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**WOOD USED IN NEW RESIDENTIAL CONSTRUCTION IN THE UNITED STATES:
A FOREST SERVICE END-USE SURVEY**

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Abstract.--The Forest Service and the Wood Products Promotion Council are currently engaged in a study to estimate the types and quantities of wood products used to construct new single- and multifamily residences in the United States. Cooperation between the Forest Service and the Wood Products Promotion Council was necessitated by a need to reduce costs to each of collecting this much-needed information. The study consists of two independent surveys: one to determine the incidence of building practice types employed in 1986 and the other to determine the amounts of wood products required for each type of building practice. Estimates of total wood products used by type of product, region, house size, number of stories, and foundation type will be developed.

INTRODUCTION

The Forest Service has long been interested in quantifying the amounts and identifying the kinds of wood products used for various end uses in the United States. When possible, information collected by other government agencies, universities, industry associations, or other research organizations is used. More frequently, however, major Forest Service data collection efforts are required. I am currently working on a study to determine the types and quantities of wood products used to build new houses and apartment buildings in the United States. This residential wood use study is a cooperative venture of the Forest Service and the Wood Products Promotion Council. The Wood Products Promotion Council is a consortium of wood products associations and corporations interested in promoting the use of wood in the United States. In this paper I review similar wood use studies conducted by the Forest Service over the past several decades, explain the motivation behind this particular study in terms of cooperation and funding, describe the survey procedures employed in this study, and speculate on the role of the Forest Service in conducting similar studies in the future. When complete, this study will provide detailed information on wood products used for new housing from a Forest Service survey for the first time since 1968.

PAST WOOD END-USE SURVEYS

Since 1948, the Forest Service has conducted many and varied wood end-use surveys. Figure 1 shows the major surveys conducted by type of end

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use and year. Aside from a manufacturing survey conducted in 1948, no major end-use data collection efforts were made by the Forest Service between 1948 and 1958. Specific reasons for this lack of survey initiatives are not known, but a general sluggishness in the economy, limited budgets, and lack of support may have all been contributing factors.

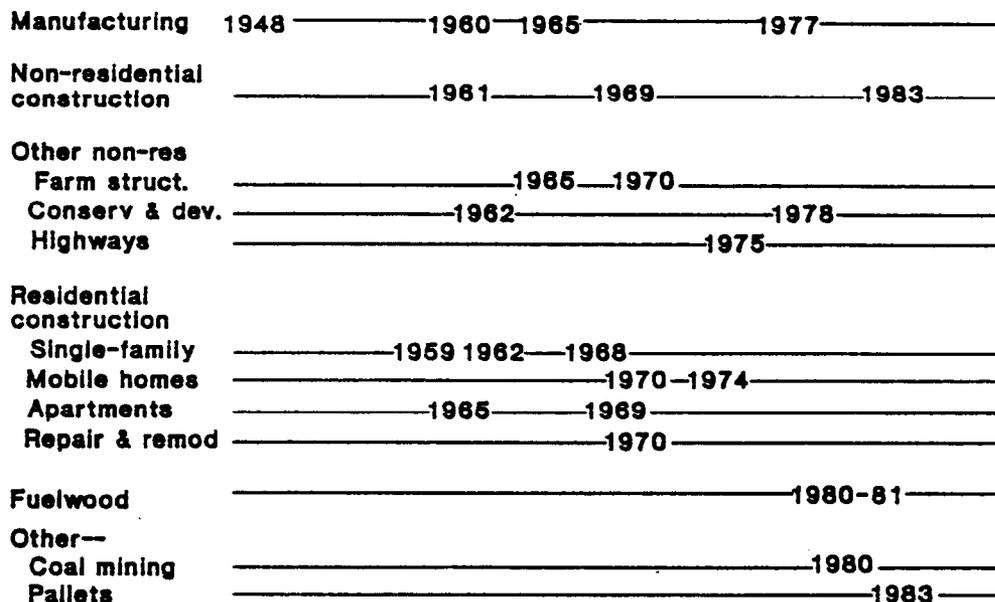


Figure 1.--Forest Service end-use surveys, 1948-1988.

