaire as soon as possible.

The results of the study will be compiled by a professional staff here at the College and will be made available later this year. They should prove helpful to your company in planning for the future. Thank you for your cooperation.

Sincerely,

Hugh O. Canham
Associate Professor

Edward J. LeBlanc
Research Assistant

SYRACUSE CAMPUS
SYRACUSE, N. Y. 13210
Schools of:
- Biology, Chemistry & Ecology
- Continuing Education
- Environmental and Resource Engineering
- Forestry
- Landscape Architecture

Empire State Paper Research Institute
Institute of Environmental Program Affairs
Polymer Research Institute
Renewable Materials Institute
U.S. Forest Service Cooperative Research Unit

CRANBERRY LAKE CAMPUS
CRANBERRY LAKE, N. Y. 12927
Charles Lathrop Pack Experimental Forest
Cranberry Lake Biological Station

ELLIS INTERNATIONAL LABORATORY
CLAYTON, N. Y. 13624

NEWCOMB CAMPUS
NEWCOMB, N. Y. 12852
Archer & Anna Huntington Wildlife Forest
Adirondack Ecological Center

TULLY CAMPUS
TULLY, N. Y. 13159
Heiberg Memorial Forest
Genetic Field Station

WANAKENA CAMPUS
WANAKENA, N. Y. 13695
Forest Technician Program

WARRENSBURG CAMPUS
WARRENSBURG, N. Y. 12885
Charles Lathrop Pack Demonstration Forest
Summer Field Program

CONFIDENTIAL

Firm name: _____

Address: _____

Major Sawmills
Jefferson, Lewis, Oneida, and Oswego Counties

Date: _____

# Sawmill Questionnaire

## I. RAW MATERIALS

The total volume of logs purchased in 1979 34,427,000 (specify scale or tonnage).

| | |
|---|---|
| The percent of total volume purchased at mill | 93 % |
| The percent of total volume purchased at roadside and trucked by you | 4 % |
| The percent of total volume purchased as stumpage and logged by your crew | 3 % |
| Total | 100% |

Origin of logs (1979)

| | |
|---|---|
| The percent of total volume purchased within the 4 county region* | 84 % |
| The percent of total volume purchased outside the 4 county region but within New York State | 16 % |
| The percent of total volume purchased outside New York State | 0 % |
| Total | 100% |

Cost of logs (1979): Please list species and price range per (thousand) M Bd, ft.

| | Stumpage price range | Mill delivered price range | Log rule(or oth |
|---|---|---|---|
| E.g. Yellow birch | 70-90 | 90-110 | Doyle |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |

## II. PRODUCTION

The total revenue from sale of lumber products, railroad ties, and other sawmill products in 1979 (not including secondary manufacturing $ 11,737,590

The total quantity of lumber products, railroad ties, and other sawmill products produced in 1979 (not including secondary manufacturing) 33,637,540
(please specify scale)

2.87 Bd. ft./$

| | | |
|---|---|---|
| The percent of materials sold to users i.e., secondary plants, final consumers | within state | 46 % |
| | | - % |
| The percent of materials utilized by your own firm for further manufacturing into secondary products (if any) | | 31 % |
| The percent of materials shipped outside New York State (including outside the U.S.A.) | | 16 % |
| The percent sold to wholesalers, destination unknown | | 7 % |
| | Total | 100% |

*4 county region includes: Jefferson, Lewis, Oneida, and Oswego Counties.

