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A Survey of the Pulp and
Paper Industry in the South

by

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INTRODUCTION

One of the most important developments in the field of forestry during recent years is at the present time occurring in the Southern Region of the United States. The discovery of processes which make southern pines suitable for newsprint manufacture has opened a new chapter in the industrial expansion of the South. The pulp and paper industry is now taking advantage of the extensive areas of second-growth pines which the South has to offer and, as a result, during the past few years millions of dollars of capital have flowed into the South for the erection of newsprint mills and new kraft paper mills.

Prominent authorities on the subject have predicted for many years that the industry would migrate from the cut-over lands of the northeast to this great region which offers much to its future development and expansion. Now that the migration of the pulp and paper industry to the South is a reality and no longer a prediction there is a great deal of anxiety expressed in relation to the industry's effect on already existing forest industries. These fears are well founded as the South is a region which contains a declining supply of large timber. The pulp and paper industry will, if not placed on a sustained yield basis and integrated with other forest industries,

utilize the timber before it can grow to a size suitable for the manufacture of products of higher value.

The purpose of this thesis is not only to point out the factors which will encourage the establishment and further development of the pulp and paper industry in the South, but also to discuss the many problems and difficulties which will arise with future development, together with their possible solution.

Previous studies relating to the topic have, in the main, been related to only one or several phases of the problem and have not given detailed thought to the subject in all its magnitude. Most of the literature published has been compiled by men who are authorities on some particular phase of the work and for this reason a great deal of pertinent information concerning the economic, social, management, and research aspects has been offered.

The data used in presenting this paper have been accumulated from the most recent and most valuable publications. Information published by the Southern Forest Experiment Station and the Forest Products Laboratory offered the most assistance in writing this thesis.

DEVELOPMENT OF THE INDUSTRY TO THE PRESENT TIME

The last two decades have been important ones to the Southern Region of the United States. During this short time there has been a tremendous expansion of the pulp and paper industry in the South. The exceedingly rapid exodus of the industry from the North is not surprising when one pauses for a moment and considers the important changes which have taken place in the fields of science and research, and economics.

The pulp and paper industry has long centered in the Northeast and Canada, moving steadily farther North as Spruce, the King of pulpwoods, was carelessly utilized with no thought for future replenishment of the once magnificent stands of timber. Today the industry is taking advantage of the immense area of second-growth Southern pine which has been made available through research and favorable economic conditions.

The rapid expansion of the industry in the South is evident when we consider that on January 1, 1938, out of a total of thirty eight pulp mills in ten southern states from Virginia to Texas eleven of them were still under construction or had been operating less than 18 months. The total reported capacity of the 38 plants is approximately 10,000 tons of pulp daily. I have shown in the chart (figure 1) the location of the existing and

MILL NO.	NAME OF PULP AND PAPER MILLS	MILL NO.	NAME OF PULP AND PAPER MILLS
1	CHAMPION PAPER & PAPER COMPANY	31	SOUTHERN CRAFT CORPORATION - GREENSTON MILL
2	CHAMPION PULP & PAPER MILLS	32	CHAMBERS PINE COMPANY
3	CHAMPION PULP & PAPER COMPANY	33	KENDRICKS CONTAINER CORPORATION
4	SOUTHERN CRAFT CORPORATION	34	HALFAX PAPER COMPANY, INC.
5	MOORE PAPER CORPORATION	35	CHAMPION PAPER COMPANY
6	SOUTHERN CRAFT CORPORATION - LONGLEAF MILL	36	STELLA PAPER COMPANY
7	SOUTHERN CRAFT CORPORATION - LANTANA MILL	37	NEAR CORPORATION
8	CHAMPION PAPER MILL	38	SOUTHERN CRAFT CORPORATION
9	SOUTHERN CRAFT CORPORATION - CAMDEN MILL	39	NATIONAL CONTAINER CORPORATION
10	S. S. CROWN COMPANY	40	NEAL PAPER BOARD CORPORATION
11	MAGNETIC CORPORATION	41	NATIONAL CONTAINER CORPORATION
12	MAGNETIC CORPORATION	42	SOUTHERN CRAFT CORPORATION - SPRINGFIELD MILL
13	SOUTHERN CRAFT CORPORATION - MOSS POINT MILL	43	COLUMBIAN PAPER COMPANY - LANTANA MILL
14	SOUTHERN CRAFT CORPORATION - MOBILE MILL	44	WEST VIRGINIA PULP & PAPER COMPANY - CONVENTION MILL
15	MOBILE PAPER MILL COMPANY	45	NEAL PULP AND PAPER COMPANY - NEW ISLAND MILL
16	GULF STATES PAPER CORPORATION	46	COLUMBIAN PAPER COMPANY - ALBANY VISTA MILL
17	SOUTHERN CRAFT CORPORATION - FARMERS CITY MILL	47	HUN-KELL-LOESS PINE COMPANY
18	ST. JOE PAPER COMPANY	48	CHESAPEAKE CORPORATION
19	CONTINENTAL CORPORATION OF AMERICA	49	CAMP CHESAPEAKE CORPORATION
20	HUNTERDON PULP AND PAPER COMPANY	50	WEST VIRGINIA PULP & PAPER CO. - CHARLESTON MILLS
21	UNION BAG AND PAPER COMPANY		
22	WEST VIRGINIA PULP & PAPER CO. - CHARLESTON MILLS		

② INDICATES NEW MILL IN OPERATION LESS THAN 16 MONTHS.