From 1959 to 1974, many large, expensive wood end-use surveys were conducted by the Forest Service. All major solid wood end-use areas were surveyed at least once, with several having two or more surveys. Most of these surveys were conducted solely by the Forest Service, or by the Forest Service in cooperation with other government agencies. For example, the 1961 nonresidential survey was conducted solely by the Forest Service, the 1960 manufacturing survey was conducted jointly by the Forest Service and the U.S Bureau of the Census, and the single-family residential surveys were done cooperatively with the Federal Housing Administration. Although several of the surveys were 100 percent canvasses of all wood users, most were sample surveys. Study budgets approaching a quarter of a million dollars were not uncommon. Many of the factors necessary to put together major survey efforts fell into place during the 1960's. A strong domestic economy coupled with rising federal budgets, support from within and without the Forest Service, and a need for information that either had not been collected since World War II or had never been collected contributed to the plethora of studies conducted. The number and size of end-use surveys conducted during this time were unprecedented in Forest Service history.

By the mid-1970's, and into the 1980's, Forest Service data collection efforts began to dwindle. Shrinking Federal budgets severely impacted data collection budgets, while support for major data collection efforts seemed to vanish. Innovative new approaches for mustering support and funding were needed and found. The 1977 manufacturing survey, for example, was a cooperative effort among three Forest Service units, with each sharing direct and indirect costs. The 1980 fuelwood survey was a nationwide household telephone survey, which reduced data collection costs. The 1983 nonresidential construction study was a cooperative effort between the Forest Service and the Wood Products Promotion Council (WPPC). The WPPC is a consortium of wood products associations and corporations interested in promoting the use of wood in the United States. The American Plywood Association, a key member of the Council, was instrumental in developing the cooperation between the WPPC and the Forest Service needed to conduct a large scale study of this type. In this study, the WPPC and the Forest Service jointly developed study plans, the WPPC funded and conducted actual data collection, the Forest Service tabulated and analyzed the data, and the Forest Service and WPPC jointly prepared final study reports. These and other innovative support and funding procedures allowed the Forest Service to maintain wood end-use data collection efforts through the mid-1980's.

A bibliography of some of the more important surveys conducted during this 40-year period (Fig. 1) is included at the end of this report.

WOOD USED IN NEW RESIDENTIAL CONSTRUCTION

The new residential construction wood use survey now in progress by the Forest Service follows closely the procedures used in the previously mentioned nonresidential study. The residential study is a cooperative effort between the Forest Service and the Wood Products Promotion Council, with the WPPC performing the field work, the Forest Service performing the data tabulation and analysis, and both jointly preparing study plans and study reports. In this way Forest Service and WPPC resources are combined, allowing for a larger, more complete study than possible independently. It also broadens our base of support by bringing members of the WPPC directly into a Forest Service study. The arrangement, although relatively informal, has resulted in meaningful, worthwhile information for all concerned.

Study Procedures

The cooperative study by the Forest Service and Wood Products Promotion Council of wood used in new residential construction is designed to measure total wood products used to construct new single-family and multifamily residences in the United States during the 1986 building season. To do this, two important pieces of information are needed: the incidence of wood use and the amount of wood used per type of application, commonly referred to as wood use factors. The incidence of wood use tells us how frequently a particular building practice is used, such as, the percentage of houses built with exterior walls having 2- by 6-in studs, 24 in on center; wood use factors tell us how much wood is required to build such a wall. This information, combined with housing production data from the U.S. Department of Commerce, Bureau of the Census, can be used to

This study is therefore a two-part survey measuring both incidence of use and wood use factors. Figure 2 depicts the two facets of the study.

<u>Incidence of Use</u>	<u>Wood Use Factors</u>
<ul style="list-style-type: none"> - Telephone survey of approximately 1200 builders - Determine construction characteristics of new houses <ul style="list-style-type: none"> - stud size, spacing - floor system - roof system - siding types, etc. 	<ul style="list-style-type: none"> - Field interviews of approximately 500 builders - Determine actual types/quantities of wood products used by application - Data augmented with blueprint take-offs

Figure 2.--Forest Service/Wood Products Promotion Council residential wood use survey

I shall report only the single-family portion of the study. The multifamily portion closely follows these procedures.

