

WOOD TANKS

April 1942



(Report)

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
FOREST PRODUCTS LABORATORY
Madison, Wisconsin
In Cooperation with the University of Wisconsin

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Tank stock is choice, carefully selected, and carefully manufactured stock, and brings a good price. Varied industries and processing operations put it to essential uses. Forest products industries are naturally interested in holding and possibly expanding the market for it. Manufacturers of other materials are interested in substituting their products for wood. As a result, there has developed considerable competition between materials for the tank market. A preliminary study has been made by the Forest Products Laboratory to determine how extensive the substitution of other materials for wood in tanks has been and to determine the cause of the trend in the individual industries and what technical requirements as to service must be met to hold or recapture the market. The requirements which must be met have been fairly easy to determine; just how they can be met is not always apparent.

The work reported here was intended as a background against which the specific technical problems encountered could be analyzed and perhaps subjected to experimentation and testing where needed. However, war demands have occasioned such transfer of personnel that the original plans must now be abandoned and further work along this line held in abeyance. This report, therefore, is prepared merely to record preliminary data.

The latest available Census, 1937, showed about 75,000 establishments in the groups of industries which are heavy users of tanks. Many establishments in other industries use one or two tanks for water storage or for processing. The most practical method of covering such a large field was thought to be the selection of typical plants of the more important groups of heavy users for visit and examination. In addition, the number of tank manufacturers being comparatively small, a large percentage of them located in the East and Mid-West were interviewed. The tank manufacturers furnished not only the names of typical users but also considerable information on the trend and practices in the various industries and on species and grades used.

Information was obtained on the use of tanks for food products, beverages, textiles, chemicals, leather products, iron and steel products, and water storage. It was not possible to cover all the products produced by those industries.

General Consumption Trend

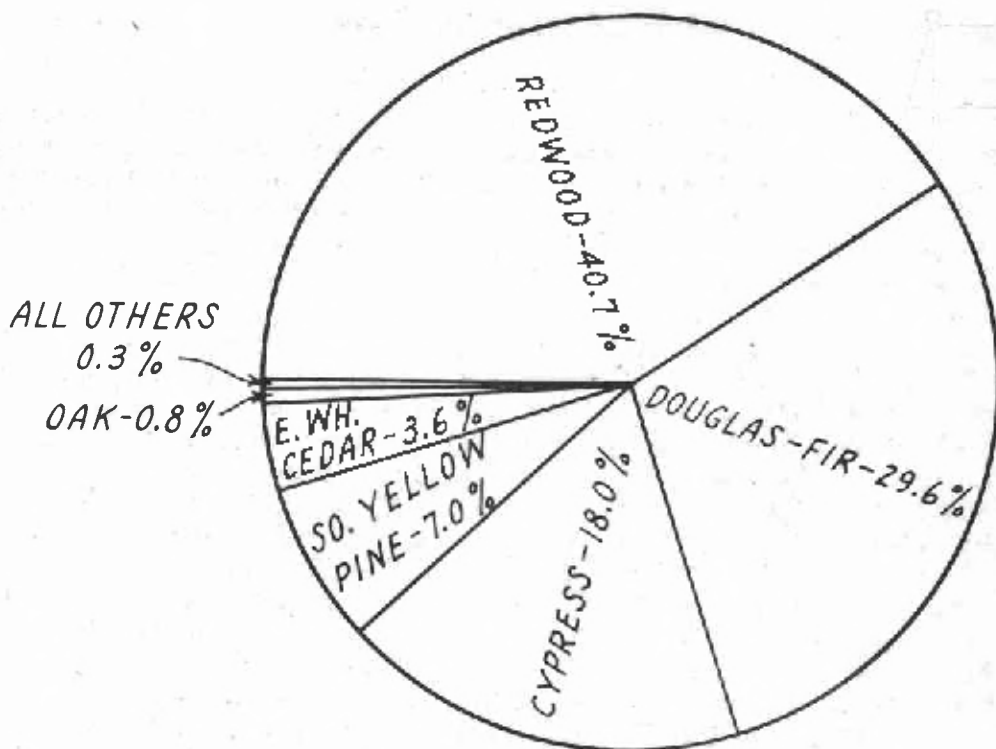
The general trend in the use of wood in tanks must of necessity be based on the available Census statistics. Granted they are meager and possibly incomplete, nevertheless they furnish a more accurate base for determining the general trend than do the broad impressions of individuals connected with the tank industry or any figures that it was possible to obtain in the survey here reported.

