

**A MARKET STUDY
of
THE SOUTHEAST UNITED STATES**

WP-OI-95.08

Working Paper

CANADA-BRITISH COLUMBIA PARTNERSHIP AGREEMENT ON FOREST RESOURCE DEVELOPMENT: FRDA II

Canada 

BC 

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of
THE SOUTHEAST UNITED STATES**

WP-OI-95.08

by

**The Western Canadian Wood Machinery
&
Services Export Association**

This study was prepared as part of the Opportunity Identification Program (Program 5), Canada-British Columbia Partnership Agreement on Forest Resource Development: FRDA II.

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Preamble

This report is part of a larger project undertaken by the members of the Western Canadian Wood Machinery and Services Export Association in cooperation with FRDA. The objectives of the project were:

.. to assess the potential for exports of wood machinery and engineering products into select jurisdictions with either emerging or an established forest products industry; and

.. to develop a sound market development plan for those jurisdictions where the export opportunities warranted.

The report was initially released within the Association and has led to considerable market development effort and some very positive export success.

Acknowledgment

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Dr. Bill Wilson, Canadian Forest Service; and

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Disclaimer

The views expressed in this report do not necessarily represent those of the Canadian Forest Service or the B.C. Ministry of Forests.

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1.0 EXECUTIVE BRIEF

Southeast Forestry Sector

The Southeast forestry sector is huge. The total softwood and hardwood resource totals 74 million hectares. Softwood Southern Yellow Pine forests alone total 30 million hectares. In comparison, this is about 9 times the cumulative amount of pine plantations in Chile, New Zealand and Australia. The Southeast enjoys the fourth fastest growing pine resource in the world.

Harvest levels

The current softwood harvest is 150 million cubic metres. This is 10 times the current harvest levels in Chile or New Zealand. Hardwood harvests add 82 million cubic metres to the total Southeast harvest.

Wood Products Manufacturing

The Southeast produces slightly more softwood lumber than the sawmill sector in British Columbia, a significant measure of the scope of the market size. At 35 million cubic metres, this lumber production level is approximately 10 times the production of Chile or New Zealand.

Lumber production is projected to continue its growth. Industry experts predict that this growth will result from improved recoveries at the mill level, not from increased log supply. Log recovery technology, particularly scanning and optimization, is the trend in the sector.

Overshadowed by the growth in softwood lumber production is a significant hardwood sector. There are more hardwood sawmills in the Southeast than there are softwood mills, although they generally have lower production levels. Nevertheless, the hardwood sector is a significant market opportunity for equipment suppliers.

There are 9 new OSB facilities planned for this region. Conservatively, these mills will require a total investment in the range of U.S. \$400 million. Despite the predatory role of OSB, the plywood sector is also expanding.

Market Opportunities

There are defined niche market opportunities for Canadian consulting and engineering companies. As the market expands, the demand for engineering expertise from outside the local market is also growing.

The harvesting sector is typified as being under mechanized. Increasing labor costs will play a major role in improving the economies of increased mechanization. Environmental concerns will strengthen the market applications for specialized equipment and attachments.

The wood products sector has enormous potential. The hot term in the sawmill sector is "increased recoveries", yet it is estimated only 30% of the mills in the Southeast have scanning and optimization technology. Green field projects, plant modernizations and equipment upgrades will result from the improving profitability of the sawmill sector.

Growth in OSB facilities is staggering. Of the 16 mills planned for the U.S., 9 will be in the Southeast.

Total anticipated capital investment in the Southeast wood products sector approximates U.S. \$600 - 700 million over the next three years. This projection does not include annual mill maintenance budgets.

Competition

Although the competition is well entrenched, there are defined market opportunities for Canadian suppliers in the Southeast. To be successful, Canadian companies must be prepared to compete on the same ground as the existing market competition. There are a number of Canadian success stories in this market, and invariably the successes were founded on high quality products and a strong Southeast operation.

Approach to the Market

With the exception of those companies that enjoy a niche market product, companies that want to compete in the Southeast market must do so through a local operation. Feedback from the market was conclusive. If you want to compete, you have to play on the same footing as the competition. Companies will have to address the following factors.

- Focus on the specific equipment requirements unique to the processing of Southern Yellow Pine. The Southeast demands equipment that is durable, easy to operate, and easy to maintain.
- A local operation is essential. Companies must be perceived as local market players, and they must be able to market as well as local competitors.
- Service and support are key to long term survival in the market. There are case histories of reputable Southeast companies that have not maintained this effort, and as a result have lost their market share.
- You must be prepared to make a concentrated commitment to the market. Your operation must convince the market that Canadians are not opportunistic sellers.

2.0 SOUTHEAST UNITED STATES OVERVIEW

The "Southeast" is a term used to define a geographic region of the United States. Depending on who you talk too, the States included in this region will vary.

This report will repeatedly use this term. The States included therein were defined by WCWMSEA for the purpose of its market study, and to facilitate the preparation of this report. This is not an electoral definition, or a geographic definition used by any American government departments.

For the purposes of this report, the Southeast will include the following eleven States: **Arkansas, Alabama, Florida (northern), Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Texas (eastern), Tennessee, and Virginia.**

2.1 Political System

The United States is defined as a federal republic of 50 states. The government structure is divided into three branches, namely legislative, executive and judicial.

The legislative structure is made up by the elected officials from each State. The United States has a two party system, so all the elected members of the legislative assembly are from the Democratic or Republican parties. Each State elects two Senators. The remaining house representatives are elected from each State based on its population.

The executive branch, which comes under the direct control of the President, is responsible for United States laws and foreign policy. Departments of the Civil Service are the vehicles for delivering these laws and policies. The head of each department is appointed and collectively these department heads are known as the Cabinet. Also included in the executive branch are independent groups such as the Securities and Exchange Commission.

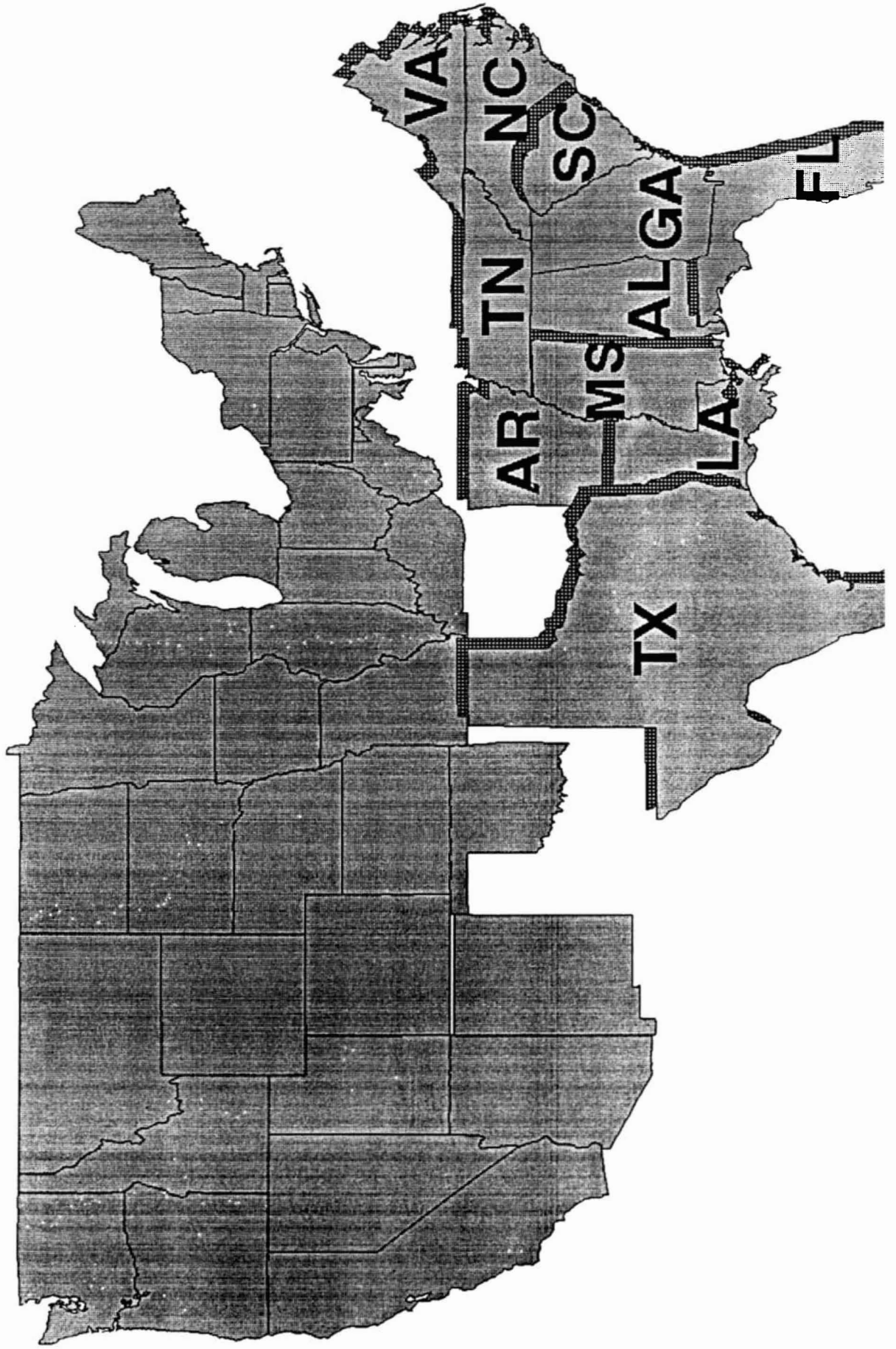
The judicial branch is the system of courts in the country. The U.S. legal system is based in common law, adopted from England. However, the legal system has expanded beyond common law through the interpretation of Federal and State constitutions. In every case, Federal law supersedes State law. With the exception of Louisiana, whose legal system is based on the French civil system, all the State legal systems are based in common law.