III. EMPLOYMENT

The total number of people employed by the mill in any capacity (including part-time and seasonal workers) in 1979 623.

| | |
|---|---|
| The percent of the above total persons employed who spent most of their time logging or transporting logs. | 2 % |
| The percent of the total persons employed who work in a sawmill most of the time (including millworkers and clerical). | 63 % |
| The percent of the total persons employed who work in secondary production (further remanufacturing) most of the time (if any) | 35 % |
| Total | 100 % |

How many of the total number of people employed by your mill were on a seasonal or part-time basis in 1979? not enough information

The total amount spent on wages and salaries in 1979 (including owner's salary)

$ 5,249,550

Where do your workers live? (1979)

| | |
|---|---|
| The number of your workers residing within the 4 county region | 623 |
| The number of your workers residing outside the 4 county region but living in New York State | 0 |
| The number of your workers residing outside New York State | 0 |
| Total should equal total number of persons employed as reported in beginning of III. | 623 |

IV. The total property taxes paid by your firm for mill property and forest land in 1979 was $(not enough info.) (please include school, town, and other general property taxes)

CONFIDENTIAL

Firm name: _____

Address: _____

Minor Sawmills

Jefferson, Lewis, Oneida and Oswego Counties

Date: _____

# Sawmill Questionnaire

## I. RAW MATERIALS

The total volume of logs purchased in 1979 6,378,400 (specify scale or tonnage).

| | |
|---|---|
| The percent of total volume purchased at mill | 90.6 % |
| The percent of total volume purchased at roadside and trucked by you | 2.2 % |
| The percent of total volume purchased as stumpage and logged by your crew | 7.2 % |
| Total | 100% |

Origin of logs (1979)

| | |
|---|---|
| The percent of total volume purchased within the 4 county region* | 86.7 % |
| The percent of total volume purchased outside the 4 county region but within New York State | 13.3 % |
| The percent of total volume purchased outside New York State | 0 % |
| Total | 100% |

Cost of logs (1979): Please list species and price range per (thousand) M Bd. ft.

| | Stumpage price range | Mill delivered price range | Log rule(or othe |
|---|---|---|---|
| E.g. Yellow birch | 70-90 | 90-110 | Doyle |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |

## II. PRODUCTION

The total revenue from sale of lumber products, railroad ties, and other sawmill products in 1979 (not including secondary manufacturing $ 4,506,940

The total quantity of lumber products, railroad ties, and other sawmill products produced in 1979 (not including secondary manufacturing) (please specify scale) 6,250,050

| | |
|---|---|
| The percent of materials sold to users within New York State i.e., secondary plants, final consumers | 65 % |
| The percent of materials utilized by your own firm for further manufacturing into secondary products (if any) | 26 % |
| The percent of materials shipped outside New York State (including outside the U.S.A.) | 9 % |
| The percent sold to wholesalers, destination unknown | 0 % |
| Total | 100% |

*4 county region includes: Jefferson, Lewis, Oneida, and Oswego Counties.

III. EMPLOYMENT

The total number of people employed by the mill in any capacity (including part-time and seasonal workers) in 1979 148.

| | |
|---|---|
| The percent of the above total persons employed who spent most of their time logging or transporting logs. | 2 % |
| The percent of the total persons employed who work in a sawmill most of the time (including millworkers and clerical). | 79 % |
| The percent of the total persons employed who work in secondary production (further remanufacturing) most of the time (if any) | 19 % |
| Total | 100 % |

How many of the total number of people employed by your mill were on a seasonal or part-time basis in 1979? not enough information

The total amount spent on wages and salaries in 1979 (including owner's salary)

$ 1,135,600

Where do your workers live? (1979)

| | |
|---|---|
| The number of your workers residing within the 4 county region | 148 |
| The number of your workers residing outside the 4 county region but living in New York State | |
| The number of your workers residing outside New York State | |
| Total should equal total number of persons employed as reported in beginning of III. | 148 |

IV. The total property taxes paid by your firm for mill property and forest land in 1979 was $ 27,490. (please include school, town, and other general property taxes)

CONFIDENTIAL

Firm name: _____

Address: _____

_____

Jefferson, Lewis, Oneida and Oswego Counties

Date: _____

## SECONDARY MANUFACTURERS' QUESTIONNAIRE

1. The total cost of all raw materials utilized in 1979 $ 13,245,100

2. The total cost of lumber (excluding plywood and veneer) utilized in 1979 $ 5,964,000 . 45.0%

| | | |
|---|---|---|
| a. The percent of lumber purchased that came from within the 4 county* region | 50.1 | % |
| b. The percent of lumber purchased that came from outside the 4 county region but within New York State | 11.6 | % |
| c. The percent of lumber purchased that came from outside New York State | 38.3 | % |
| Total | 100 | % |