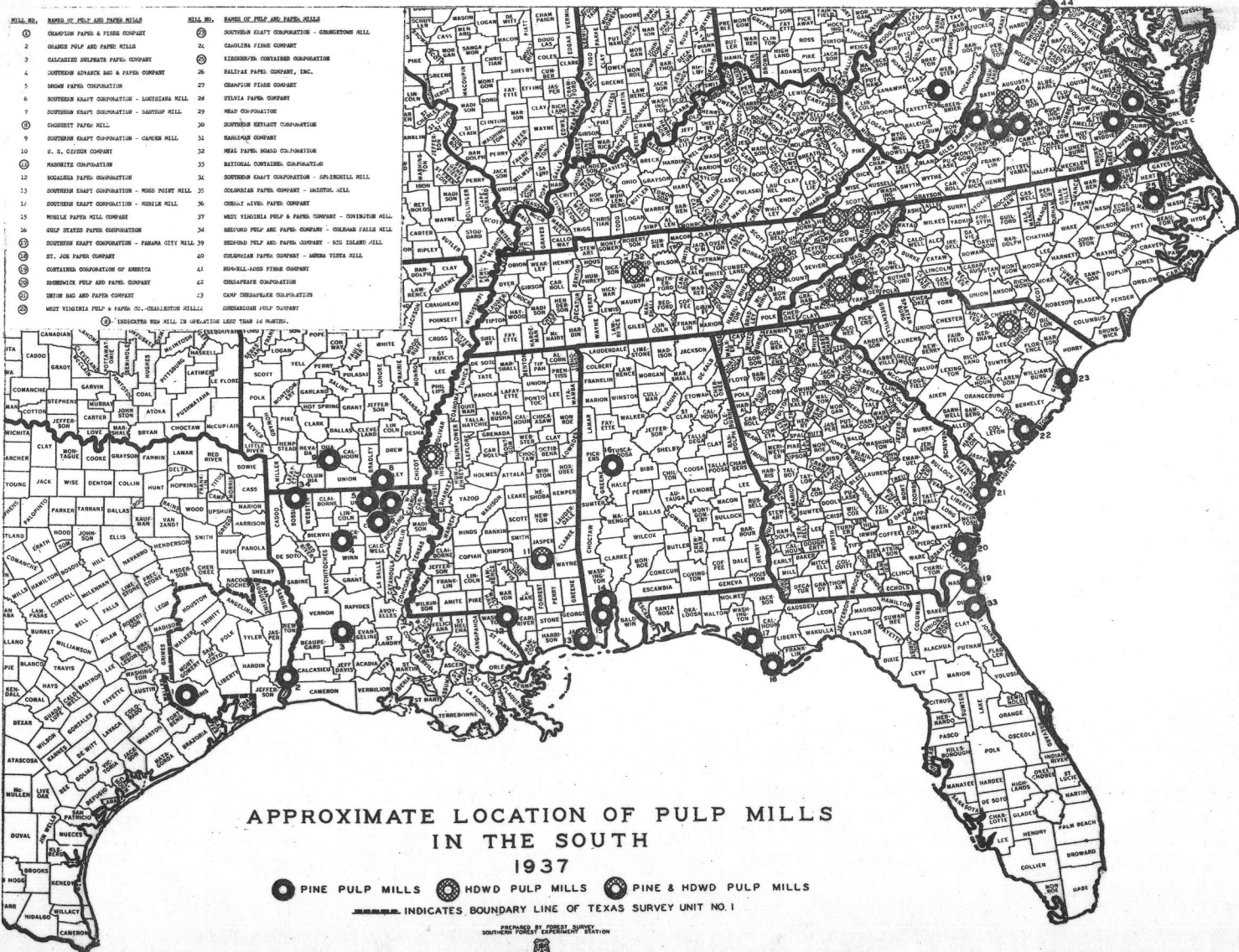


Figure 1

definitely projected mills in the South (24). Most of these mills are situated near the coast line of either the Atlantic Ocean or the Gulf of Mexico, but progressively more mills are being built farther inland near the areas of highly potential values from the standpoint of raw materials. The distribution of these pulp mills by states is as follows (14):

Alabama	3	Mississippi	3
Arkansas	2	North Carolina	4
Florida	5	South Carolina	3
Georgia	2	Texas	2
Louisiana	7	Virginia	7

It is estimated that approximately \$200,000,000 will be invested in the thirty-eight mills and that they will require about five million standard cords of rough wood annually.

The pulp and paper industry is opening a new chapter in the industrial development of the South, and one which it can be justly proud of.

LARGE TIMBERED AREA IN THE SOUTH

Why is the industry moving South? When we stop to consider the advantages offered by the South it is surprising the emigration did not start much sooner.

Probably the primary reason for the tremendous expansion is the abundance of the necessary raw material, wood, in the section. The South's greatest offering to the paper manufacturing industry is the pine belt extending from Virginia to Texas, a forest area of approximately 178 million acres.

The pine belt of the South contains great areas of cheap cutover and second-growth timberland, much of which is still held in large units of ownership mainly by lumber companies.

To bring much of this area into rapid reproduction requires protection against fires which kill the seedlings that would otherwise reforest the land. Where seed trees have not been left, of course planting is essential.

Destruction of forests by conflagrations such as occur in the more combustible forests of the North and West, is practically unknown in the South. Complete forest destruction in the South, as a rule, occurs only where loggers have left heavy slash in the forests followed by an unusually dry season and by fire. Ground fires commonly experienced, burn only the forest litter and seedlings. It is common knowledge among southern timberland owners that where fire and hogs are kept out of the area, reforestation will occur naturally in great abundance.

Of southern forest lands less than 20 million acres are original stands, but recuperative power is remarkable as is indicated by 110 million acres of restocked land of which 51 million acres are in sawlog condition. This means that with protection and planned cutting these forest lands should produce forever (8).

Fortunately we have actual figures to show the existing stand of timber in the South. The Southern Forest Experiment Station has published the results of an actual survey of 68,000,000 acres in the "deep South", from Texas to South Carolina. About 68 percent was found to be forested and the average stand suitable for pulpwood was 4.2 cords of pine and 2 cords of hardwood per acre (19). This stand will not all be available for utilization by the paper industry if that part of the pine stand in trees which are now being worked for naval stores or are considered likely to be worked in the future is deducted. The net stand on the average acre available for paper manufacture will be 2.6 cords. This is a light stand but in the future will undoubtedly be increased through more intensive forest management and improved conservation measures.

GROWTH

As has already been intimated, forest and economic conditions are probably more favorable for industrial

forestry in the South than for any other region in the United States. Blessed with a long growing season, good sites and heavy precipitation, both pines and hardwoods grow more rapidly in the South than any where else in North America.

Many claims are made by forest owners in the South as to the large area of commercial timber lands and the tremendous yields to be expected from managed forests on these lands. A correlation of these two important factors will give the South a decided advantage over competition from the North, Pacific Coast, and European pulp producing centers.

The relative growth and yield of the four principal southern pines is exemplified in a recent publication of the Chemical foundation called "The Deserted Village". Growth figures for the southern pines are quoted from a circular of the United States Forest Service as follows: In fully stocked stands at twenty years of age the yields of pulpwood to be expected on an acre are, for longleaf pine, 15 cords; shortleaf, 18 cords; loblolly pine, 28 cords; and slash pine, 36 cords. These figures are theoretical and are not attainable over extensive areas even under the most intensive management. In the same publication an eminent pulp and paper engineer from Canada is quoted as saying that 300 square miles of southern pine land will produce pulp wood to supply a 500 ton newsprint

mill while the same mill now requires 2,000 square miles of Canadian spruce land. This relationship is definitely in favor of the South and is well within the bounds of reason.

It is possible to grow much larger volumes than are now being produced but it will take time and greater development of management techniques than are now being practiced. There are instances where growth is quite phenomenal. Recently there was exhibited at the Southern Forest Experiment Station sections from an 11-year-old slash pine from Georgia, an 80-year-old spruce from Nova Scotia, and an 138-year-old spruce from Maine. The diameter of the 11-year-old, was $1\frac{1}{2}$ inches greater than that of the 80-year-old, and only 1 inch less than that of the 138-year-old spruce (29). Examples of second growth slash pine can be found which are merchantable for naval stores in 12 to 15 years, that is, where stands have been silviculturally treated. Such examples as these are unusual and must be considered above the average. On the Ocala National Forest in Florida which contains 150,000 acres of the better class of forest-growing land, a period of 25 years is allowed in which to grow a pine tree on the average site to 9 inches (19).

The most optimistic foresters consider a growth of one cord on an acre each year the maximum he should estimate on an area 100,000 acres in extent. This is assuming

successful fire protection and the practice of intensive management. More conservative estimates are not more than one-half this amount.

ACCESSIBILITY

It has been stated that the South contains the greatest potential source of pulpwood in this country and that growth is faster in this section than anywhere else in North America. This is an asset that cannot be overlooked when predicting that the South will be the greatest pulp producing center in the United States in the near future. There is another important factor, which, combined with the above statements, definitely assures future growth of the industry. This is the accessibility of the area to markets and manufacturing centers. The nearness to excellent local markets and the largest markets of the nation, as well as export markets, favor the South over the northern, western and foreign sources.

Within the area itself are many railroads penetrating all parts of the pine belt and hardwood regions. Water transportation is also made available by the many streams flowing southward from the mountains to the Atlantic ocean and gulf. Many of these streams are navigable through the main pine belt. No area now producing pulpwood is provided with better facilities than the southern forest region, if as good.

LOW COST OF PRODUCTION

The most important single item of expense in maintaining a pulpwood mill is the cost of wood.

The South undoubtedly has an immense supply of cheap wood, and this factor alone will play an important part in future expansion of the industry.

If we disregard the mechanical pulping processes, where cheap power is of paramount importance, the chemical processes of pulping cost approximately the same in any locality. That is to say, the plant investment and its attendant charges the cost of labor, chemicals and steam, and the efficiency of management will come to about the same total regardless of location. Of course there are exceptions but as a general proposition this assumption seems justified. If this assumption is granted then any advantage that an industry in any particular locality will have over the same industry in some other locality will be in the cost of the raw material wood or the freight haul to market, or perhaps both.

Cost data compiled by the United States Forest Service show the average pulpwood cost (rough wood) in 1929 as follows:

New England	\$16.60 per cord		
New York	18.04	"	"
Lake States	12.43	"	"
Southern states	7.56	"	"
West Coast states	8.96	"	"
Average for U. S.	12.76	"	"

These figures are outmoded but show the relationship of costs of wood for different localities in the United States. Taken during a period of inflation the costs are approximately three to four dollars too high.