The individual State governments follow the same template as the federal system. Of note, each State may have the power to enact its own laws in areas that are not superseded by federal constitution.

2.2 Geography

The United States is the fourth largest country in the world. Geographically, for purposes of dividing the country into areas with similar geographic and climatic conditions, regional sub divisions have been established. These divisions include the Northeast, the Southeast, the Midwest, the Southwest, and the Pacific Northwest.

South East US Forestry Region



Geographically, the northern half of the continental United States experiences climatic conditions similar to Canada, with defined seasonal differences including a snowy winter. The Southeast and the Southwest regions enjoy a warmer annual climate marked by warmer summer conditions and milder winter conditions, typically without snow.

This climatic tendency is significant in the Southeast, where conditions are conducive to the cultivation and growth of Southern Yellow Pine as a commercial forestry species.

Another important geographical consideration is the physical size of the Southeast region of the United States. The geographical size of the area may create the need for more than one marketing structure to service the region effectively.

This point is compounded by the fact there are subtle parochial cultural differences within the sub-regions of the Southeast. These subtleties are the basis for generations of business dealings, and an established framework for doing business today. The parochial nature of the sub-regions must be considered when establishing a marketing structure.

2.3 Population

The 1993 population of the U.S. was approximately 257 million people. Indicative of the North American pattern of migration to warmer climates, over one-half of the country's population lives in its southern and western regions, which include the States in the Southeast.

3.0 SOUTHEAST UNITED STATES BUSINESS ENVIRONMENT

It is extremely difficult to segregate the economic trends of the Southeast region from those for the entire country. Therefore, the following review is reflective of the trends for the whole country. Regional trends will be noted where possible.

3.1 Economic Trends

The American economy is based on a free enterprise system. In general terms, the various State governments do not interfere with the free enterprise system, nor do they take a direct involvement in the production of goods.

As a result of its abundant supply of resources and labor, the country's standard of living considered to be high. Unemployment is in the range of 6%, and inflation is in the range of 3% per annum, a dramatic drop from the inflationary period of the early 1980's. In 1990, the median family income was U.S. \$30,000.

Of note, the economy of the United States has shifted from production to service industries. The employment ratio of service industry workers to production workers is 3:1. The economy of the country is consumer driven, with about 66% of the total output of goods and services purchased by individuals, the remainder by business and government.

3.2 Currency

Like Canada, the United States monetary unit is the dollar, which is also divided into 100 cents. At the time this report was prepared, a United States dollar was worth the equivalent of 1.4 Canadian dollars.

3.3 Import Duties

The United States is a member of the General Agreement on Tariffs and Trade (GATT). Of notable importance, the United States and Canada entered the North American Free Trade Agreement (NAFTA) in 1991.

Under the provisions of NAFTA, forestry equipment manufactured in Canada enters the United States duty free. Duty paid on parts or materials that were imported into Canada and incorporated into equipment subsequently exported to the United States, may be reimbursed to the payor under the provisions of the Duty Drawback program.

3.4 Taxation

The taxation system of United States is extremely complicated and beyond the scope of this report. It is strongly recommended that a company considering the establishment of a U.S. operation enlist the services of a reputable legal and/or accounting entity to ensure all State and Federal considerations are examined.

3.5 Business Practices

Business practices in the United States are essentially identical to their counterparts in Canada. The minor differences in the American legal and financial systems will not present a problem for Canadian companies operating in this market.

- The Southeast region covers 11 states, and a huge geographical area. Prospective marketers will find that this geographic area is a composite of sub regions, each with its own unique set of parochial social characteristics. Marketers should be aware of the importance of regional representation to address these market factors.
- In general terms, business practices in the Southeast are conducive to Canadian participation.
- A common dollar based currency is used. The exchange rate, now in Canada's favor as an exporter, is a major advantage to forestry equipment suppliers.
- Social customs and language are identical to Canadian practices.
- Transportation to this market is inexpensive as compared to transportation costs to overseas markets, and travel time is not a significant factor.

3.6 Foreign Investment

In general terms, there is an open door policy to foreign investment in the United States. Foreign capital is treated as equitably as domestic capital. With minor exceptions, there are few restrictions to foreign ownership of American corporations. There are no restrictions on profit repatriation, nor are there any foreign exchange controls.

Although tax policy and labor have remained neutral toward foreign investment, industry is not always supportive of the concept. Certain industries have lobbied to protect their industries by way of trade barriers and foreign investment restrictions. WCWMSEA's market study did not uncover this sensitivity in the forestry sector.

Manufacturers contemplating the investment in a local facility should check with local authorities, as incentives are available for the establishment of operations in certain regions. These incentives are typically in the form of tax holidays.

3.7 Labor

Skilled work force is typically readily available throughout the United States. Unions are common but membership has fallen significantly. Union membership has traditionally been highest in the manufacturing sector, but this percentage as a total of all unionized workers in the United States has dropped. This is a result of two factors, the growth of the service sector, and the reducing ability of manufacturing labor to endure the economic impact of prolonged strikes.

Working conditions are dictated by the Fair Labor Standards Act, which covers minimum wage, overtime, child labor, etc. The Occupational Safety and Health Act is a federal policy assuring safe working conditions.

Companies considering the employ of Americans should become familiar with social security requirements, unemployment insurance requirements, and workers compensation. It should be noted that as a percentage of total manufacturing cost, payroll costs are higher in the United States than in many other developed industrial countries.

4.0 FORESTRY SECTOR OVERVIEW

The reduction in the allowable cut in the Pacific Northwest has been a major catalyst for the forestry sector in the Southeast United States. The Clinton Administration has planned significant reductions in the Northwest cut, which has adversely effected the Western U.S. wood products sector. The decrease in Western U.S. wood products manufacture is being absorbed by Southeast and Western Canadian producers.

Fibre supply cutbacks in the Northwest have resulted in a significant number of mill closures in the region. As a result, Southeast sawmills and plywood mills are now the biggest suppliers in the United States, and their percentage of national production will continue to grow as these mills continue to absorb the production lost in the Northwest. A corresponding growth in wood prices has compounded the growth potential for the Southeast forestry sector.

These market factors bode extremely positively for the Southeast region. Yet, many participants in the forestry sector believe that high wood prices, the result of a reducing national log supply, may result in the premature over cutting of private timber in the Southeast. As private forest is a significant part of the regions timber reserves, the concern is that this over cutting will stagnate the long term growth potential of the sector.

Interviews during WCWMSEA's market study determined that market participants believe that there will be a trend to smaller logs, the result of several factors. One factor is the national shortage of logs. Southeast timber is expected to replace Northwest timber in the national supply. This may result in a premature cutting of timber to capitalize on wood prices.

A second factor is the belief of private land owners that laws protecting endangered species and wetlands are inevitable, so the time to sell is now. This may have a significant impact on the region, as 90% of the forest resource is owned by private concerns. Only 10% of the industrial forest is owned by the government.

4.1 Forestry Sector Conversion Factors

The measuring tools used by the Southeast forestry sector differ from the measures used in other international markets studied by WCWMSEA. This report will use the measures most common in the Southeast. Conversions into factors cited in previous market reports are made for purposes of illustration. Conversion calculations are included in Appendix 1 of this report for the readers convenience.

The following is an overview of the different reporting measures used in the Southeast.

- Forest holdings are commonly stated in **acres**, as compared to hectares.
- Timber on the truck or in the mill yard is measured in **cunits**, as compared to cubic metres.
- Lumber production is measured in **board feet**, as compared to cubic metres.