3. The total receipts from sale of products in 1979 $ 31,221,210

4. The total amount spent on wages and salaries in 1979 $ 5,897,640

5. The total number of employees on your payroll in 1979 619

6. Origin of employees (1979)

| | |
|---|---|
| a. The number of employees residing in the 4 county region | 563 |
| b. The number of employees residing outside the 4 county region but within New York State | 55 |
| c. The number of employees residing outside New York State | 1 |
| a., b., c., should total same figure reported in question 5 | 619 |

*4 county region includes: Jefferson, Lewis, Oswego, and Oneida counties.

CONFIDENTIAL

# LOGGER'S QUESTIONNAIRE

Jefferson, Lewis, Oneida and Oswego Counties

Check one:

[ ] Work as an employee of a logging contractor, sawmill or other. Disregard the rest of the questionnaire. Please mail back using return envelope.

Date: _____

[XX] In business for yourself or with others, full or part-time. Please complete the rest of the questionnaire. (Note, if in partnership with others, please return one completed questionnaire for the entire partnership).

## WHERE YOUR LOGS GO (1979)

The total volume of logs sold to sawmills in 1979 41,086,500 (specify scale or tonnage).

| | |
|---|---|
| The percent of logs sold to mills in the 4 county region* | 76.9 % |
| The percent of logs sold to mills outside the 4 county region but within New York State | 11.4 % |
| The percent of logs sold to mills outside New York State | 11.7 % |
| Total | 100% |

The total volume of logs sold as fuelwood in 1979 (if any) was 5,936,900 , (specify unit of volume)

## WHERE YOUR LOGS CAME FROM (1979)

| | |
|---|---|
| The percent logged within the 4 county region | 88.3 % |
| The percent logged outside the 4 county region but within New York State | 11.7 % |
| The percent logged outside New York State | 0 % |
| Total | 100% |

## Species Handled

| | |
|---|---|
| The percent of total volume logged in 1979 that was hardwood | 72.8 % |
| The percent of total volume logged in 1979 that was softwood | 27.2 % |
| Total | 100% |

The total number of people who worked for you in 1979 on a regular or part-time basis, including independent contractors, truckers, and fellers was 260 .

Please specify the number of pieces of the following equipment that you own and/or lease:

Skidder(s) _____ Logging truck(s) without loader _____

Chainsaw(s) _____ Bulldozer(s) _____

Logging truck(s) with loader _____

Other (please specify type and number owned and on hand)

_____ _____ _____

_____ _____ _____

* The 4 county region includes: Jefferson, Lewis, Oneida, and Oswego Counties.

# TELEPHONE QUESTIONS

## Sawmill phone questionnaire

1. How many board feet of logs did you use in your operation in 1979?
2. We'd like to know where your lumber went, that is:

   What percent did you use for your own use?

   What percent was sold for use within the state?

   What percent was sold for use outside the state?
3. How many people did you employ in 1979?
4. Approximately how much did you spend on wages and salaries in 1979?

## Secondary manufacturers' phone questionnaire

1. What was the total cost of your raw materials for 1979?
2. What percent of that cost was due to lumber?
3. How many people did you employ in 1979?
4. What percent of your production was sold to users:

   Within the region?

   Outside the region?

   Outside the state?

## Analysis of Data

### Major Sawmills

Of the 18 major sawmills in the Tug Hill region, 6 returned completed questionniares, and 9 provided information through the abbreviated format of the phone questionnaire.

The total volume of timber utilized by the 3 non-respondents was estimated as the midpoint of the mill capacity range as given in the Directory of Primary Wood-Using Plants cited earlier. For example, the reported range of capacity was 2 - 3 mm bd. ft, the midpoint of 2.5 mm bd. ft. was used as that mills annual timber utilization figure.