In recent years southern pine pulpwood has sold at abnormally low prices, due to the depression. Costs of rough pine pulpwood, which at present average about \$4 per standard cord, delivered at the mill, were between \$5 and \$5.50 in some states and as high as \$7 to \$8 in other states during the 1925-29 period. Present prices can be expected to increase as economic conditions improve, and future prices for pulpwood delivered at the mill can be expected to average around \$5 per cord (12). This will probably be made up as follows: stumpage, 75 cents; cutting, \$1; transportation from stump to mill, \$2.25; and margin for profit, \$1.

An analysis of these cost figures for the raw wood shows a decided advantage in favor of the South, with perhaps the exception of the Pacific Northwest.

The matter of hauling costs does not show such an obvious advantage for the South over the West. However, excellent available means of transportation and relatively short hauls to markets and manufacturing centers point favorably to the South.

Recently Dr. C. H. Herty stated (12) that Canadian and Northern United States pulp mills could manufacture and ship pulp to New York, before the N.R.A., for not less than \$47.43 a ton, and that the South could deliver pine paper of the same quality in New York for \$27.54 a ton. These figures, if proven valid, will mean the Northern industries must prepare to compete with even increasing competition from the rising industry in the South.

Expansion of the paper industry in the South in the form newsprint mills, or more kraft mills, means competition between northern European countries as well as other sections of the United States. Doubt is expressed by many authorities as to the outcome of such an eventuality. Sweden and Finland are our two greatest foreign contributors of newsprint pulp. Mr. R. S. Kellog in a recent discussion (12) reported these two countries as well as Great Britain and Japan are shipping pulp to this country at the extremely low price of \$5 a ton to Washington and Oregon. However, Dr. Herty in the same discussion maintained that newsprint can be delivered along the South

Atlantic Coast to New York City for \$3 a ton, which is half what it averages from various existing mills in the United States according to Mr. Kellog's figures before the N.R.A. The fact that the South is favored with proximity to markets may be a deciding factor in future competition.

What are the costs of transportation within the region itself? These costs are an important item as the cost of pulpwood increases very rapidly with handling and with the distance it must be transported to the mill. This is particularly true of the southern pine, which weighs from five to six-thousand pounds per cord in the usual green state, and conditions in the South make the use of green wood preferable. Using as a basis some traffic figures which are now in force in one section of the South (15) railroad hauling costs increase at the rate of about one cent per cord per mile. The freight charge rises ninety-nine cents per cord in hauling from a distance of ten miles to one-hundred and eleven miles. The Southern Forest Experiment Station figures show that when transporting pulpwood by truck it costs approximately \$1.25 cents per cord more for a distance of twenty-six miles than a distance of twelve miles, or an increase of about nine cents per mile. It can readily be understood that the manufacturer will be wise if he maintains a permanent source of wood supply near the location of his mill.

That the South has a large supply of cheap wood cannot be denied. However, if the region is to maintain its attraction to new pulping developments this factor of cheap wood must be retained. The main reason for this is the competition of other areas. If increase in pulp production in the South is attended by decreased production elsewhere, as is very likely to be the case, it will ultimately mean a diminishing demand for wood in these other areas, as well as decreasing the cost of wood in such areas and bringing them on a parity with the South in pulp production cost, and hence in ability to compete. If this be true, new mills must base their costs on the lowest figure to which competing mills, or areas, can drop. Sound development can not be built on boom prices and inflated values. This is particularly true with wood pulp that must meet both foreign and domestic competition, because wood pulp is one of the few items that has not received tariff protection.

Such is the present situation in the South today as we consider the production costs problems of the wood pulp industries.

NEWSPRINT

The first newsprint mill to be erected in the South is under construction at the present time in Lufkin, Texas.

This mill not only marks the first venture in the manufacturing of newsprint in the Lone Star State, but inaugurates the start of a new industry in the Southern Region. The mill site has been named Herty, Texas, in honor of the late Dr. Charles Herty who perfected the process of converting southern pine pulp into newsprint.

It may readily be seen that a permanent source of low cost materials is not the only reason for the pulp and paper industry to remain in the South. New products and possibilities, such as the newsprint industry, open wide vistas ahead.

A summary of past development of the newsprint industry shows an emigration of hundreds of millions of dollars of American capital from the United States to Canada where it was used for building great newsprint mills. This move was only natural because the industry was following that type of wood, spruce, which was most easily adapted to the manufacture of newsprint. Artificial means such as tariffs and embargos speeded this emigration as well as the natural causes. Therefore the tide changed, and, whereas the United States mills had formerly manufactured two-thirds of our newsprint consumption and imports were limited to one-third, these figures are now reversed.

In pursuing such a policy, financial interests

followed the beaten path, oblivious to the fact that where logs are cut and conditions for reproduction are unfavorable for their replenishment costs must increase, and, eventually the industry will become extinct. On the other hand a permanent industry under continued low costs must be sought in a region where reproduction of logs keeps pace with consumption, and where raw materials can be worked up into a finished product under favorable conditions and with accessibility to consuming centers. The South with its immense supply of permanent raw material is potentially the answer to this problem.

In recent years a great deal of discussion has centered around the possible future requirements of the United States newsprint consumption. In the Hale report an attempt was made to work out a possible distribution of future pulp production among the various forest regions, not in any sense as a forecast or prediction, but simply to illustrate the balance which might be obtained should the prospective requirements of 25 million cords a year be supplied without dependence on imports. Table 1 presents the results of this prediction.

An analysis of Table 1 points definitely to the fact that the South will play an important part in supplying a large proportion of the future newsprint requirements of the United States. If future consumption stabilizes at

approximately 25 million cords for all purposes of pulp manufacture a total of 18,500,000 tons will be converted by the sulphite and mechanical process (6,600,000 for newsprint, and the balance for other uses). The South will be expected to supply 2 million cords of the 6,600,000 cords for newsprint.

However, the South holds possibilities for an expansion of the domestic newsprint industry several times more than sufficient to make up the balance of 2 million cords to satisfy national requirements. The Hale report estimates that current growth of the timber suitable for newsprint in the South totaled over 11 million cords a year. This is an extremely conservative estimate as much of the land in the South suitable for the production of pulpwood for newsprint at the above figure. When it is considered that present growth is far below ultimate possibilities of the region, the South is in a position to supply as much of the 6,600,000 cords as might not be more advantageously produced from spruce-fir and hemlock forests of the North and West.

No longer is the future of the newsprint industry in the South a matter of conjecture. Climaxing a long period of experimentation by Dr. Charles Herty, the Forest Products laboratory, other chemists, and Experiment Stations, the first newsprint mill in the South, established

Table I

Possible Contribution of Forest Regions to Prospective
Pulpwood Requirements, By Process of Pulp Manufacture.
(thousand cords)

Region	Total	Processes					
		For Mechanical and Sulphite					For soda & semi- chemical process
		Total	For news- print paper	For other processes		For sul- phate process	
				Softwood	Hdwd		
New England	3,250	2,600	1,000	400	1200	150	500
Middle Atlantic	1,500	1,200	200	200	800	50	250
Lake	3,200	2,200	400	800	1000	600	400
Central	500	500			500		
South	7,500	4,000	2,000	1,000	1000	3200	300
Pacific Coast	7,050	6,000	2,000	4,000		1000	50
Northern Rocky Mountain	250	250	150	100			
Southern Rocky Mountain	250	250	100	150			
Alaska	1,500	1,500	750	750			
	25,000	18,500	6,600	7,400	4500	5000	1500

at Herty, Texas, will very likely prove beyond a doubt that southern pines can be utilized for the manufacture of newsprint and yield a profit to the operators.

Recent examinations and tests at the Forest Products Laboratory have confirmed the idea advanced by Dr. Charles Herty that the trunk of the young, fast grown pine trees consists largely of sapwood and contains relatively small quantities of resin, the substance which is usually considered the bar to the pulping of the pines by the sulphite or ground-wood processes. Indications are that pine sulphite pulp, unbleached, may provide Southern mills with an essential ingredient for the production of large tonnages of newsprint, cheap book, magazine, tablet, drug-store wrapping and similar papers.