- Board feet of **solid logs** and board feet of **sawn lumber** are different. Each of these measures has a different cubic metre equivalent. Appendix 1 notes this difference.

4.2 Forest Resource

The Southeast region is estimated to have approximately 200 million acres (81 million hectares) of timberland. This total is estimated to represent 40% of the total timberland in the United States.

Of the total Southeast timberland, it is estimated that softwood timber stands total approximate 2.9 billion cubic metres, representing about 24% of United States softwood stands. Hardwood stands are estimated at 4.2 billion cubic metres, representing 44% of the U.S. total.

The scope of the forest resource in the Southeast must be emphasized. To date, WCWMSEA has conducted market studies in Chile, New Zealand and Australia. The emerging plantation reserves of these countries are considered significant, especially given the impact they will have on the growth of their respective forestry sectors.

As noted in Table 1, Southeast softwood forest is calculated at 30 million hectares. As illustrated below, this forest is estimated to be about **9 times as large as the reserves of the three above mentioned countries in total**. This is an incredible consideration.

Country	Millions of Hectares
Southeast United States	30
Chile	1.4
New Zealand	1.2
Australia	0.9

Hardwood reserves add an additional 44 million hectares to the forest reserve, and the hardwood wood products sector is a significant market opportunity in the Southeast.

4.2.1 Softwood Timber

Southeast softwood timber is made up entirely of **Southern Yellow Pine**, which will be referred to as SYP in this report for the readers convenience. SYP is a commercial species that includes several pines with similar characteristics, including longleaf pine, shortleaf pine, loblolly pine, slash pine, and Virginia pine.

Softwood stands in the Southeast are estimated at 2.9 billion cubic metres, predominantly loblolly and slash pine. The SYP resource is a combination of plantations owned by industrial entities which are typically referred to as industrial forest; and timber owned by private interests, both plantation and natural stand.

TABLE 1

**COMMERCIAL FOREST LAND BREAKDOWN
by
OWNERSHIP AND STAND TYPE
HECTARES (IN MILLIONS)**

	SC	NC	GA	VA	FL	AL	MS	LA	TX	AR	TN	TOTAL
COMMERCIAL FOREST LAND	5.0	7.6	9.6	6.2	6.1	8.9	7.2	5.6	4.7	7.0	5.4	72.8
OWNERSHIP CATEGORY												
Non-Industrial Private Forest	3.6	5.8	6.5	4.70	2.9	6.4	5.2	3.6	2.8	4.0	4.3	49.8
Forest Industry	1.0	1.0	2.4	.7	2.2	1.9	1.6	1.5	1.5	1.8	.5	16.1
Public	.4	.8	.6	.8	1.0	.5	.4	.5	.3	1.3	.5	7.1
STAND TYPE												
Pine Plantation	1.1	.9	2.0	.5	1.6	1.4	1.1	.6	.5	.6	.2	10.5
Natural Pine	1.2	1.7	2.4	.9	1.4	1.5	1.2	1.4	1.3	2.4	.5	15.9
Oak Pine	.8	2.3	1.3	.7	.5	1.7	1.4	.8	1.0	---	.5	10.0
Upland Hardwood	1.0	2.9	2.4	4.0	.8	3.0	2.4	.9	1.4	3.0	3.8	25.6
Lowland Hardwood	1.0	1.1	1.5	.2	1.8	.9	.7	1.9	.6	1.1	.3	11.1

NOTES:

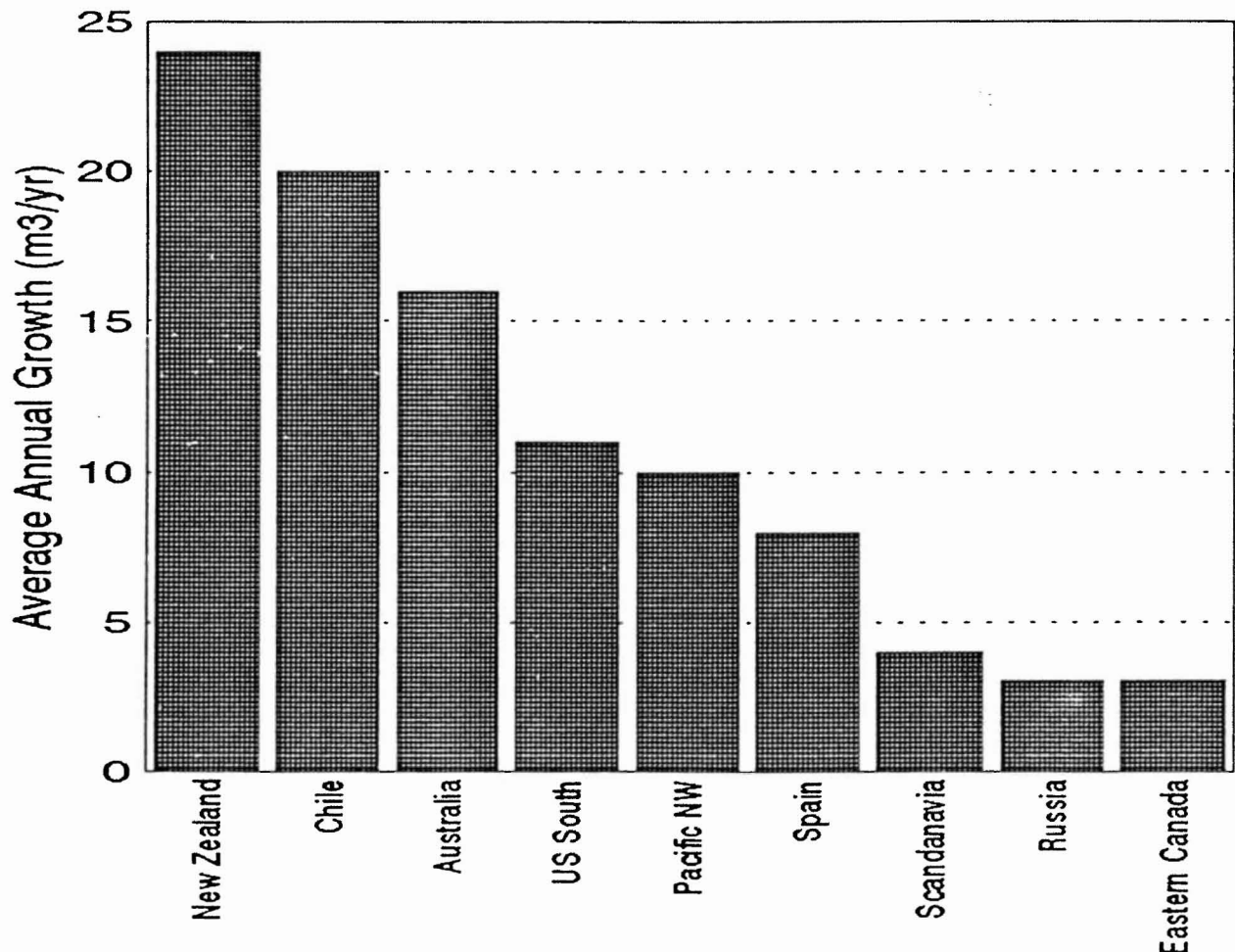
1. Mississippi information was unavailable. Numbers were extrapolated from Alabama, based on known 7.2 million CFL in Mississippi.
2. Depending upon the state, many more acres are partially harvested each year that do not show up in this chart.
3. Oak pine stands are 70% oak, 30% pine.

Much of the industrial plantation forest is owned by timber processors, but of interesting note, significant plantation holdings are owned by oil companies. SYP plantations were an excellent way to restore the land after oil exploration or production. Today, these oil concerns are basking in a wealth of above ground non-hydrocarbon reserves.

With ideal rotation cycles of 30 - 40 years, SYP is an extremely fast growing species. This rotation period compares favorably to the ideal rotation cycles for Radiata Pine evidenced in Chile, New Zealand and Australia, which in general terms were in the realm of 25 - 30 years. In certain cases, 30 - 40 years rotations of Radiata were witnessed where higher yields were targeted.

The below chart compares the growth rate of SYP to other pine species around the world. As noted, SYP has the fourth fastest incremental growth rate in the world, in the range of 11-12 cubic metres per acre per year. This incremental rate is bettered only in New Zealand, Chile and Australia

INTERNATIONAL SOFTWOOD GROWTH RATE



Processing Implications

Like its Radiata Pine cousin, SYP's unique characteristics present distinct processing requirements different from those common to the Pacific Northwest and Western Canada.

SYP is an extremely heavy wood, weighing 68 pounds per cubic foot green (1094 kilograms per cubic metre). Allowing for 40% loss in drying, SYP is estimated to weigh 44 pounds per cubic foot dry (655 kilograms per cubic metre). This weight is similar in range to Radiata Pine, and significantly higher than most Northwest wood species, and a comparison is provided in Appendix 4. This is particularly significant in all aspects of the wood processing sector.