From the completed questions, weighted average percentages of roundwood purchased by different methods (as stumpage, at roadside, at mill) were calculated. These same percentages were then applied to the volumes reported over the phone and to the estimated volumes of non-respondents to apportion their purchase of logs among the three methods.

Origin of logs was derived in the same manner. Weighted average percentages as calculated from the completed questionnaires were applied to the phone reported and estimated volumes of non-respondents to determne the amount purchased within the region, within New York State, and outside the state.

Only 3 respondents in the Tug Hill region chose to answer the total revenue question. This low response warranted the use of information obtained in a similar study of the Southern Tier West region where a linear regression* had been set up. By adding the 3 data points from Tug Hill, the following regression equation resulted:

Total Revenue (Y) = 148,565.67 + (3.0995) timber purchased (X)
R = .84865
Std dev. $Y = 9.384 \times 10^5$, $X = 2.569 \times 10^6$

From this equation, the estimated total revenue for each non-respondent in the Tug Hill region was calculated by substituting the reported or estimated timber purchased figure into the equation.

In a similar manner, the regression equation dealing with total quantity produced in the southern region was used to obtain information in the Tug Hill region. The linear regression of total quantity produced (Y) on total volume purchased (X) was:

Total quantity produced (Y) = 217,859.17 + (.96369) lumber purchased (X)
R = .99076
Std. dev. $Y = 2.558 \times 10^6$, $X = 2.630 \times 10^6$

* Caution must be used in an analysis of the data where many of the regression equations have high positive Y intercepts. One might interpret this to mean if X = 0, Y would have a meaningful value. This is an erroneous conclusion because it is difficult to extrapolate information not within the realm of the regression line itself. Projecting a value for Y when X is 0 would be well outside the range of any regression used with the data.

Total quantity produced figures were obtained by applying the reported and estimated capacities to the equation.

The percentage breakdown of the regional destination of the quantity produced was obtained by calculating the average percentages of the respondents and applying them to the total quantities estimated for the non-respondents.

To arrive at the total number of persons employed by the non-responding firms, a linear regression was set up regressing employment (Y) on the total volume purchased (X) from the respondents data. Estimated volume figures of the non-respondents were then fitted to the line to arrive at the number of persons employed. Both respondents and estimated non-respondents figures were summed to arrive at a total employment figure.

The equation of the regression line was:

Number of persons employed (Y) = 9.10391 + (.000003) timber purchased (X)
R = .54416
Std. dev. Y = 7.451, X = $1.359 \times 10^6$

The following percentage breakdown of which activities workers spend most of their time in was arrived at by determining the average of the percentages of the respondents and applying the percentages to the estimated total number of employees for non-respondents. Final percentages reported are weighted averages of both respondents and non-respondents.

Very few respondents reported employing persons part time, therefore, an overall figure for the region was not developed.

To determine total wages and salaries for the region, the average wage per employee was calculated for each responding firm. These figures were then averaged to obtain the average wage per employee in the industry. This figure, $8,100, was multiplied by the reported number of employees for each non-respondent on this question. Total amounts spent on wages and salaries were then summed.

The regional breakdown for employees was determined by first calculating average percentages for the respondents and applying these averages to the total employment figures. Weighted average percentages of both respondents and non-respondents were then obtained.

Very few respondents reported a property tax figure, therefore, an overall figure for the region was not developed.

Minor Sawmills

It was estimated that a total of 34 minor sawmills were in production in 1979. Of these mills, 9 returned a completed questionnaire and 6 provided information through the abbreviated format of the phone questionnaire. These respondents were treated as a sample and their figures were used to determine totals for the entire 34 mill population.

The 15 respondents reported a total of 2,814,000 bd. ft. purchased in 1979. Therefore, the projected total amount purchased by the 34 mill population is 6,378,400 bd. ft.

$$\text{i.e.} \quad \frac{15}{2,814,000} = \frac{34}{X} \qquad X = 6,738,400$$

The following three percentages describing how wood was purchased are the weighted average percentages reported by the respondents.