The only accurate figures available on the amount of wood used for tanks are those obtained for 1933 and for 1940 by the Forest Survey. Only 1933 figures were available at the time the bulk of the work on this project was done. Since the first draft of this report was written, preliminary figures for 1940 have become available, and these 1940 figures have been used in Figure 1 and superimposed on the data as originally drafted in Figure 2. Substitution of 1940 for 1933 figures as a base of estimates could not be made in Figure 2 because "Value of Product" comes from the biennial census of manufacturers which is taken only for odd years. In line with the above Forest Survey, figures show that 22,929,000 board feet were used in 1933 and 45,529,000 board feet in 1940. Using the 1933 figure and the figures for the value of the product from the biennial census, an estimate was made of the lumber consumption in odd years from 1927 to 1939, inclusive. These estimates are shown by the red line in Figure 2. The actual 1940 figure is shown as a detached point. The estimated lumber consumption for the 12-year period from 1927 to 1939 varied between 31 million board feet, which occurred in 1937, and a consumption of 15,000,000 in 1933. The figures are probably low, for some users make their own tanks and few, if any, of these get in the census returns. The trend as shown by the data is toward an average consumption of about 25 million board feet, varying above and below that figure with shifting economic conditions.

The data do not prove a loss of market to other materials for the period of record. A comparison of the value of the wood tank production with that of steel over the 10-year period 1929-1939 on the basis of percentage of change (Fig. 3) indicates that steel dropped faster during the depression, was slower to start recovery, and did not recover as completely as wood. The deduction drawn from the curves of Figure 3 is that the wood tank at least has held its own with the steel tank over the 10-year period. That overall trend, however, does not apply in the case of individual industries. In some industries wood tanks have given way to metal tanks; in others wood has been partially replaced. The fairly constant production of wood tanks shown in Figures 2 and 3 is accounted for by the opening of new markets or expansion of old ones and the replacing of lost markets.

Species Used

The number of woods used in commercial tank construction is limited. Of six species used, redwood, Douglas-fir, and cypress furnish about five-sixths of the tank stock (Fig. 1). Other woods of commercial