For harvesters, the weight of a tree in the forest will create problems for equipment designed to fell or delimit lighter Western species. However, SYP limbs do not tear like Radiata Pine, hence automated delimiting is feasible. But the use of shearing heads is a problem. Several Southeast companies have prohibited the use of shearing felling heads on their timber, because the fibre loss is significant when compared to felling with saws.

For sawmill equipment companies, SYP requires extremely durable equipment. Lighter equipment, notably the type of equipment manufactured by European companies for European plantation wood, will process SYP but it will require significant maintenance. This is one of several factors contributing to the non-success of European equipment manufacturers in the Southeast market.

SYP also has an extremely high resin content. Sawing equipment has to be designed to deal with this factor. Special saw guides are required, and pitch build-up on the saw blade is a factor.

4.2.2 Hardwood Timber

Hardwood stands are made up by a variety of species including several types of oak, hickory, gums, ash, and cypress. Hardwood forests are commonly characterized by upland or lowland locations. Lowland hardwoods grow in moist conditions in river lowlands and swamps. These locations, because of the soil moisture, sustain little or no pine growth.

Upland hardwoods grow in more traditional forest settings, and in some of these natural stands the hardwood species co-exist with pine growth. "Oak Pine" forests are characterized by 70% oak and 30% pine combinations.

In comparison to SYP, hardwood species are natural regenerated. Most hardwoods are harvested at 50 years or older.

4.2.3 Ownership Categories

Table 1 illustrates the forest ownership categories. As noted earlier, private ownership of the timber resource is a significant market factor in the Southeast region. The pertinent facts are summarized as follows.

- Private forest is owned by parties other than wood processors. It is a combination of plantation and natural forest stands including both softwood and hardwood. Private forests total 50 million hectares, or 68% of the total commercial forest land.
- Industrial forest, including softwood plantations owned by wood processors, totals 16 million hectares, or 22% of the total commercial forest.
- Government owned forests, both natural stand and plantation, represents 7.1 million hectares, or about 10% of the total forests.

As noted above, **90% of the commercial forest is owned by private concerns, with only 10% held by the government.**

4.2.4 Timber Stand Type

With 68% of the total timber land owned by private non-industrial concerns, it is not surprising to learn that almost 65% of the SYP timber stock is natural growth. Notably, only 35% of the softwood supply is plantation stock. The following is a summary of the timber stand types noted in Table 1:

- There is approximately 10.5 million hectares of SYP plantation.
- Natural pine stands total 16 million hectares.
- Oak pine stands are combination forests characterized by 30% pine, 70% oak concentrations. Thus, an additional 3 million hectares of pine exists in this forest type. In total, SYP covers about 30 million hectares.
- Hardwoods from combined forest, and upland and lowland forest, total 43 million hectares.

4.2.5 Timber Stand Size and Age

Table 2 notes that 43% of the total Southeast forest resource is sawtimber, defined as timber with a minimum diameter at breast height (4.5 feet above the ground) of 9 inches for softwood and 11 inches for hardwoods. The remaining growing stock is divided between pole timber and sapling size.

The chart below shows the age class distributions of the forest resource. Of note, in the Southeast most SYP is harvested before it is 30 years old. Approximately 25% of the total forest is 20 years or younger. A significant amount of this young stock is SYP.

The expectation of the forestry sector is a trend to smaller logs. The size of the forest stand and its age distribution support this conclusion. Higher wood prices, industry growth, and environmental concerns are expected to fuel the trend to smaller logs.

4.2.6 Environmental Concerns

The red-cockaded woodpecker is to the Southeast what the spotted owl is to the Northwest. Both of these birds are protected by the Endangered Species Act.

TABLE 2

**COMMERCIAL FOREST LAND BREAKDOWN
by
SIZE OF TIMBER
HECTARES (IN MILLIONS)**

	SC	NC	GA	VA	FL	AL	MS	LA	TX	AR	TN	TOTAL
COMMERCIAL FOREST LAND	5.0	7.6	9.6	6.2	6.3	8.9	7.2	5.6	4.7	7.0	5.4	72.8
SIZE CLASS												
Sawtimber	1.9	3.7	3.8	3.0	2.0	3.1	2.4	3.3	2.3	3.1	2.6	31.2
Pole Timber	1.3	2.0	2.6	2.1	1.6	2.4	2.4	1.1	1.1	2.3	1.8	20.7
Saplings	1.8	1.8	3.0	1.1	1.8	3.4	2.4	1.0	1.2	1.5	.9	19.9

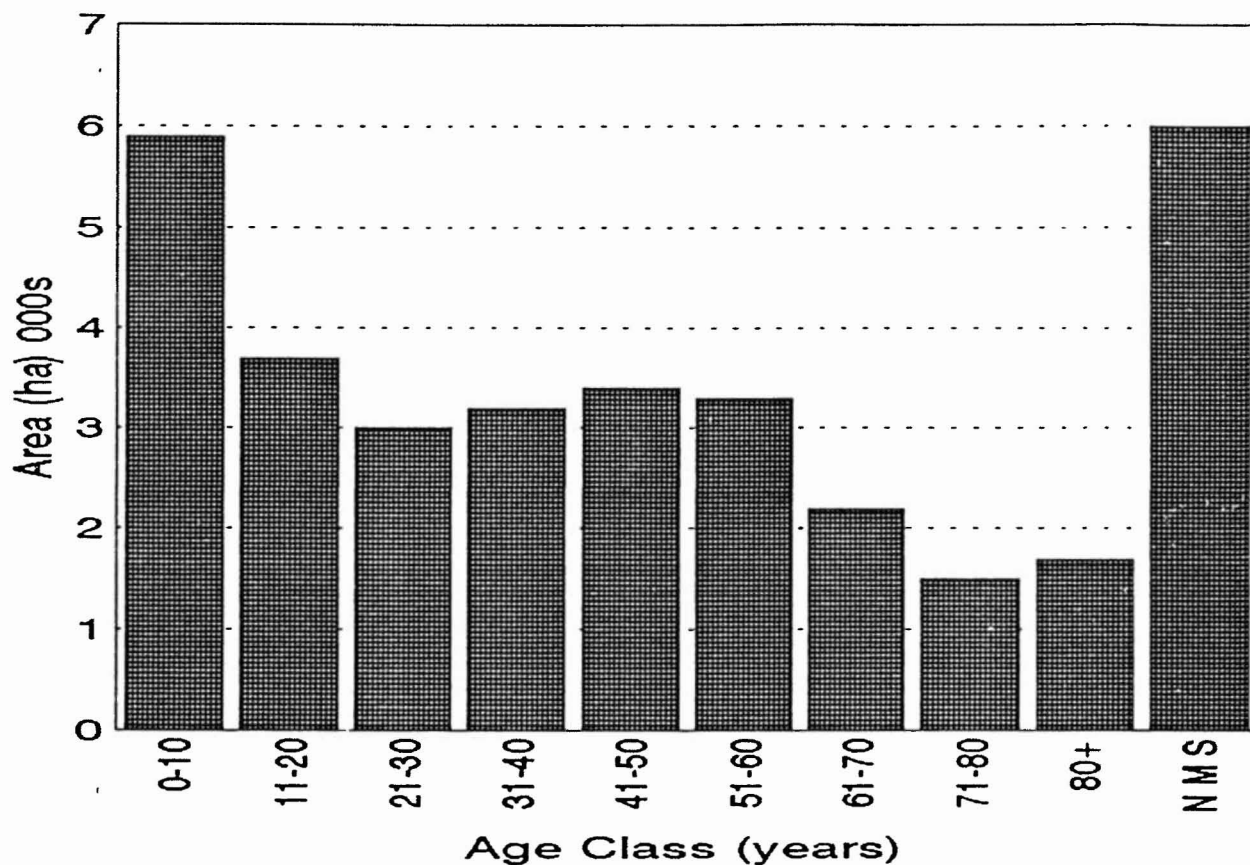
NOTES:

DBH: Diameter at breast height 4.5 feet above ground.

1. Sawtimber: Softwoods 9 inches at DBH, hardwoods 11 inches DBH.
2. Pole Timber: Live trees at 5 inches DBH, but smaller than sawtimber.
3. Saplings: 1 inch to 5 inch DBH.

COMMERCIAL FOREST LAND BREAKDOW

By Age Class Distribution Hectares (in million)



N M S = No Manageable Stand

NOTES:

1. Age class distribution information was unavailable for the states of Alabama, Mississippi, Louisiana, Texas, Arkansas and Tennessee.
2. No Manageable Stand - Never regenerated and varying degrees of natural regeneration, but generally considered timberland less than sixty percent (60%) stocked with growing-stock trees that can be featured together under a management scheme.