The incidence of use portion of the new single-family housing study consisted of a random telephone survey of approximately 1,200 builders who built one or more houses in 1986. Field representatives from the American Plywood Association conducted interviews and recorded types of building characteristics employed by each builder on telephone survey forms. Examples of building characteristics include stud size and spacing, roof and floor types, siding types, and garage size. This information was then stratified by region, size of structure (square feet of floor area), number of stories, and foundation type. Results of the incidence of use telephone survey of single-family residence builders is presented in table 1. A validation of the incidence of use survey results was made using data from the U.S. Department of Commerce Characteristics of New Housing report. Although the data are not strictly comparable, they do appear to have similar regional distributions by type of characteristic (table 2).

Table 1.--Distribution of sampled single-family houses from the 1986 incidence of use survey, by region, size, number of stories, and Foundation type

Region	Number having basement or crawl space				Number on slab				Total
	One story		Two or more stories		One story		Two or more stories		
	<1600 ft ²	≥1600 ft ²	<1600 ft ²	≥1600 ft ²	<1600 ft ²	≥1600 ft ²	<1600 ft ²	≥1600 ft ²	
North	78	73	21	181	6	2	1	10	372
South	49	52	9	102	74	172	5	89	552
West	27	22	8	60	25	45	6	24	217
									1,141

Table 2. --Comparison of incidence of use survey with 1984 Census characteristics of new housing

Region	Incidence of use (Survey/Census)						Total (Survey/Census)
	Foundation type		Stories		Living area		
	Basement or crawl space	Slab	One	Two or more	<1600 ft ²	≥1600 ft ²	
				<u>Percent</u>			
North	95/84	5/15	43/38	57/62	28/48	72/52	32.5/27.8
South	38/35	62/65	63/62	37/38	25/51	37/49	48.4/49.6
West	54/38	46/62	5/56	45/44	30/49	70/51	19.0/22.7

The second part of this study is designed to measure wood usage rates for specific building components. These wood use factors will estimate the amount of lumber, plywood, other structural panels, and nonstructural panels used per dollar of construction value and per square foot of floor area for roof, wall, and floor applications. American Plywood Association field representatives conducted personal interviews and site inspections of 500 selected builders and houses concerning the types and quantities of wood products used in houses currently being built. Builders were not selected at random but were selected to insure adequate coverage of all building types, components, and regions. Blueprints of houses currently under construction were also obtained from these builders, and other sources. Use factors are being developed from these blueprints by professional wood products estimators. These two sets of data will be combined and stratified along the same lines as the incidence of use data.

The incidence of use data, wood use factor data, and regional housing production data from the U.S. Department of Commerce, Bureau of the Census C25 Characteristics of New Housing report (U.S. Department of Commerce, Bureau of the Census 1987) will be used to develop estimates of wood use in single-family houses by type of wood product, region, foundation type, number of stories, and size of house.

FUTURE FOREST SERVICE WOOD END-USE SURVEYS

The Forest Service has provided the public a wealth of information over the past 40 years from its surveys of end-uses of wood. Much of this information would not otherwise have been available. The future role of the Forest Service in conducting new end-use demand studies is uncertain. Reduction in budgets and funding over the past years have made large

end-use demand surveys unaffordable. Support outside the Forest Service has also declined as wood products firms and trade associations have placed less emphasis on planning efforts using these data. This survey of wood used for new residential construction may be the last Forest Service survey of wood use.

Interest in wood fiber consumption by U.S. pulp and paper producers is growing. Future surveys to collect information on wood fiber requirements for pulpwood, and paper and board may be undertaken.