TOTAL - 42,529,000 BOARD FEET

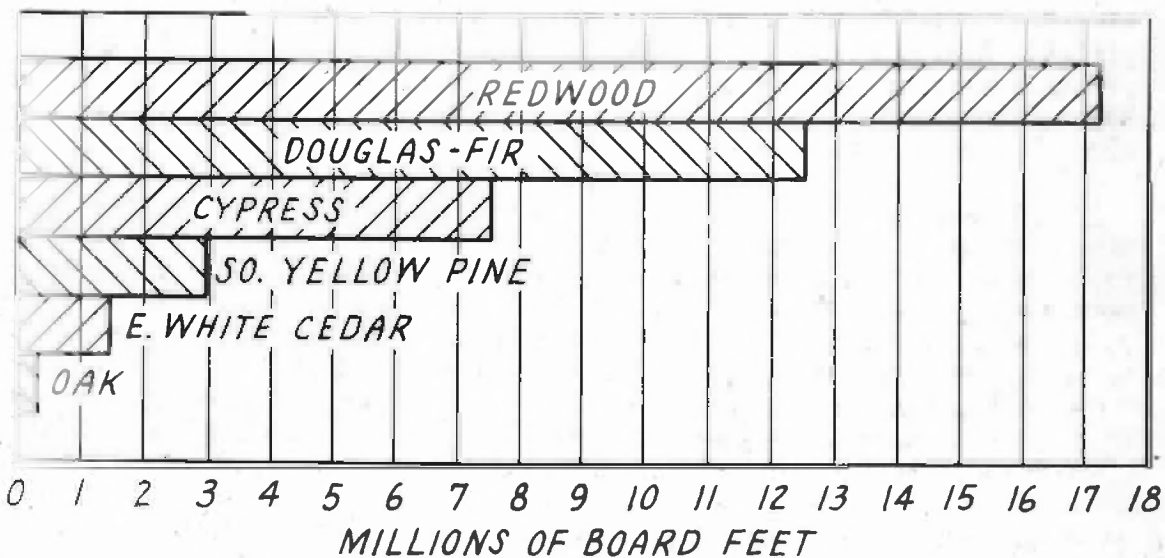


FIG. 1
LUMBER SPECIES USED IN TANKS
(PRELIMINARY 1940 FOREST SURVEY)