Or major significance to the Southeast forestry sector, **the Endangered Species Act applies to private land.** While the full impact of this law has yet to be felt, one company has attempted to achieve a compromise with the government before the protection of this bird becomes a major issue.

Georgia Pacific has discovered over 100 colonies of the red-cockaded woodpecker in its forest holdings. To protect the habitat, Georgia Pacific has agreed to leave a buffer zone around the location of the colonies. This has effected about 60,000 acres of the company's forests, but this action was taken to preserve the right to manage the remainder of its commercial forests.

While this response is a collaborative one, other private land owners have not had such good fortune with the red-cockaded woodpecker. A forest owner in North Carolina scrapped his plans to harvest 2000 acres because the bird nests in the forest. Forest owners have been arrested for violating the Endangered Species Act in Georgia.

Wetlands protection legislation also applies to private land. Once again, the full impact of this law has not yet been felt, but it is expected to change allowable cuts and harvesting practices in the future. The environmental lobby against tire rutting in wetland areas is getting louder, and it is only a matter of time before the industry will have to respond to these challenges.

4.3 Harvest Levels

Softwood and hardwood harvesting have increased dramatically in the Southeast. The current softwood harvest is estimated to be approximately 150 million cubic metres per year, representing about 50% of the United States total softwood harvest.

The hardwood harvest approximates 82 million cubic meters, representing about 46% of the national total.

A United States Department of Agriculture report suggests that both softwood and hardwood harvests will increase a total of 50% over the next thirty years.

Once again, a comparison of harvest levels in the Southeast to levels evidenced in Chile, New Zealand and Australia reveals the scope of the Southeast sector. As noted below, the Southeast softwood harvest, at current levels, **is almost four times the size of the cumulative harvest of the above mentioned countries.** It will take twenty years before the cumulative softwood harvest in these three countries reach 50% of the existing levels in the Southeast.

Country	Softwood Harvest In Million M3
Southeast	150
Chile	15
New Zealand	15
Australia	10

TABLE 3

<p align="center">GROWING STOCK VOLUMES, GROWTH & REMOVAL VOLUMES CUBIC METERS (IN MILLIONS)</p>												
	SC	NC	GA	VA	FL	AL	MS	LA	TX	AR	TN	TOTAL
GROWING STOCK												
Pine	227	336	420	168	260	311	252	297	221	221	84	2,797
Hardwood	227	560	420	540	160	336	272	235	126	311	386	3,573
NET GROWTH												
Pine	9.6	16.5	22.9	6.4	13.7	18.2	14.8	12.6	13.0	10.8	2.8	141.3
Hardwood	5.1	16.4	12.8	16.0	3.9	15.7	12.7	8.8	4.6	11.1	15.1	122.2
REMOVALS												
Pine	13.8	14.4	26.9	5.9	13.3	20.3	16.5	12.1	13.4	12.0	1.5	150.1
Hardwood	6.6	12.9	9.6	8.7	1.8	10.9	8.9	5.0	3.7	7.3	4.7	80.1

4.4 Wood Products Manufacturing Sector

The Southeast's consumption of logs by industrial use is noted below.

	Softwoods	Hardwoods
Sawmills	42%	33%
Pulp Mills	41%	37%
Veneer	13%	3%
Other	4%	27%

Historically, sawmills in the Southeast have taken a back seat to paper mills. Major forest products companies in the market, such as Georgia Pacific, International Paper, and Louisiana Pacific, have historically had a much stronger paper focus. This focus was driven by high paper prices.

Today, the combination of a glut of pulp in world markets and the growth of wood product prices has resulted in a defined reorientation to solid wood products by the majors.

Investment

It is estimated that 1994 forestry sector capital expenditures in the United States will approximate U.S. \$1.2 billion.(1) Approximately 40% of the projects will be in the Southeast. A simple calculation suggests that U.S. \$480 million will be spent by the Southeast forestry sector. It is estimated that the Southeast forestry sector will spend U.S. \$700 million in 1995. The large growth in expenditures is attributable in part to 9 OSB plants scheduled for construction.

Markets

Like the Pacific Northwest and Western Canada, the Southeast softwood products sector is dimensional lumber reliant. Most of the solid softwood products manufactured in the Southeast are produced for the building trade. Very few mills produce grade cuts of lumber, and this does not appear to be a future trend in the market.

Most of the softwood products produced in the Southeast are for the domestic market. While a few companies interviewed during the course of WCWMSEA's study indicated they were producing for export markets, this was an exception rather than the rule, and these exports typically accounted for a small part of the total production of the mill in question.

By contrast, the hardwood sector is driven by specific cuts to satisfy the specific order of the end user. Most hardwood is produced for further manufacturing, including furniture, moulding, and flooring. Given the nature of the products, hardwood exports are more common.

1. 1993-94 North American Factbook, Wood Technology, Miller Freeman Inc.

Of note, softwood logs are the United States largest wood export, but the amount has decreased steadily in the last 5 years to about 13 million cubic metres.

Constraints to Market Growth

At this point in time, there appears to be no constraints to market growth in the Southeast. However, a change in any of the following factors could adversely effect market conditions.

- . A drop in U.S. housing starts.
- . Reduced log supply in the Southeast. Environmental pressures are seen as the biggest threat in this possibility.
- . Increased log supply in the Pacific Northwest. This is unlikely while the Clinton Administration is in power.

Like the Pacific Northwest and Western Canada, the Southeast softwood market would benefit from the development of new wood products, including the development of a secondary processing sector. However, with a strong demand for dimensional lumber products, there is no significant market catalyst for this development.

4.4.1 Harvesting

As wood production grows, so will the levels of timber harvested. It is anticipated that softwood lumber production will expand another 1 billion board feet (2.4 million cubic metres) in the next two or three years. While most of this growth is expected to come from increased recoveries at the mill level, part of the growth will arise from increased timber supply.

Smaller softwood logs are the expected trend toward the end of this decade, as the age class distribution of the majority of the softwood timber stands is below 20 years.

Softwood harvesting in the Southeast is done on predominantly flat land with skidder based operations. Low labor costs has resulted in low mechanization in harvesting operations. Virtually all harvesting in the Southeast is performed on a contract basis, and it is extremely price competitive. This severe price competition minimizes the possibility of increased mechanization, as contract pricing will not support the capital investment in equipment.

Hardwood harvesting is performed on a selective basis, or using small block clear cuts. Lowland forest applications have introduced West Coast excavator based equipment and mechanized falling.

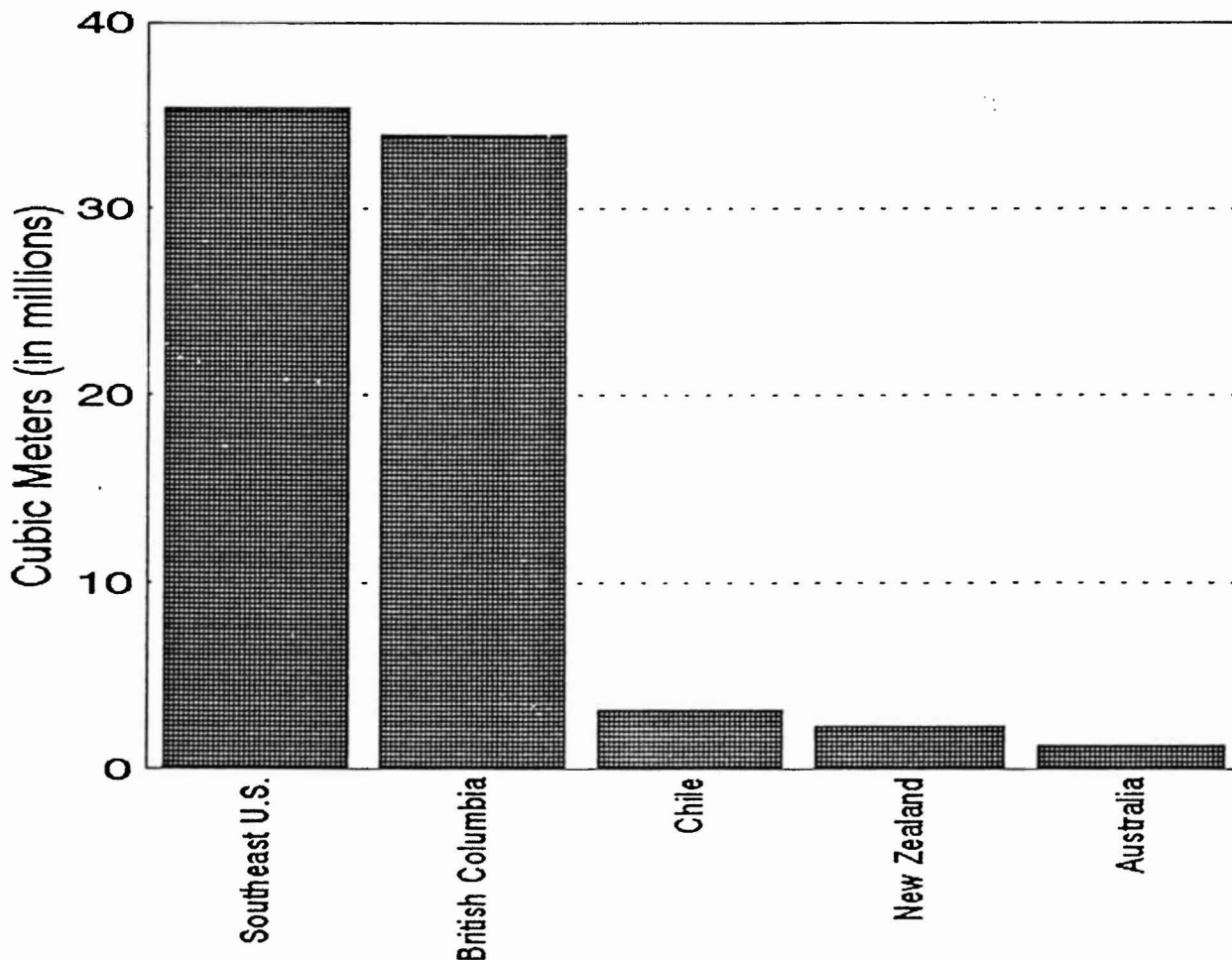
As the harvesting sector moves toward worker safety, it is expected that increased payroll burdens for items such as Workers Compensation will push labor costs up, and improve the economics of increased mechanization. This is similar to trends evidenced in New Zealand and Australia.