In studies of pulping qualities of southern pines special emphasis has been placed on slash pine. Several interesting and important developments have occurred in the pulping of slash pine by the standard pulping processes and also by modification of the standard processes. It has been found that second-growth slash pine, which has very little heartwood, produces a pulp of excellent bleaching characteristics when treated by the modified kraft process developed by the Forest Products Laboratory. A bleached sulphite pulp suitable for bond and other white papers is produced from young-growth slash pine by the standard sulphite process. Newsprint sheets containing

90 percent of groundwood or a 50-50 mixture of groundwood and sulphite have been produced experimentally from the same type of wood.

Whether or not the newsprint industry is economically feasible will be definitely ascertained when the mill at Herty, Texas commences operation in the near future. From the standpoint of the capital that is invested in this large mill proves that it is a carefully planned business venture founded on a sound economic basis. It is an established fact that newsprint paper produced from southern pines can be used satisfactorily, as has been proven by the ten Georgia daily papers that used the product in a demonstration test. Also, editions of the Lewiston, Maine, Daily Sun for last June 26th were printed on paper made experimentally by the Great Northern Paper Company from southern slash pine pulp. This paper proved entirely satisfactory and compared favorably in all respects with newsprint made from spruce and hemlock grown in the north-east and in Canada.

Further development of the newsprint industry may be looked for in connection with the hardwoods found in the South. The late Dr. Herty recently announced that black gumwood is adapted to newsprint manufacture. Here is another possibility which, if realized, will add millions to the annual valuation of products manufactured

in the South.

SULPHATE

The newsprint industry presents a new opportunity for the South but in the possible future development of this industry consideration must be made in relation to the production of pulp for other uses and in the relation to the production of lumber and other forest products as well. Southern pine timber is admirably suited for sulphate pulp production, and sulphate pulp is not only being consumed in constantly increasing quantities for kraft paper, boards and other well established uses; but is entering into many fields formerly supplied by sulphite pulps. From an economic standpoint the prospect for future expansion of sulphate pulp production in the South is perhaps brighter than for newsprint manufacture, first because of the pressure which will result from potential pulp production from newsprint mills in Canada, many of which, by lowering their capital investments will be operating at a very low figure; and second, because of similar pressure on our markets from northern European countries whose very financial existence is founded on exporting the paper and pulp products derived from their forests of spruce.

As has been stated before, it has been estimated that

our total national pulpwood requirements will be stabilized at about 25,000,000 cords for all processes of pulp manufacture. Of this total 5,000,000 cords will be converted by the sulphate process, and 1,500,000 cords by the soda and semi-chemical processes. It is estimated that the eleven states from Virginia to eastern Texas and eastern Oklahoma can supply, besides 30% of the newsprint requirements, 2,000,000 cords (17%) of the mechanical sulphite pulp required for other purposes; 3,700,000 cords (64%) of the sulphate pulp and 300,000 cords or 30% of the total requirements of 25,000,000 cords, which would be the largest contribution from any one section of the nation. It is worth noting also that it is considered reasonable that mechanical and sulphate production for all purposes might be double the amount used for newsprint paper.

At present the South dominates the field in the production of pulpwood where the sulphate process is used. Most of the mills in the South at the present time are manufacturing sulphate or kraft pulp, and a few are making bleached sulphate pulp. The majority of the mills run on southern pine, but a few use hardwoods or a combination of pine and hardwoods. The principal product is kraft wrapping paper, kraft liner, and kraft box-boards; whereas the bleached sulphate pulp goes into book or other white paper. A few mills manufacture wallboard and one

of the mills under construction will make rayon.

In addition to those products now manufactured the South holds possibilities for producing many types of fine papers not now manufactured from Southern species, and possibly other products for which the special characteristics of Southern woods may make them adaptable.

There are other factors not already mentioned which will prove advantageous to further, quicker development of these industries in the South. Low priced labor, nearness to sulfur, salt, limestone, alumina and clay make the purchase of necessary supplies less expensive; and hydroelectric power, cheap coal and cargoes of fuel oil along the coast assure reasonable expense for power and steam. In fact, in no other section of the country are factors so favorable for future development of the paper industry. One cannot help but be an optimist in the midst of such happenings.

INTEGRATION OF FOREST INDUSTRIES

The migration of the pulp and paper industry to the South in the form of new kraft and newsprint mills brings to light many opportunities for industrial expansion. The new forest ownership by pulp and paper companies in the South, for the purpose of establishing a long time supply of low cost pulpwood is the most significant and

interesting development of many years. It will be in this region that the closer relationship of forestry and industry will prove profitable for both. This migration is rated all the way from "the menace of the pulp mills" to "the greatest opportunity that forestry has ever had" (21). The menace of course, lies in the enormous new demand in a region of declining supply of large timber, and in a form of competition that can take small trees before they have had time to attain larger size for other uses.

One of the greatest anxieties at the present time is the location of the new mills, many of which are concentrated along the seaboard, where competition will be keen. There is ample room for suitable locations of newsprint pulp mills in this great forest region, where over two-thirds of the entire area is forest land. In selecting a southern location for pulp mill consideration should be given to the following factors: availability of ample and continuous supplies of high-quality pulping cordwood, labor power and fuel, water, and chemicals; transportation facilities; proximity to markets; and taxes.

Although the prospects of further expansion in the pulp and paper industry are favorable, E. L. Demmon (13) states that certain precautions must be observed if this expansion is to be on a sound basis; and the following

policy should govern this expansion:

1. There should be no more pulp mills in the South than its forest lands can support from timber not needed for established forest-using industries.

2. Insofar as economic circumstances will permit, new pulp mills should be fairly well distributed throughout the South and not concentrated in restricted localities.

3. Each new and existing plant should plan for permanency and should utilize timber in its territory on a sustained yield basis, with full regard for the needs of other wood-using industries, integrating the production of pulpwood with other forest products of greater value.

The proper location of plants can not be over stressed as any mislocation of plants with respect to continuing timber supplies is not only wasteful of capital, but because it results in unstable populations is also unsatisfactory from the standpoint of community development.

Inconjunction with the location of the new pulp mills arises the danger of non-coordination of the various industries. The pulp and paper industry is not the only one dependent upon the South's forests. Preceding it by many years are the lumber, naval stores, pole and piling, and other wood using industries. If conservative cutting

practices and other forestry measures are followed by each of these industries, the forest resources except perhaps in limited areas, probably will be found ample.

From the point of view of the long time welfare of the people and communities of the South, the problem of integrated utilization of forest industries naturally raises the question, "Should more pulp mills be built, more new sawmills be constructed, or should the timber consumption of other kinds of forest industrial plants be increased?"

A sound answer to this question hinges on a consideration of the following three points (24).

1. The comparative stumpage value per unit of wood volume of pulpwood, sawtimber, poles, veneer blocks, etc. ...Making this comparison is an aid in measuring the relative economic advantage in growing wood for pulp mills, sawmills, poles, etc...

2. The amount of labor required to manufacture a unit volume of wood into paper, lumber, ect...Industries requiring a large expenditure of labor per unit of volume of product, are, other things being equal, more valuable as community holders.

3. The value added through manufacture of a unit volume of wood into paper as compared with the value of an equal volume of wood when made into lumber or other

products. In general the greater the value added through manufacture, the greater will be the sum of money distributed in wages, purchase of supplies, plant maintenance, interest on investment, and dividends.

A development of each of these questions is made by R. K. Winters (24), comparing items for lumber and paper production.

Present stumpage prices for pulpwood if purchased by the cord are usually quoted at 50 to 75 cents per standard cord in this area. (The United States Forest Service is asking \$1.00 per cord for pulpwood from the National Forests in the South). On the basis of 77 cubic feet of solid peeled wood per cord this wood is worth about two-thirds to one cent per cubic foot of peeled wood. Comparable stumpage prices for good pine saw timber at \$5.85 per M board feet is $3\frac{1}{2}$ cents per cubic foot. Accordingly, wood marketed for pulp sells for only $\frac{1}{5}$ to $\frac{1}{3}$ as much per unit of volume as when grown to a size and quality suitable for the manufacture of the better grades of lumber.