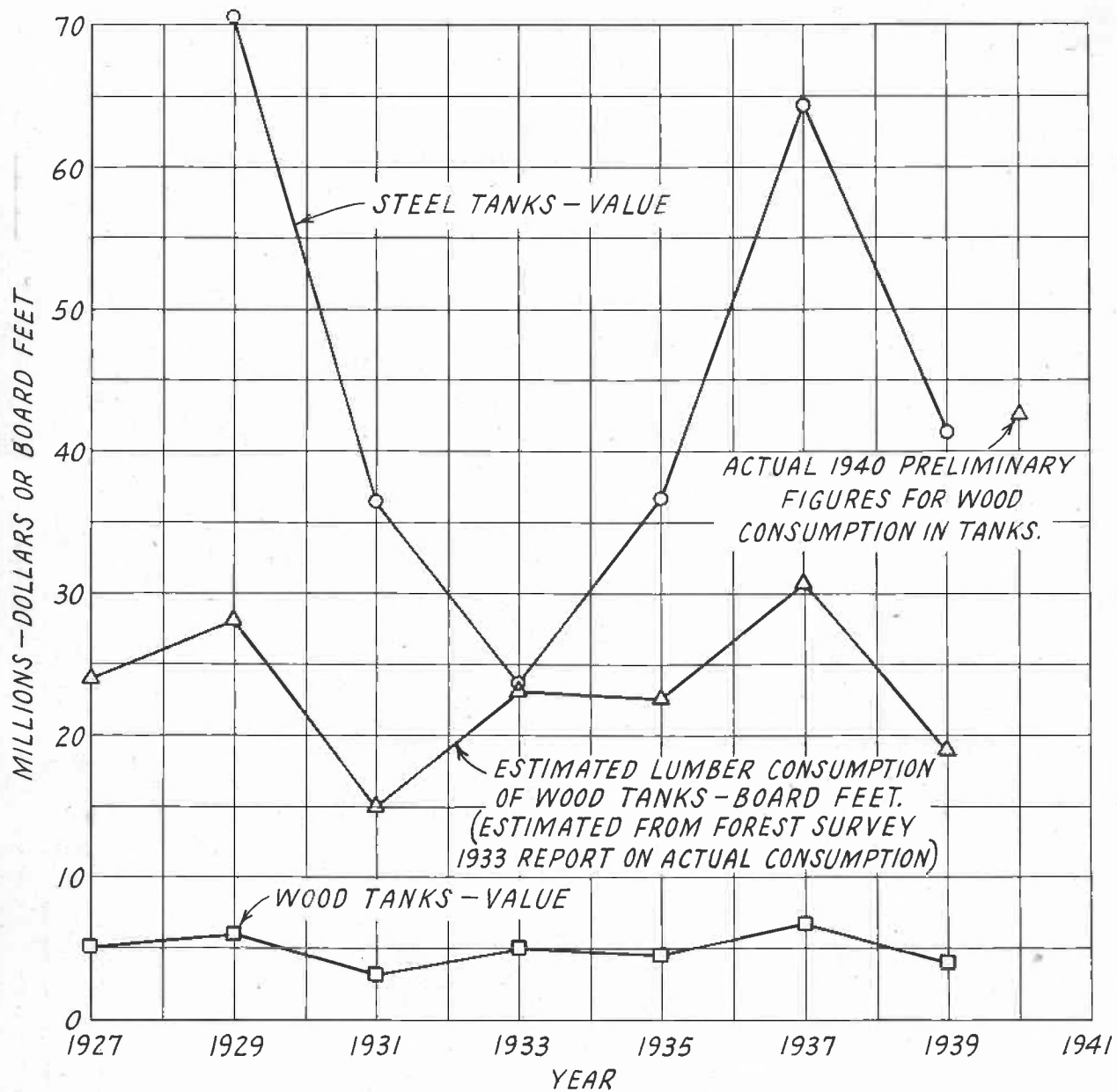


FIG. 2
 COMPARISON OF VALUE OF WOOD AND STEEL TANK PRODUCTION
 AND ESTIMATED LUMBER CONSUMPTION
 (SOURCES OF VALUES - BIENNIAL CENSUS AND FOREST SURVEY)