4.4.2 Sawmilling

Since the late 1980's, softwood lumber production in the Southeast has grown consistently to its current level of about 15 billion board feet (35.4 million cubic metres) per annum, or about 45% of the U.S. total softwood lumber production. Softwood production has grown most dramatically since 1991 when total production was 12.5 billion board feet (29 million cubic metres).

To emphasize the size of this lumber production, the output of the Southeast is compared to B.C. and countries reviewed in other WCWMSEA reports in the chart below. As illustrated, softwood production in the Southeast is slightly higher than that of British Columbia, although it takes more production facilities to do so. What is staggering is the comparison to Chile and New Zealand. Considered emerging forestry concerns, production in these countries is only 10% of the production in the Southeast.

INTERNATIONAL SOFTWOOD LUMBER PRODUCTION In Cubic Meters



The sawmill operations visited by WCWMSEA were more comparable to British Columbia mills than those noted in Chile, New Zealand or Australia. Of the top 200 sawmills in the United States, 82 are located in the Southeast, as listed in Appendix 6.

Thirty-two of these mills produce in excess of 100 million board feet per year (236,000 cubic metres). The remaining 50 mills produce between 50-100 million board feet per year. It is estimated that about 1000 mills in the continental U.S. produce more than 1 million board feet per year.

The ability of the Southeast softwood sawmilling sector to increase lumber production will not be restricted by log supply. The constraining factor appears to be sawmill capability. It is projected that most incremental lumber production **will not** come from new mills, **but from attempts by existing mills to optimize wood production.** This will be achieved by improved work methods and technology/equipment enhancements. It is estimated that **only 30% of mills** in the Southeast have scanning and optimizing equipment. This is a significant factor for WCWMSEA members to note.

An example of this trend is the new Potlatch Sawmill in Warren, Arkansas. Built to replace an older mill on the same site, Potlatch describes the new mill as one that "will produce 40% more timber than the one it replaces using only 5% more logs". A significant part of this claim is the fact Potlatch's old mill processes large diameter logs. With scanning technologies in the new mill, recoveries from these large logs should be higher.

It is important for the reader to understand the distinction between the products made from softwood and hardwoods. Most Southeast softwood is used for lumber production, panel products and chips.

By contrast hardwoods are used to make variety of products, including railway sleepers, veneers for specialty products, and cants and lumber for furniture. Some hardwood is used for pulp and OSB production. Unlike softwood prices, which are volatile, prices in the hardwood sector are higher and more stable. Many hardwood facilities produce to fill specific contracts at a pre-established prices.

4.4.3 Panel Products

The prices for panel products, like lumber products, have risen. The price movements have been less dramatic than those for lumber, but the increases have been significant enough to fuel expansion in the panel area. Total plywood and OSB production in the Southeast was forecasted to be in the range of 16 million square feet (3/8 inch basis) in 1993, representing over 60% of the nations production of these products.

Output is expected to grow in the range of 7% in 1994. However, in the longer term, production is forecast to grow significantly. During its market study, WCWMSEA learned that construction will start on as many as 9 new OSB plants in the Southeast within the next two years. There are 15 existing OSB mills in the region.

Nationally, there is expected to be a total of 16 new OSB facilities, as an anticipated total cost of U.S. \$655 million. If the projects discussed for the Southeast are built, they will represent a huge capital investment by the region.

The acceptance of OSB as a replacement product for plywood is the primary reason for this expansion. This acceptance seemed to vary by State in the Southeast, but it has generally achieved a strong market share.

Despite the predatory role of OSB on the plywood market, surprisingly plywood is also in an expansion mode. This is largely due to the decline of the Western United States plywood industry resulting from fibre supply cut backs. The Southeast currently produces about two-thirds of the total plywood production in the United States.

The Southeast also produces MDF, particleboard and hardboard. Production levels of all these products are about 50% of the national total. Continued production growth is expected in these areas, but not the pace of OSB or plywood.

4.4.4 Pulp and Paper

As mentioned earlier in this report, paper production has been the foundation of the forest products industry in the Southeast. It is estimated that the region produces over 70% of the country's pulp, and over 50% of its paper and paperboard products.

5.0 SOUTHEAST UNITED STATES CONSULTING ENGINEERING SERVICES MARKET OVERVIEW

To illustrate how the consulting engineering sector operates in the Southeast, it is advantageous to look at how engineering is done on forestry projects in the region.

Forestry & Harvesting

The independent consulting forester plays a significant role in the Southeast. As noted earlier in this report, the majority of the industrial forest is owned by private concerns. Unlike timber processors who own forest stands and who normally would have foresters on staff, these private owners must rely on the consulting sector for the services of a consulting forester to assess their forest stands. Foresters are commonly contracted to quantify the forest reserve when an owner decides to tender his timber stand on the open market. Typically, the consulting forester will measure the timber stand, prepare the tender documents, and oversee the tender process.

Once the tender has been awarded, the forestry consultant may also be contracted to oversee the harvesting plan, if the role is not assumed by the purchaser of the timber stand. Once the harvesting has been completed, if the land owner decides to reforest, the forestry consultant may also be secured to undertake this task.

Given the nature of forest ownership in the Southeast, the forestry consultant has a significant role.

Wood Products Engineering

Engineering in the wood product manufacturing sector is provided in a variety of ways.

- . The engineering needed for minor mill work, such as equipment upgrades or line changes, is typically done at the mill level. This engineering may be done by maintenance or production personnel, or by site engineering staff. In mills owned by majors, input from corporate engineering staff may also be available.
- . On larger mill upgrades, engineering input may come from several sources. One option is for mill personnel or corporate to undertake the engineering. On larger equipment supply projects, engineering may be provided by the equipment vendor. Alternatively, an engineering consultant such as Mid-South Engineering, would be contracted to perform the work.
- . On major mill projects, such as new mills or a complete mill modernizations, the industry practice is to contract the work to a consulting engineering company (e.g. Mid-South), who will be responsible for process design and equipment selection.

On a North American basis, it is estimated that sawmill staff perform engineering 40% of the time.⁽²⁾ Machinery suppliers provide engineering in about 20% of the projects. A combination of company/equipment supplier engineering represents 13% of the projects. Consulting engineers secure about 8% of the projects. Although consulting engineers received the lowest percentage of project work, it is expected that their projects are the largest in scope and dollar value.

The way engineering is supplied in the Southeast appears consistent with the North American pattern. This is a significant consideration for engineering companies and equipment suppliers planning to operate in the Southeast. **Equipment vendors supplied engineering as a component of 33% of all projects.**

5.1 Use of Consulting Engineering Companies

As noted above, the use of independent project engineers is a common practice in the Southeast. In the forestry and harvesting side of the sector, the common practice is to contract with a local company with expertise in local forest stands. Canadian consultants are not a part of this market.