BIBLIOGRAPHY

- Baumgartner, David C. 1971. The changing market for wood materials used in farm structures. USDA Forest Serv. Res. Pap. NC-61. N. Cent. Forest Exp. Sta., St. Paul, MN. 6 p.
- Dickerhoof, H. Edward. 1978. Use of wood in mobile homes is increasing. U.S. Dep. Agric. Resource Bulletin FPL-4. Forest Prod. Lab., Madison, WI. 20 p.
- Fasick, Clyde A., H.E. Dickerhoof, and J.D. Lawrence. 1973. Evaluation of the use of wood products in mobile home manufacture. Forest Prod. J. 23(6):11-16.
- Gill, Thomas G. 1965. Wood used in manufacturing industries, 1960. USDA For. Serv. Stat. Bulletin 353. USDA For. Serv., Washington D.C. 121 p.
- Gill, Thomas G. and R.B. Phelps. 1969. Wood used in manufacturing industries, 1965. USDA For. Serv. Stat. Bulletin 440. USDA For. Serv., Washington D.C. 101 p.
- McKeever, David B., D.R. McCurdy, F.H. Kung, J.T. Ewers. 1986. Wood used in pallets manufactured in the United States, 1982. USDA For. Serv. Resource Bulletin FPL-RB-17. Forest Prod. Lab., Madison, WI. 13 p.
- McKeever, David B. and D.G. Martens. 1983. Wood used in U.S. manufacturing industries, 1977. USDA For. Serv. Resource Bulletin FPL-12. Forest Prod. Lab., Madison, WI. 56 p.
- Merrick, Gordon D. 1951. Wood used in manufacture, 1948. USDA For. Serv. Res. Paper 2. USDA For. Serv., Washington D.C. 66 p.
- Reid, William H. and D.C. Baumgartner. 1977. Wood products used in farm building construction in the United States, 1958-1975. USDA Forest Serv. Resource Rep. FPL-2. Forest Prod. Lab., Madison, WI. 37 p.
- Reid, William H. and D.B. McKeever. 1980. Wood products used in constructing conservation and development projects by the Corps of Engineers in the United States--1962 and 1978. USDA For. Serv. Resource Bulletin FPL-9. Forest Prod. Lab., Madison, WI. 13 p.
- Reid, William H. and D.B. McKeever. 1978. Wood products and other materials used in constructing highways in the United States. USDA For. Serv. Resource Bulletin FPL-5. Forest Prod. Lab., Madison, WI. 19 p.

Reid, William H. and M.G. Wright. 1974. Wood products used in the construction of nonresidential and nonhousekeeping buildings--United States. 1969. USDA Forest Serv. Stat. Bulletin 534. 70 p.

Risbrudt, Christopher D. and R. Chamberlin. 1982. Wood products in Coal Mining. USDA Forest Serv. USBM Contract No. J0205049. Forest Prod. Lab., Madison, WI. 50 p.

Skog, Kenneth E. and I.A. Watterson. 1985. Residential fuelwood use in the United States: 1980-81. USDA For. Serv. Resource Bulletin WO-3. USDA For. Serv., Washington D.C. 45 p.

Spelter, Henry. 1985. A profile of the nonresidential nonbuilding construction market for lumber and plywood. USDA For. Serv. Resource Bulletin FPL-16. Forest Prod. Lab., Madison, WI. 19 p.

Spelter, Henry and R.G. Anderson. 1985. A profile of wood use in nonresidential building construction. USDA For. Serv. Resource Bulletin FPL 15. Forest Prod. Lab., Madison, WI. 22 p.

U.S. Dept. of Commerce, Bureau of the Census. 1987. Characteristics of new housing: 1986. Construction Reports Series C25. USDC, Bureau of the Census, Washington D.C. 65 p.

U.S. Dept. of Commerce, Bureau of the Census. 1985. Characteristics of new housing: 1984. USDC, Bureau of the Census, Washington D.C. 65 p.

Wright, Maurice G. and W.H. Reid. 1972. Wood materials used in apartment construction, 1969. USDA For. Serv. Research Paper WO-16. USDA For. Serv., Division of Forest Econ. and Marketing Research, Washington D.C. 16 p.