In the South, it is estimated that for an average mill approximately three 10-hour man-days are required to manufacture 1,000 board feet of standard, dressed, pine lumber. This labor requirement includes the employment necessary in cutting the logs in the woods, transporting

them to the mill, sawing them into lumber, and drying and surfacing the lumber. Expressing this in terms of cubic contents, we find that the lumbermill labor requirement is 13.5 man-hours per standard cord of wood with bark, containing 77 cubic feet of peeled wood. In contrast, the corresponding labor requirements of the southern pulp industry is estimated at 17 man-hours per standard cord. This includes the cutting and transporting of the billets to the pulp mill and the manufacturing of the pulp and kraft paper or paper board. It is apparant, therefore, that the wood-pulp industry uses more labor per unit of wood consumed than does the pine-lumber industry.

The current market price of southern pine lumber (average all grades) is in the neighborhood of \$32 per M board feet. If we assume that average second-growth pine stumpage sells at \$3 per M board feet, this leaves \$29 as the value added through manufacture. Converting this to standard cords, this is approximately \$13 per cord. Assuming a stumpage price of 50 cents a standard cord for wood and an average current price for southern kraft paper at \$95 per short ton (f.o.b. mill) and further assuming 1.5 standard cords of wood and bark per ton of kraft paper, the value added to a standard cord of wood by converting it into this type of paper is \$62.83. Thus we

see that the value added to the cost of wood in the manufacturing of kraft paper is about five times as great as the value added the manufacture of pine lumber.

Comparing only the wood pulp and the lumber industries we find that for the same unit of volume the value of high-grade sawmill stumpage is greater than that of pulpwood stumpage, although paper manufacture requires a greater expenditure of labor and adds a greater value through manufacture. It is apparent, therefore, that each has advantages and that each can play an important part in industrial life of a community. Ordinarily these industries are not competing in the same market for the same kind of wood, but under pressure of need, pulp mills can cut the trees over a large area before they reach a size that makes them attractive to the lumber mill and thus force lumber mills out of the territory. Proper utilization of the dense, fast growing stands of pine can be obtained through a series of thinnings for pulpwood which will increase the growth of the remaining stand to be utilized later in the form of sawlogs. Cuttings of this kind in Europe (24) indicate that the volume produced in periodic thinnings needed to grow a stand of pine trees to an average d.b.h. of 15 inches is about equal to the volume removed in the final harvest of sawlog-size trees. This means, for example, that if a stand in the South treated after this fashion yields 12,000 board feet

per acre at the end of 50 years, it probably would have yielded during this period 25-30 cords of pulpwood per acre in thinnings.

Furthermore, in all stands there are defective, crooked, and partially rotten trees that ought to be cut and replaced by thrifty seedlings. As a rule these defectives can be used as pulpwood with resulting improvement to the growing condition of the stand. In addition, generally some part of the tops of trees cut for sawlogs can be utilized for pulpwood.

The sawlog industry is probably generally the most important enterprise utilizing the pine forests of the South, but there are other industries which also are important, and these too must be considered in any plan for the proper integration of forest industries. Of these, the major ones may be listed as the naval stores, poles and piling, and railroad ties, industries.

The naval stores region east of the Mississippi River covers a total land area of 50 million acres of which slightly more than 36 million acres, 72 percent, is classed as productive forest land. Table II (26) presents data showing production of certain forest products in 1934 with an estimate of the value based on 1936 prices. According to these data the gross income from sale of naval stores, about 27 million dollars, is 49 percent of the total

Table II

Current volume and value of forest products
of the active naval stores region

Forest product	Unit of Measure	Production in 1934	1936 price per unit	Value of 1934 production using 1936 prices.	Proportion of total value	Estimated stumpage value <u>5/</u>	Proportion of total estimated stumpage
					Percent		Percent
Naval stores	Unit <u>1/</u>	<u>3/</u> 535,161	<u>4/</u> \$49.85	\$26,677,776	49	\$5,335,555	44
Pine lumber	M. bd.ft.	1,039,340	23.00	23,904,820	44	5,976,205	50
Pulpwood	Cord <u>2/</u>	437,000	4.00	1,748,000	3	349,600	3
Poles and piling	Lineal feet	17,989,000	.05	899,450	2	269,835	2
Ties	Piece	2,008,000	.40	803,200	2	160,640	1
					\$54,033,246	100	\$12,091,835 100

- 1/ 1 barrel (50-gallon) of turpentine and 3 1/3 barrels of rosin
2/ Standard cord (123 cu. ft.).
3/ For naval stores season 1934-1935 (year ending March 31, 1935).
4/ Season average price April-September, 1936, inclusive.
5/ Based on: 20 percent of 1936 price for naval stores
25 percent of 1936 price for lumber
20 percent of 1936 price for pulpwood
30 percent of 1936 price for poles and piling
20 percent of 1936 price for ties.

income from forest products listed. Pine lumber production ranks second with an estimated value of 44 percent of the total. The other items listed; namely, pulpwood, poles and piling, and railroad ties are of lesser importance, ranking in the order named. The value of pulpwood is 3 percent of the total and about equals the value of the other minor products.

These volumes and gross values of finished forest products do not answer the question of the relative ranking of forest products in terms of income to the landowner in the form of stumpage. The latter part of Table II shows the relative stumpage income. From the total estimated stumpage income in 1934 of about 12 million dollars, lumber leads with 6 million dollars (50 percent), naval stores is second with 5 $\frac{1}{3}$ million dollars (44 percent), pulpwood a poor third with $\frac{1}{3}$ million dollars (3 percent), while poles and piling and ties account for a little less than $\frac{1}{2}$ million dollars between them (2 and 1 percent of the total respectively).

Proper handling of the timber resources in the naval stores region is as imperative as it is in the sawlog stands of the South. Improper utilization in the form of pulpwood cutting in immature stands will be disastrous to continued reproduction of the more important forest products. The following diagram, Figure 2 (13), illustrates the possible management schemes for longleaf or slash pine.

Although not complete, it portrays a prominent place for pulpwood combined with other products.

The primary utilization of a stand of long leaf or slash pine may be for naval stores, logs, piling and poles, or for pulpwood. If the primary utilization is for naval stores, the worked-out timber may later be removed in the form of logs, poles and piling, or pulpwood, or a combination of these. Pulpwood may also be salvaged from tops of trees cut for logs or for piling.

It is reasonable to believe that pulpwood in the future will rank higher with respect to lumber and naval stores than at present. However, it is unlikely that the supremacy of the latter will ever be seriously challenged by pulpwood. Figure 2 indicates a subordinate place for pulpwood in most phases of management of pine stands in the naval stores region. It is safe to assume that only a serious disruption of the present balance of prices of timber, naval stores, pulpwood, ties and poles and piling will bring pulpwood into a dominate position with the two major forest products, of the region.

In summing up, we may readily see that it is definitely possible to integrate the pulp and paper industry with the other industries already existing. On the other hand, there is the possibility that some pulp mills will cut thrifty, rapidly-growing, young timber when it is about

Figure 2

Illustration of place of pulpwood in the management of
longleaf and slash pine.