Likewise, the three percentages describing the origin of the logs are also the weighted average percentages reported by the respondents.

Seven respondents reported a total of $927,900 for total revenue. Therefore, the projected total revenue for the 34 establishments is $4,506,940.

A total quantity of 6,250,050 bd. ft. produced was arrived at in the same manner. In this case four respondents provided figures totaling to 735.300.

The following percentages describing the destination of materials are the average percentages reported by the respondents.

Fourteen respondents reported a total of 61 employees. When projected against the 34 member population, this results in a total of 148 employees.

The following percentages describing what functions the employees spend most of their time are the average percentages reported by the respondents.

Too few respondents reported seasonal or part-time workers, therefore, no total was ascertained.

Nine firms reported a total of $300,600 spent on wages and salaries which results in a total figure of $1,135,600 for the entire 34 mills.

Seven respondents reported a total of $5,660 paid in property taxes in 1979. The estimated total property tax paid by this sector is, therefore, $27,490.

## Secondary Manufacturers

In the counties that comprise the Tug Hill region, it was estimated that 21 secondary manufacturers were in operation in 1979. Of these, 11 firms returned completed questions, 7 firms provided information via the abbreviated phone questionnaire (see Appendix), and 3 firms refused to provide any information. These 3 non-participating firms were not accounted for in the results. The remaining 18 firms were treated as the population. Information not received through the abbreviated phone questionnaire was extrapolated from the information reported by the 7 firms who completed the original questionnaire.

The numbers heading the following sections refer to individual questions on the Secondary Manufacturers Questionnaire (see Appendix).

1. All respondents in the population reported total cost figures. These were summed to arrive at $13,245,100 overall total figure.

2. Figures for lumber costs were obtained directly from respondents questionnaires and indirectly from the percentages reported by the phone respondents. In the latter case, the percentage of the cost due to lumber was applied to the total cost figure for each firm. These figures were summed together to arrive at a lumber cost figure for the entire industry of $5,964,000.

   The average percentages of lumber origin as reported by the 11 responding firms were applied to the lumber cost figures of the remaining 7 phone contacted firms. The total figure in each category is the weighted average for the entire industry.

3. To arrive at the total sales revenue for the non-responding firms, a linear regression was established regressing sales revenue (Y) on total cost of all raw materials (X). The regression equation was:
   Sales revenue (Y) = -49,578.72 + (2.24749) total cost (X)
   $R = .99793$
   Std. dev. $Y = 1.303 \times 10^6$
   Std. Dev. $X = 5.784 \times 10^5$

4. To arrive at a total wage figure for non-respondents on this question, an average wage per employee was calculated for the entire industry from reported data. Their average wage, $7,870, was then applied to the number of employees reported by the non-respondents of their question. Their figures, along with respondent figures were summed to arrive at the total wages for the industry.

5. Total number of employees was reported by all participating firms. The reported data was merely summed to arrive at a total of 619.

6. Average percentages of origin of employees were obtained from the respndents and applied to non-respondents total employees figure. The resulting figures were summed with the reported data to arrive at the origin breakdown figures.

Loggers

It was estimated a total of 163 loggers were in operation in 1979. Of these, 25 returned a completed questionnaire. (See Appendix for a copy of the quesionnaire.) Three respondents indicated they were employees of a logging contractor or sawmill, which when projected against the entire population, results in an estimated 20 timber harvesters employed in this manner.

$$\text{i.e.} \quad \frac{3}{25} = \frac{X}{103} \qquad X = 19.8 - 20$$

To avoid duplication, these 20 were excluded from the loggers' calculations because their information was included in the sawmill data. Thus, the total number of independent loggers, excluding these 20, is 143. The 22 loggers who indicated they were not employees of others were used as a sample and their reported data was projected against the entire 143 logger population.

The total volume of logs sold to sawmills in 1979 totaled 6,321,000 bd. ft. as reported by the respondent. Projected against the 143 logger population results in a total of 41,086,500 bd. ft. sold to sawmills.