In the sawmill sector, the Southeast's practice of contracting external engineering consultants is similar to the practice evidenced in Western Canada. Two of the companies that WCWMSEA met with on its market study, namely Mid-South Engineering Co. and The Bowlin Company, are engineering firms dedicated to wood products engineering. For the most part, the focus of these companies are sawmill operations, but both companies have engineered other wood products facilities, including plywood mills and OSB facilities. Bowlin has a related division of the company that manufactures material handling equipment.

The strength of these companies is a key knowledge of their local wood product markets. The processing of SYP, like the processing of Radiata Pine in Chile or New Zealand, brings its own unique set of processing requirements. The strength of the engineering companies in the Southeast is their knowledge and experience in engineering facilities for this species of pine.

This local market expertise is key in consultant selection criteria. Mill personnel indicated that it is unlikely they would use Canadian consultants for standard mill engineering where local expertise is available. However, mill personnel did note that they have sought Canadian engineering for projects on which they perceived there was not a local expertise. An example of this situation was noted by one company interviewed by WCWMSEA. It had looked to Canadian engineering for log scanning technology, and it was planning a trip to British Columbia to meet with engineering companies with OSB experience.

For a Canadian engineering company to succeed in the local market, it would have to acquire an expertise in SYP processing, and it would have to have a local presence. Companies with a specialized engineering expertise should focus on product awareness, as in these niche market opportunities, the Southeast market is prepared to deal with the Canadian office of these companies.

2. Capital Spending in the Wood Products Industry 1993-1994, Wood Technology, Miller Freeman Inc.

5.2 Market Perception of Canadian Engineering Consultants

The market perception of Canadian engineering companies was high. PS&E Projects, Anthony-Seaman and Woodpro were companies mentioned during our meetings. Of note, one Southeast engineering company expressed an annoyance about Canadian success in the OSB field, noting that American companies do not enjoy a similar freedom of access to the Canadian market (a fact later qualified by WCWMSEA as being inaccurate).

Of interest, an engineering firm located in Fredericton, New Brunswick is engineering an OSB facility for International Paper. International Paper also noted that it commonly looks to Canada for engineering expertise in niche areas.

In general, market awareness and acceptance of Canadian engineering companies was strong. This awareness appeared to be correlated to companies with a specific market expertise or capability not available in the local market. This was also true in cases where Canadian companies were more capable than local companies in defined engineering fields.

5.3 Market Opportunities for Canadian Consulting Companies

Forestry and Silviculture

Forestry Consultants play a major role in the Southeast given the dominance of the privately owned forest stands. However, local knowledge is critical in the consultant selection process. Canadian companies contemplating a role in this market would likely have to possess a niche expertise, and the provision of this expertise would ideally be achieved through a collaboration with a local company with a strong historical presence in the market.

Harvesting

Most of the harvesting in the Southeast is performed on a contract basis. Harvesting operations are normally managed by consultants contracted by the land owner, or by the timber processor who is purchasing the timber stand. Give this framework, there is little opportunity for Canadian consultants.

Where there is an opportunity for Canadian consultants is in the definition of economic mechanized harvesting applications for the Southeast region. Due to favorable site conditions and low labor rates, harvesting contracting is extremely price competitive. This competitive factor does not support investment in equipment, thus the Southeast market can be typified as an under mechanized one.

Sawmill Sector

There is a defined opportunity for Canadian companies with niche market expertise. Market awareness is essential in this regard.

Canadian engineers contemplating competing in traditional SYP mill process and equipment engineering should do so by way of a collaboration with a local company that has an established market presence and SYP track record. As vendor supplied engineering becomes a bigger factor in the market, there may be an opportunity for Canadian consultants to support Canadian equipment suppliers setting up in this market.

5.4 Strengths, Weaknesses, Opportunities & Threats (SWOT) Analysis for Canadian Consulting Companies

Strengths

Canadian companies are acknowledged as having world class expertise.

Southeast companies are prepared to use Canadian companies for niche services, and location is not a determining factor.

Weaknesses

SYP expertise is critical to penetrate traditional forestry, process and equipment engineering areas. Canadian companies do not commonly possess this expertise.

A local office or collaboration is essential to compete in the traditional SYP market.

Opportunities

Niche market opportunities exist as buyers look for engineering expertise in key areas including fibre recovery and OSB.

Southeast market will use Canadian companies if expertise is better than capability in local markets.

The majority of project engineering is provided by equipment suppliers. There may be an opportunity for Canadian engineers to support Canadian equipment suppliers in this market.

OSB engineering opportunities is a huge market, with 9 new facilities slated for the region.

Threats

It is projected that most capital expenditures in the sawmill sector will be for enhancement and upgrades, primarily in the scanning and optimization areas. This means there will not be a significant number of major projects for external consultants.

6.0 SOUTHEAST UNITED STATES SAWMILLING SECTOR OVERVIEW

It is estimated that there are 1000 mills in the United States that produce over 1 million board feet (2,200 cubic metres) per year, both softwood and hardwood production. The Southeastern Lumber Manufacturers Association has approximately 400 independent lumber manufactures in its organization, and this group does not include most of the major producers. Thus, it is estimated there are in the range of 600-700 softwood and hardwood mills in this region.

Of note, of the top 200 mills in the United States, 82 are located in the Southeast. Of these 82 producers, 32 produce more than 100 million board feet per year, the remainder produce between 60-100 million board feet. Appendix 6 provides a listing of these top 200 sawmills.

The Southeast market is dominated by 8 major companies, as outlined in Table 4. As noted, these companies produced about 6.5 billion board feet of lumber representing 48% of the total Southeast output of approximately 15 billion board feet in 1993. These companies cumulatively have 88 softwood mills in the Southeast.

The Southeast produced approximately 15 billion board feet in 1993, or the equivalent of 33 million cubic metres. For purposes of comparison, it is estimated that this total production was accomplished by about 300 softwood mills. British Columbia produces 34 million cubic metres in 205 sawmills.

6.1 Sawmill Equipment Focus

In general terms, the study team was surprised to find a sawmill sector that was much more modern than expected. The Southeast has an inaccurate stereotype of being an outdated sawmill sector, out of sync with modern processing technologies. What the study team evidenced were modern mills with the latest in scanning and processing technology.

This may have been biased by the fact that most of the mills visited were owned by major companies, obviously with the financial ability to upgrade their facilities to meet market conditions.

WCWMSEA's market study team visited 9 different mills, most of which are on the top 200 sawmill list noted above. The largest of the mills was the Cavenham operation in Fernwood, Mississippi, which produced 190 million board feet per year. The smallest mill was the Roy O'Martin (MARTCO) hardwood mill in LeMoyen, Mississippi, which produced 42 million board feet.

In general terms, the mills ranged from state-of-the art, as were both the Cavenham mill and the new Potlatch Mill, in Warren, Arkansas; to aging and in definite need of upgrading, which portrays both of the Georgia Pacific mills visited in El Dorado, Arkansas, and Columbia, Mississippi.

TABLE 4

MAJOR PLAYERS IN THE U.S. SOUTH
APPROXIMATE PRODUCTION CAPACITIES, 1993

COMPANY	LUMBER (MMbf)	SOFTWOOD					NUMBER OF MILLS IN S.E.
		PLYWOOD (MMsf 3/8")	OSB (MMsf 3/8")	PARTICLEBOARD (MMsf 3/4")	MDF (MMsf 3/4")	HARDBOARD (MMsf 1/8")	
Champion International	328	740	0	0	0	0	5
Georgia-Pacific	2,046	5,004	775	766	100	642	23
International	872	530	520	178	132	800	10
Louisiana-Pacific	1,260	1,750	945	75	120	0	27
Temple-Inland	400	250	0	339	0	508	5
Union Camp	455	200	0	90	0	0	6
Weyerhaeuser	1,000	850	300	198	0	0	9
Willamette	113	1,302	0	210	260	0	3
Total (Top 8 Companies)	6,474	10,626	2,540	1,856	612	1,950	88
Top 8 Market Share of U.S. South	46%	82%	80%	95%	85%	57%	

Source: Widman Research

The modern mills incorporated sharp chain systems, and scanning throughout the mill. The older mills were using older generation Chip-N-Saw, with some scanning upgrades. Of note, there is not much equipment diversity in the softwood mill sector in the Southeast. Unlike British Columbia mills, whose complexities accommodate the processing of several wood species, Southeast softwood mills process only Southern Yellow Pine. With the exception of the break down equipment employed, the processing methods in most of the mills we visited were fairly homogeneous.

A description of the equipment noted in our mill visits has been included in the Meeting Notes section included in Appendix 3. In summary, the older generation Kockums Can Car (KCC) Chip-N-Saw was popular. Several of the mill managers met with communicated their views that the Chip-N-Saw is on the way out. Their reasoning was the need for improved recoveries.