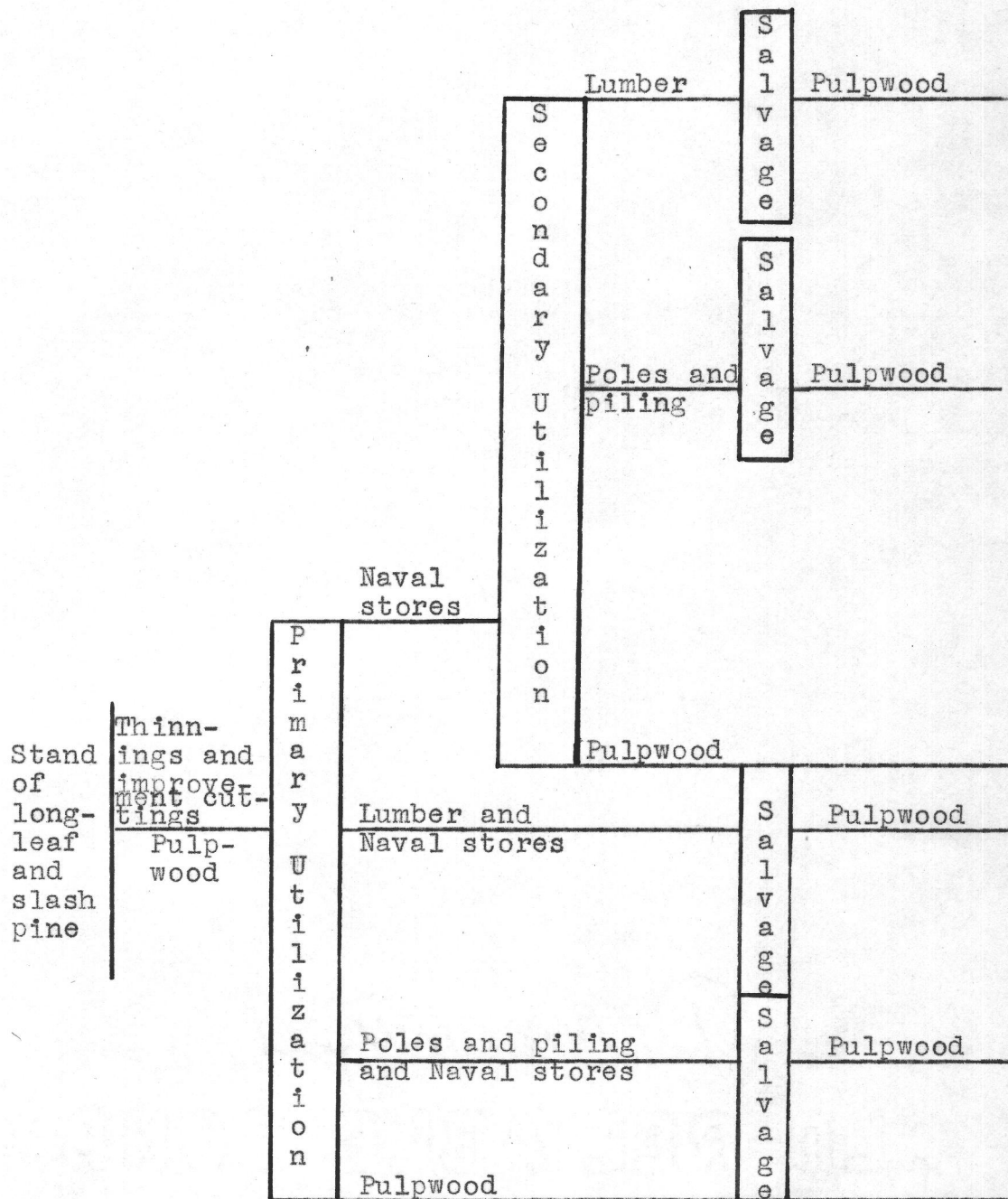


PLATE I

PULPWOOD PRODUCTION

- A. Turpentined stand of longleaf pine after being cut for pulpwood. The timber was cupped when 5-7 inches in diameter. Cupped trees and also uncupped trees to a small diameter limit were removed. (F.S. Neg. 303892)
- B. Pulpwood cutting in 60-year old longleaf pine. Only trees worked out for turpentine have been cut. The residual stand is left for further growth and eventual turpentine. Note the pens of pulpwood. (F.S. Neg. 303883.)
- C. Before the pulpwood was cut the area in this picture was covered by a stand of shortleaf and loblolly pine; the ownership boundary is marked by the line of cutting. One side is clear cut and the other left untouched. (F.S. Neg. 204762.)
- D. Pulpwood cutters in the naval stores region. Both white and colored men work at pulpwood cutting. (F.S. Neg. 303874.)
- E. Most kraft paper mills accept turpentined butts if all charred wood and metal have been removed. Some landowners require that all these butts be salvaged. If fire has not charred the turpentined faces only ingrown bark and nails need be removed. (F.S. Neg. 303881.)

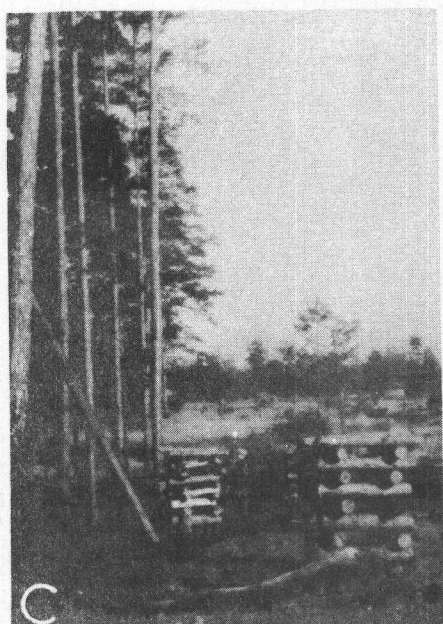
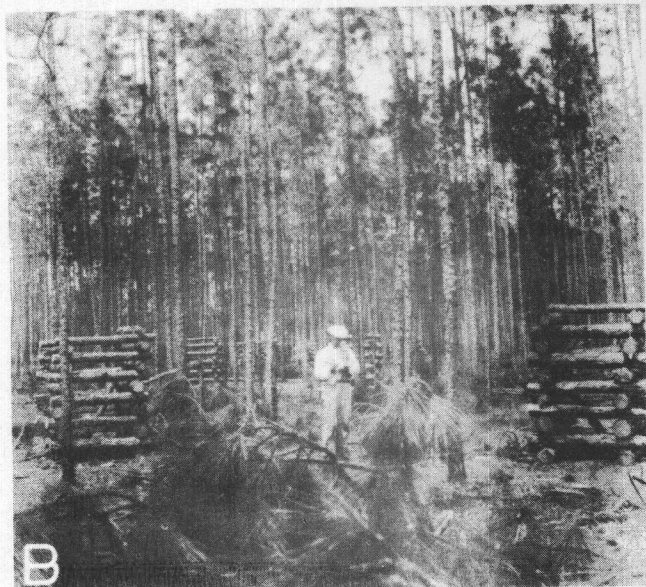
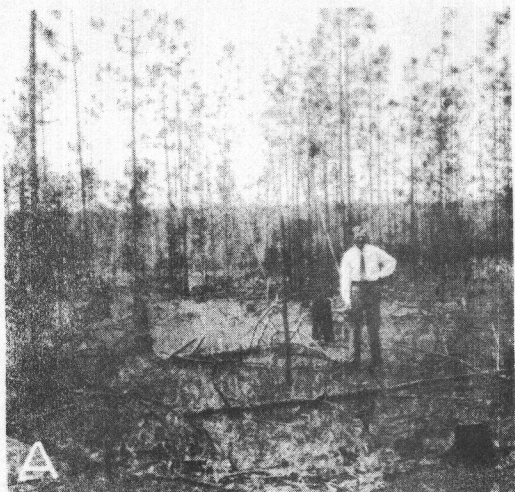


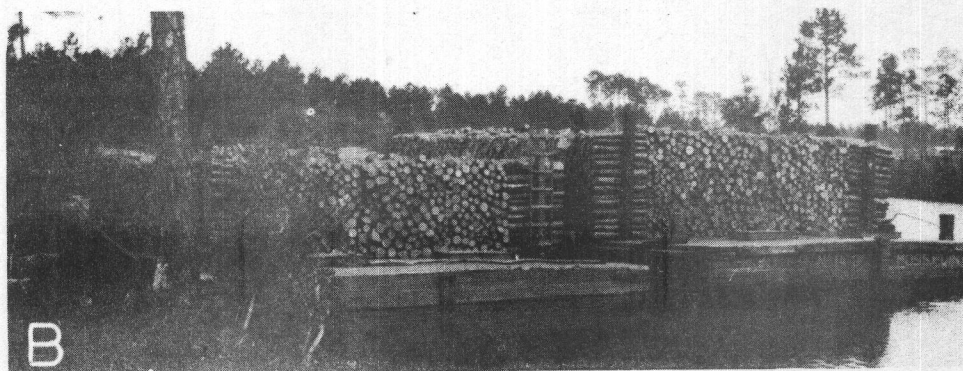
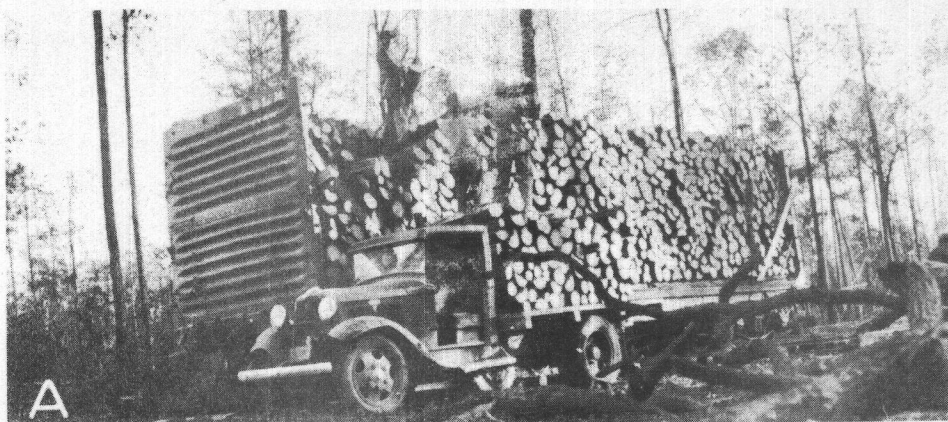
PLATE II