The three percentages concerning the location of the mills to which loggers sold are the weighted average percents of the repondents.

The total volume of logs sold as fuelwood in 1979 by the 22 respondents was 913,370 bd. ft. when projected against the entire population, the resulting figure is 5,936,000.

The percentages describing where the logs originated are the weighed average percentages as reported by the respondents.

Types of wood, likewise, are the weighted average percentages as reported by the respondents.

The total number of employees reported by the respondents was 40 which when projected against the entire population results in 260 total employees.

APPENDIX C

## Determination of Local Income Multiplier

How much indirect economic activity is generated, as a result of the direct incomes received by people in the region from timber harvesting and sawmilling? To answer this we must determine how much of local residents income is spent in the region. In a broader sense, what is needed is an estimate of how much local income is generated by the spending and respending of a part of the direct income received. If nothing was purchased from outside the region, then the initial money in would generate an infinite increase in local incomes. These are open economies, however, and much of the income received by local residents "leaks" out of, or is spent outside the region. The multiplier for which we are searching will estimate the total amount of local income created per dollars of initial or direct income to residents.

The development of the multiplier in this study follows the approach of Tiebout[1] with some modifications. Tiebout has shown for a short-run model, which fits the present situation, that the total income increase to residents in a region is equal to the increase in basic, or export, income times the ratio of total income to export income.[2]

In the present study the following formulation was used:

$$\text{Additional total regional income} = \text{Income received by resident in Timber sector} \times \frac{\text{Total employment in all sectors in region}}{\text{Estimated export employment in all sectors in region}}$$

Estimated export employment in each sector in the regional economy was considered to be the residual left after meeting the needs of local consumption. Thus, estimated employment to meet local needs was the calculated figure. This was determined from the following:

$$\text{Uncorrected employment to meet local needs in a sector} = \text{total regional employment} \times \frac{\text{National employment in a sector}}{\text{total national employment}}$$

This uncorrected estimate of employment to meet local needs in a sector was then modified: (1) to account for regional differences in productivity by multiplying by the ratio of output per worker in a sector statewide to output per worker in the same sector nationwide, and (2) to account for regional differences in tastes and preferences, i.e., consumption of goods and services, by multiplying by the ration of per capita consumption of the output

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1 Tiebout, C.M. 1962. The Community Economic Base Study, Supplementary Paper No. 16, Committee for Economic Development. 477 Madison Ave., NY, NY.

2 Ibid. p.60.

of a sector in the state to per capita consumption of the sector's output nationwide. These two corrections gave a reasonably close partition of employment in the region into local and export parts for all sectors in the economy. Data for these calculations came from the following sources:

1. U.S. Bureau of the Census, County Business Patterns
2. U.S. Bureau of the Census, Census of Manufacturers, Census of Retail Trade, Census of Business Census of Selected Service.
3. U.S. Bureau of Labor Statistics Consumer Expenditure Survey.

When all calculations were performed, it was found that estimated employment in the region to meet local consumption needs was 78.4 percent of the total employment leaving 21.6 percent for export. Thus, the income multipler is 4.62[3]. The indirect multiplier is, therefore, 3.62. Stated another way for every $1.00 of local income and additional $3.62 of local income are generated.

[3] This multiplier must not be confused with the typical output or slaes multipliers normally calculated in a complete input-output study. The multiplier calculated in this study attempts to use regional income increases directly not total output or sales of all sectors as do traditional input-output multipliers. An estimate of the output multiplier for the sawmill sector was calculated from the following relationship:

$$\text{Output multiplier} = \frac{\text{Direct + Indirect Output}}{\text{Direct Output}} = \frac{37,213,204}{16,244,530} = 2.29$$

This output multiplier is similar to those found by others for the wood using sector in other regions as reported in McKillop, W. 1974. Economic Impacts of an Intensified Timber Management Program, Appendix A-Review of seleced Multiplier Studies, USDA For. Serv. Res. Pap. WO-23, Div. of Forest Econ. and Mktg. Res. Wash., DC.