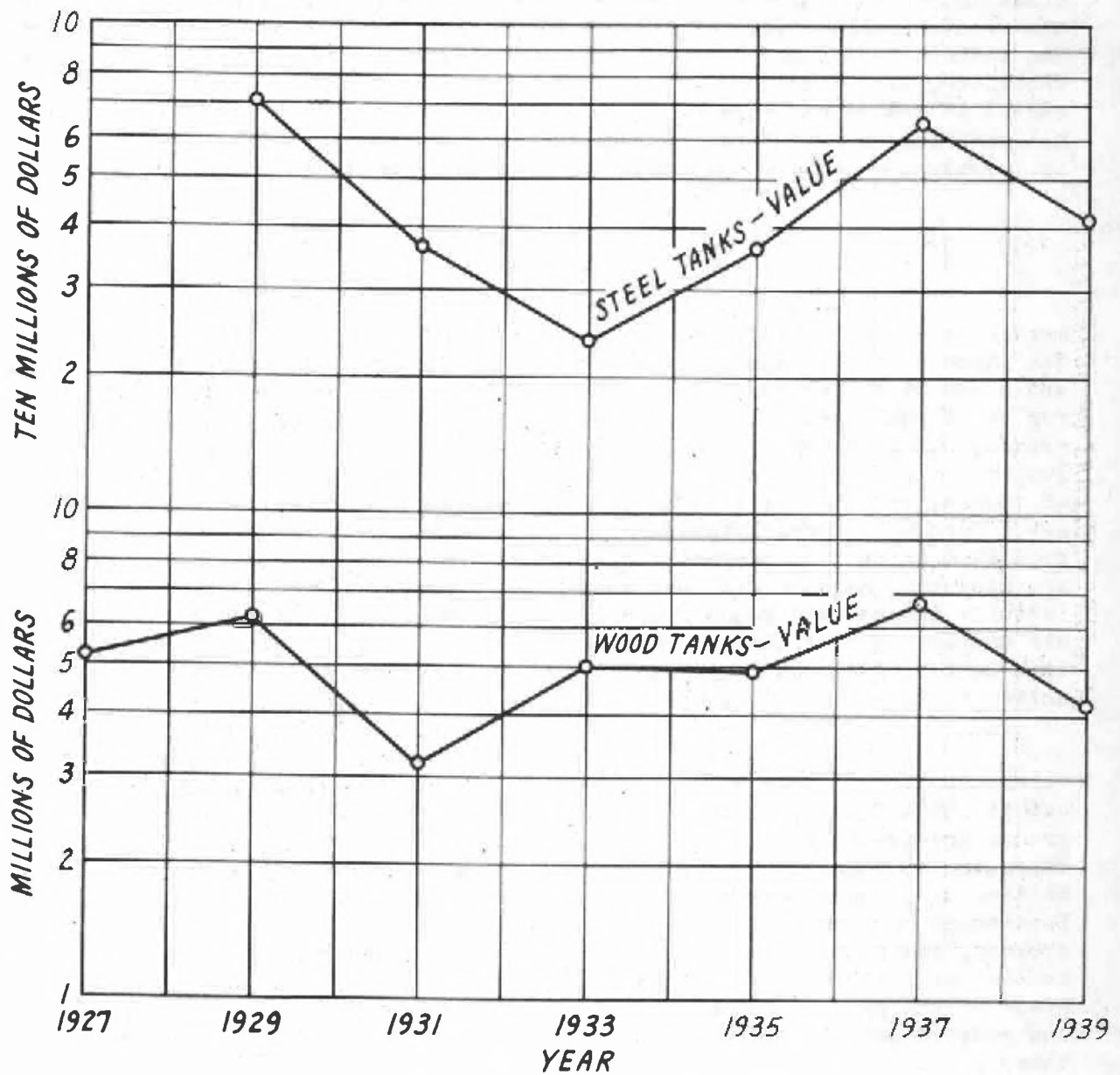


FIG. 3
 TREND IN VALUE
 OF WOOD AND STEEL TANK PRODUCTIONS

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importance are southern yellow pine, cedar, and white oak. Of less importance but sometimes used are white pine and other species. The decay hazards that exist in varying degrees where tanks are used are accountable for the small number of species used, for only highly or moderately decay-resistant woods can satisfactorily meet the use requirements. The demand for wood for tanks, therefore, will continue to be for the species now used. The only trend observed is toward an increased use of the moderately decay-resistant and medium-priced woods where the requirements are less exacting. That trend is largely the result of attempts to meet the competition of other materials.

Grades

The use of unsuitable grades is responsible for loss of some markets and for the failure of many wood tanks to render satisfactory service. The names of the grades are sometimes misleading and confusing to consumers, and responsible for part of the trouble. The names principally responsible for the trouble are No. 1 and Selects. Consumers sometimes specify these grades, believing that No. 1 means the best and that Selects means that the lumber has been especially selected for tank purposes. Tank manufacturers, of course, know the fallacy of such assumptions, but report that they are often forced to furnish tanks made of these grades either because they are specified or to meet competition. The requirements of practically all tanks are such that sapwood will not render satisfactory service. No tank manufacturer interviewed recommended the use of sapwood in any tank. Practically all complained that the use of sapwood by some competitor has not only caused them to lose individual orders, but has been partially responsible for the shift to other materials.

Lumber manufacturers generally have recognized the necessity of all-heart stock. They have established special tank grades, all of which, except the A Tank Stock Grade of redwood, prohibit sapwood. All-heart tank grades are available in cypress, redwood, western redcedar, and Douglas-fir. There are no special tank grades in southern yellow pine, oak, and eastern white-cedar, now known as Atlantic white-cedar. The Bureau of Standards Department of Commerce, has prepared a commercial standard CS92-41 for cedar, cypress, and redwood. Tank-Stock Lumber Specifications requiring tank stock to conform with that standard will assure satisfactory stock. A suitable grade of the principal tank species, cypress, Douglas-fir, western redcedar, and redwood can also be obtained by specifying "tank grade, all-heart," for there is only one grade in each species that meets that specification. There are few, if any, uses of wood for which it is easier to specify the proper grade. The trouble is that users who are not familiar with wood properties specify the cheaper grades containing sapwood either because they are misled by the grade name, do not realize the importance of all-heart stock, or are sold on price rather than quality.

Contrary to the general belief, decay is not the principal cause for the substitution of other materials for wood in tanks, although it is a hazard common to all uses, and in water storage tanks is the principal cause of trouble and replacement. The substitution by industry