PULPWOOD TRANSPORTATION

- A. Loading car from a pulpwood truck in the shortleaf-loblolly-pine hardwood type. Pulpwood production is largely performed by hand labor. (F.S. Neg. 303634.)
- B. Loaded barges ready for the tow to the pulpmill. A large proportion of the wood supplied pulpmills in the naval stores region arrives by barge. (F.S. Neg. 303463.)

SCENES OF POLE PRODUCTION AND
LOGGING IN THE NAVAL STORES REGION

- C. Peeling poles in a longleaf pine stand. Poles, logs, and pulpwood, in the order named, are removed from his timber land by this operator. (F.S. Neg. 332735.)
- D. Loading small poles with a "cross-haul." The rejected poles, in bottom of the load, are taken to the sawmill unpeeled for conversion into lumber. (F.S. Neg. 332733.)
- E. Logs as long as 80 feet are hauled by trucks and trailers in the naval stores region. The trucks can travel through most of the area with a minimum of road preparation. (F.S. Neg. 332731.)



to enter its most productive stage, thus preventing its development into the high quality material upon which other industries must depend.

CONSERVATION

One of the greatest problems facing the South today is that of conserving its extensive timber resources. For an excellent example of poor management practice the South may review the history of the lumber industry in the northeast, where successive waves of unrestricted cutting have reduced the forest growing stock to a point where those industries that remain are having difficulty in finding sufficient amounts of suitable timber to continue operations. If the South is to maintain its pulpwood industry on a permanent basis, rather than have it degenerate into another migratory, exploiting industry, causing local booms for a few years and then moving out of stripped communities, it must place its forest resources on a permanent sustained yield basis.

Figures indicate that the pulp and paper industry has moved into the South with such a large capital investment that it will be impossible to write off that investment in fifteen or twenty years and then to abandon the plants and communities dependent upon them, and secondly, that the industry must look to other sources than its own

presently owned lands for its pulpwood supplies, which will create an interest in adjoining forest lands. In conjunction with the latter point, a recent statement (15) estimated the area acquired by pulp mills in the South at about 3,300,000 acres with an estimated stand of 14,000,000 cords. These figures show that, if the forest areas owned or controlled by the pulp and paper industry were the sole source of supply for its mills, such lands would provide only sufficient raw material for slightly over three years operation, or if scientifically handled, it would provide an annual supply of wood less than half the amount required. It is obvious the industry has entered the South with plans to stay and, in order to carry out such plans, one of the prime requisites is a permanent supply of pulpwood which must of necessity come not only from industry-owned lands, but from lands other lands as well, and at reasonably low prices.

The completion of the Forest Survey in the South, and the fact that other industries, as well as the pulpwood industry, are competing over much of the same area have somewhat darkened the bright prospects for the new expansion of the pulp and paper industry in the South. The industry has awakened to the fact that if it is to enjoy a permanent and profitable existence conservation

of the timber resources is essential. The industry has adopted important measures to insure scientific and sensible means of managing its own forest areas as well as other lands from which pulpwood supplies may be drawn.

The first step toward conservation measures was taken in April, 1937 when several representatives of southern pulp and paper mills gathered in an impromptu meeting to discuss the rapid expansion of the industry in the South, and the effect such expansion might have on pulpwood supplies. This meeting resulted in a decision to call the southern industry together in New Orleans, May 3rd, to determine what steps could be taken to conserve the raw material so important to mill operations. The following announcement of the meeting will indicate the purpose for its being called (15).

"The object of this meeting will be to discuss details and formulate a program of forest utilization and conservation which will assure a continuing supply of raw material and to which all can subscribe. The general program to be considered will include three principal subjects:

1. The importance of all pulpwood operations being conducted under such rules of forest practice as will leave the land in the best productive state, and which at the same time will be economically sound and workable

for the respective sections into which the Southern Region may be divided. This statement of importance not only applies to the lands directly under control and supervision of the ultimate consumer of the pulpwood, but also to all lands from which such consumers obtain their supplies.

2. Conceding the importance of such forest practices over southern pulpwood lands, what means can be employed to effectuate the ends desired?

3. What steps can be taken to assure adequate fire protection on the areas involved in order to preserve the accomplishments obtained."

The New Orleans meeting was well attended by representatives of the pulpwood, pulp and paper industries, and of the public, by various State Foresters and by officials of the United States Forest Service. This meeting resulted in an adoption of the following set of principles:

1. It is agreed that all land, including non-company land, must be cut over in a manner which will maintain and build up the forest growing stock.

2. It is agreed that each pulp mill operator will employ the necessary qualified personnel to insure proper compliance with agreement number one.

3. It is agreed that the southern pulpwood consumers

shall be divided into working groups for the purpose of preparing proper regional rules of forest practice.

4. It is agreed that a working committee shall be appointed for each regional group in co-operation with federal and state agencies to formulate and place into effect the cutting procedure for each group in order to carry out agreement number 1.

5. It is agreed to satisfy to the fullest practicable extent, the requirements of each mill from improvement cuttings, worked-out turpentine timber, and salvage from sawtimber cuttings.

6. The industry recognizes that federal and state forest fire protective organizations, as now constituted, are inadequate, and urges their extension and pledges the industry's co-operation in securing more effective forest fire control.

7. The industry agrees to secure insofar as possible the full compliance of its wood producers with the procedure of forest practice as established for each group.

In accordance with agreement number three, the South was divided into four working groups (33), representing regions having approximately the same physical and economic conditions. They are as follows: 1. Tennessee, West Virginia, Maryland, Virginia, and North Carolina;

2. South Carolina, Georgia, and northeastern Florida;
3. West Florida, Alabama, Mississippi, and southeast Louisiana;
4. Louisiana west of the Mississippi River, Texas and Arkansas.

Due to the vast differences existing in the Southern pine belt from the State of Texas to the Atlantic, it is a difficult task to set up region-wide rules applicable to all sections of the South. The four groups therefore established instructions on how to cut the second-growth timber in their respective areas. At Jacksonville on December 6, 1937 the pulpwood industry, State Foresters and United State Forest Service members met to review the cutting instructions of the four groups, and as a result cutting rules were accepted for all four regions and are as follows (27).

CUTTING AND CONSERVATION RULES, SOUTHERN PINE
PULPWOOD INDUSTRY

Approved at a Meeting of the Coordinating Committee Held
In Jacksonville December 6, 1937.

1. Fire Protection:

We recognize the necessity of complete and absolute fire protection as a fundamental for the success of forest conservation in this region; therefore, the companies concerned will give full cooperation to State and Federal

fire protection agencies, including the working for adequate Federal and State funds for fire control work.

2. Growing stock:

Loblolly and Short Leaf Cutting Practice:

a. Selective or Partial Cutting:

We recognize that partial cutting designed to maintain and improve the forest growing stock is highly desirable practice and will use every practicable means of securing the adoption of such practice.

b. As a first step in carrying out his policy, no trees under 8 inches in diameter at stump (12" above the ground) will be cut, except for stand improvement purposes: (Note: Stand improvement consists of the removal of defective or damaged trees and necessary thinning for improved growth.)

c. If partial cutting is not practiced, not less than four seed trees per acre, well distributed over the area, will be left unless the area is already well stocked with young growth. A seed tree is defined as a thrifty tree with a well formed crown and not less than 8 inches in diameter, d.b.h.

Intensive Naval Stores Area (Turpentine Pine) Cutting Practice:

- a. Cut worked out turpentine trees and non-turpentine pines.
- b. Cut no round or one-faced turpentine trees, except such as are defective or where thinnings are needed.
- c. Thinnings may be made so as to leave not less than 50 trees per acre 6" to 9" at the stump, outside of bark, as well distributed as possible.
- d. At least six thrifty seed trees per acre shall be left unless sufficiently young growth (150 trees 6 to 8 feet high) are present.
- e. Clear cutting on restricted areas may be done with the approval of the State Forester. This applies only to long leaf and slash pine.

3. Utilization:

Defective, badly formed or damaged trees, worked-out turpentine trees and tops from sawtimber operation will be utilized to the fullest practicable extent.

4. Enforcement:

Each company represented agrees to secure, insofar as possible full compliance of its wood producers with the procedure of forest practice established.

5. Cooperation with State Foresters:

We will work out on the ground with the State Forester such practices as may fit the local situations.

6. Educational and Demonstration Work:

We recognize that the permanent success of our efforts to promote good cutting practices on non-company lands will depend on changing the present attitude of many such landowners, and we urge that the Federal and State forestry agencies undertake an enlarged campaign of education and demonstration.

7. Future Meetings:

Future meetings of the Southern Region shall be held at the discretion of the Coordinating Committee.

8. Period of Cutting:

No pulpwood cuttings shall be made over the same area more often than once in five years, except to salvage damaged material.

Article 8 of the above rules was adopted by Group 4 only, this group consisting of Texas, Louisiana and Arkansas.

The pulpwood industry is to be complimented upon taking the initiative in establishing cutting procedure to maintain a permanent timber crop as well as a permanent pulpwood industry. These rules are by no means final and are established as a minimum requirement, and in the next few years the rules will be changed for improvement in accordance to the practices and results that will be obtained and checked throughout the area.

The main problem at the present time is not in connection with consumer-owned lands, which are being carefully managed to conserve and build up the growing stock, but in outside acreage from which present supplies are being obtained. The present method of purchase on these lands is a particular evil. The mills do not buy directly from the owners, but through contractors who buy directly from the farmers or landowners at the lowest price obtainable. The danger lies in the fact that many contractors are not interested in sustained yields from the forests and often even encourage clear cutting of stands for pulpwood.

Every consumer should make all possible efforts to obtain the compliance of his producers with the rules which have been adopted. One consumer who handles his contracts regardless of the cutting methods involved can upset the entire picture by creating competition which neighbors would have to meet by similarly disregarding any rules of forest practice. It will also be necessary that large contractors place themselves on the side of conservation with the consumers and use their influence and pressure in bringing their small producers into line. This must be done because in some cases many smaller producers have no contact with the consumer except through the contractor.

There is another factor to consider if conservation practices are to prove successful; namely, that there is the pole industry, the piling industry, the railroad tie industry, the naval stores, and other industries--all dependent for their existence on the use of the same forests. The biggest problem in this instance will be to control the thousands of small portable sawmills which operate in the South, and, unless some way is found, the trees saved from the pulpwood manufacturer may fall before that of the lumber operator. In drafting the rules of forest practice, recognition was given to the requirements of the naval stores and other industries, and the necessity for their cooperation with the pulpwood industry in establishing practicable conservation policies.

Probably the greatest key to success in any conservation movement undertaken in this region is to secure the cooperation of the landowner himself. He must be sold on a plan which will call for conservative cutting, accompanied perhaps by a little less immediate income, but which in the long run will be more profitable to him. Education of the landowner in the conservation policies that are now in effect will pave the way for future success in conserving the South's resources.

WHAT THE INDUSTRY MEANS TO THE SOUTH

So much has the South offered the paper industry. What is the industry giving in return? It is obvious that this development of the pulp and paper industry offers distinct advantages to the South. First of all, a large amount of money is being spent and has been spent on new sites and additions to old mills. Construction under way in 1937 and 1938 totaled sixty million dollars. Another forty million dollars were spent for labor improvements, work villages, and land purchases. It is estimated that the thirty-eight plants in the South totals approximately \$200,000,000 of capital, most of which came from outside the region, and has been distributed in each of the southern states.

The South has no greater problem than that of creating profitable employment for several million people who can never afford a decent American standard of living until their incomes are increased. The development of the paper industry now promises much. The 39,000 men who will be employed by the industry will, in a large measure, be drawn from the southern states, and it is roughly estimated that the payroll of these mills will total not less than \$25,000,000 a year.

Another advantage will be the increased business for railroads and other transportation systems. No estimate

is available as to the amount of this increase, but the transportation of raw materials to the mills and of finished products from the mills will provide considerable additional business for the South's carriers.

Still another advantage lies in the increase of taxable assets. Several states have enacted legislation granting temporary tax exemptions to new pulp mills within their borders. While the \$200,000,000 invested in plants has added that much to the taxable wealth of the South, the increase actually will be more than this figure, since the products of the industry are subject to taxation, considerable land which has been off the tax rolls through delinquency has been restored to the rolls, and the mills themselves have acquired a certain acreage of land to supply a portion of their wood requirements.

Another factor is that it offers a new crop to the farmer. Corwood can be cut the year around during the slack seasons on the farm and can be converted into cash, which will do much to relieve the situation in a region which in the past has been a one-crop district. This will do much in the way of removing of marginal lands from cultivation.

The advantages listed above will greatly benefit the general public. The owner of southern timberland stands

will profit if proper care is exercised in the management of the timber stands. The pulp industry offers an opportunity to dispose of low-grade material for which no other profitable outlet is available. This material includes limby, crooked, or defective trees that may be taken out in improvement cuttings, suppressed trees and others removed as thinnings, the upper portions of trees cut in operations, and worked-out turpentine trees. These measures will make stand improvement profitable and will provide a basis for more complete integrated utilization.

The South has much to offer the paper industry and in return will receive a great number of direct as well as indirect benefits. Probably in no other region are factors so favorable for the development of the paper industry as in the South. The outlook is indeed bright for the South.

CONCLUSION

The writer, in compiling this paper, has attempted to express the advantages and disadvantages of the future development of the pulp and paper industry in the southern States. Also, various problems which will be encountered in its development have been enlarged upon. In conclusion, there are several points which must be

brought out if the South is to enjoy a prosperous future in connection with the expanding paper industry.

The problem is essentially in the hands of the public and of the industry itself. If the movement is to be a success it will be through proper cooperation with each other, with other agencies, and with other industries.

The public must take the responsibility of enlarging the area of publicly owned forest lands and to devote part of such lands to the growing of pulpwood. In cooperation with private owners it must extend and improve protection against fire, insects, and disease. It must solve the question of forest taxation, which at the present time discourages private owners to grow their own timber supplies. It must encourage proper forms of timber insurance. It must aid in forest-products research into pulpwood and pulping processes. It must cooperate with forest industries in extending and enlarging upon present knowledge of methods of reforestation, timber growing, and protection. Lastly, more accurate information must be obtained on timber supplies, growth, requirements, and available forest lands. To obtain this data the public and the industries must cooperate.

The responsibility of the industry is mainly in planning and providing for itself ample supplies of raw materials to meet its own future requirements. Also,

the industry must extend cooperation in the lines indicated-forest protection, forest-products and investigations, research at forest experiment stations, and a thorough timber survey. It must make a systematic effort to apply the results of research as rapidly as they become available. Finally, the pulp and paper industry should assume the leadership in timber growing on its own forest lands and those upon which it is dependent for pulpwood supplies.

The combined efforts of the public and all forest industries, with the help of the federal and state agencies, will make the pulp and paper industry a credit to the South and to itself.

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