However, in other meetings, mill managers communicated their continued preference for the Chip-N-Saw, in combination with double length infeeds, to facilitate scanning. Double end dogging is a popular term in the industry. Its advantage is improved scanning and fibre yield. Its disadvantage is price. The system has not proven its economics and has not yet won acceptance in the sawmill sector.

The most notable trends in the sawmill sector are:

- The trend to smaller logs, and;
- Increased scanning and optimization to increase fibre recovery.

Southeast softwood production is expected to grow by about 1 billion board feet within the next year. Industry opinion is that much of this growth will come from increased recoveries, and not from increased log supply, sawmill expansion, or green field projects. Scanning at the log merchandising level, scanning before log breakdown, scanning of cants, boards and trims, is the industry priority at the moment.

In limited instances, the attempt to optimize fibre recovery will mean major mill modernizations. Potlatch's old mill in Warren, Arkansas was too antiquated to upgrade. The company's effort to achieve "40% more production with only 5% more logs" required a new mill facility with 2 lines, one a sharp chain with a band saw, and one a slant headrig carriage. Potlatch's ability to achieve this recovery factor will be biased by the fact most of the logs supplied to the old mill are large logs. Once diverted to the new mill, recoveries from these logs should be high.

Georgia Pacific's attempt to improve recoveries at its mill in El Dorado, Arkansas, means a new facility on the existing site, rather than a modernization of the existing facility. This project is expected to cost about U.S. \$35 million.

However, the majority of capital expenditures planned for Southeast softwood mills will be for modernization. As outlined earlier in this report, it is estimated that only 30% of the mills in the Southeast have scanning and optimizing technologies.

Of note, given the trend to small log processing in the Southeast, none of the mill personnel met with conveyed any perception that Western Canada did not have small log capabilities.

The mills interviewed in this study indicated that, on average, their annual capital upgrade budgets were in the range of U.S. \$500,000 to 1 million. These budgets typically excluded any major capital items that would require a budgetary approval.

Kilns

Improved kiln production was mentioned as a priority area for the sawmill sector. The thrust of the sawmill sector is not new kilns, but improved production from existing facilities. There is a defined market opportunity for control systems that will improve kiln output and efficiencies.

Of note, there is virtually no dehumidification drying done in the Southeast.

Consumables

Each of the mills visited was asked about its consumables purchases. There were no specific patterns in consumables purchases, but the mill managers did shed light on a number of key market factors.

It is not uncommon for consumable purchases to be made on a tender basis, covering extended supply periods, such as a budget year. Price sensitivity in these tenders is critical.

Some mills will only deal with local suppliers for consumables purchases, as local delivery and service is the critical market factor. Brand name remained important when selecting a supplier.

Brand identification is key. Rexnord, Webster (Portallo Chain) and Can-Am were mentioned as brands of choice.

Wood Based Panels

As mentioned earlier in this report, wood panels are a significant part of the wood products sector in the Southeast. The OSB sector is the major opportunity for WCWMSEA companies. The Southeast has 9 new OSB facilities slated for construction. The capital cost for these facilities is expected to approximate U.S. \$400 million.

Despite the predatory impact of OSB, the plywood sector is also in expansion mode. Several new facilities are planned for the Southeast.

6.2 Market Potential

During the course of the market study, the study team attempted to extrapolate market potential numbers based on mill manger feedback, industry literature, and general scuttlebutt. With information available from several sources, the team concluded it would be more advantageous to summarize the market opportunities than to make an attempt to arrive at a final market potential dollar value.

- One review of the American forestry sector suggests that U.S. \$1.2 billion will be expended on major capital projects in the immediate future. Approximately 40% of the total projects were in the Southeast. A simple calculation suggests that capital expenditures in the sector will be \$480 million dollars, which includes all woods product facilities.
- Most of the mills interviewed by WCWMSEA indicated that their annual capital upgrade budgets were in the range of U.S. \$500,000 - 1 million. These numbers do not include major modernization projects, which typically require a distinct budget approval. The Southeast softwood sector has 82 mills that produce more than 60 million board feet per year. The 8 major softwood producers in the Southeast have 88 mills in total. Allowing for duplication, it is estimated that as many as 125 mills spend the above noted annual budget for minor capital purchases and maintenance items. That equates a range from U.S. \$62 - 125 million annually. Of note, it is estimated that there are an additional 175 smaller softwood mills in the Southeast.
- Major capital expenditures required by softwood mills in the United States are estimated at U.S. \$285. Using 40% as the percentage representing Southeast projects, a simple extrapolation suggest that approximately \$115 million will be invested in the Southeast softwood sector in the next two years.
- Nine new OSB facilities are slated for the Southeast. At an average cost of U.S. \$45 million per facility, this equates an approximate U.S. \$400 million investment.

Without a scientific means of arriving at a definite market potential figure, it is safe to state that the potential for sawmill equipment and engineered board equipment sales is significant.

6.3 Opportunities in the Hardwood Sawmill Sector

The Southeast hardwood sector is a significant market opportunity for equipment and service suppliers. Although the primary focus of this and previous WCWMSEA reports is softwood pine production, because the hardwood sector in the Southeast is so large, it is opportune to discuss the market opportunity.

While there is a stereotype that hardwood production involves a dramatically different process than softwood production, there actually is no major difference in the equipment and processes used. The major equipment distinction is the need for robust equipment to process hardwood. Given the fact SYP has a higher weight than many hardwoods, the equipment implications are similar.

The Roy O'Martin hardwood mill visited during the study looked identical to most of the softwood mills visited. The equipment utilized in the mill was the same as that used in a softwood facility. The major difference at the mill level are summarized as follows.

- The mill runs at slower speeds to ensure quality levels of the cut lumber.
- The only difference in head rigs is the set works.

- The mill has two USNR slant headrig carriages, and the only difference from a softwood sawing was the kerf and profile of the saw blade.
- The mill was using standard secondary breakdown equipment adapted to hardwood sawing, complete with optimization technology. Of note, the board scanners had a manual operator override to allow for grade recovery based on the contract being filled.
- The sorting equipment was identical.
- Kiln set up was similar, but a slower drying process was utilized to control air flow and temperature effecting wood quality.

While it is safe to say that there are more hardwood mills than softwood mills in the Southeast, it should be clarified that the mills are typically much smaller in size and production volumes. The Roy O'Martin mill visited was a modern mill and large by hardwood mill standards. Yet its top end production was only 50 million board feet per year.

Although the mills are smaller, their profitability should not be under estimated. In general, hardwood prices are higher, more stable and more predictable than softwood prices. Most hardwood production is grade quality to fill specific contracts at previously established prices. Contract production requires a dedicated marketing effort and most hardwood operations are integrated with a marketing arm.

WCWMSEA companies should not overlook the potential of this market segment.

6.4 Perception of Western Canadian Suppliers

The perceptions of Western Canadian sawmill equipment suppliers communicated by the mill managers WCWMSEA interviewed can be summarized in three key points.

- The majority of the managers interviewed were familiar with the Western Canadian companies in the Southeast market. Companies repeatedly noted were Newnes, Valon Kone Brunette, Nicholson, Durand-Raute and Optimil. Mill personnel noted that name recognition was a result of individual local market operations and marketing efforts. Although these companies were recognized as Canadian, they were commonly perceived as a part of the local market.

The mill managers who communicated this perception about Canadian suppliers emphasized the importance of local operations, and commitment to the local market. Interestingly, one manager noted that he felt it was important that a Canadian supplier maintain its own identity and its own operation in the local market. He felt it was a risk to use a local market agent, who may not be product dedicated, and might not provide the all important pre and post sale technical support and service.

- A few mill managers noted they had no perception of Western Canadian equipment suppliers. Generally, this was the result of a poor product knowledge, as opposed to a dislike of Canadian equipment. One manager in particular, who's company is undertaking a major plant modernization, communicated that he was interested in the best equipment for the mill, American or Canadian. However, his awareness of Canadian equipment capability was extremely low, solely because of low exposure.
- Several mill managers, acknowledging an awareness and acceptance of Western Canadian equipment suppliers, went further to say that they commonly go beyond traditional/normal local market suppliers to source Western Canadian suppliers directly on their home turf. However, the common theme to this approach was niche products, or products that might not support the economics to support a local market operation. Importantly, these managers communicated that product/technology superseded geographic location as the critical purchase factor.

Moreover, these managers did not make a significant distinction between local market and external market supply, especially in key product areas. The key issue was the ability of the external supplier to provide timely technical support and service.

- Perception of Canadian companies providing consumables (e.g. sprockets, bearings, chain) is significantly different than market perceptions of major equipment suppliers. Name brands, ease of local market access and price were the key variables in consumables purchases. Given these purchase factors, perception of Canadian suppliers becomes a moot issue. Unless the company has local representation, it is unlikely to supply in the Southeast. Regional representation within sub areas of the Southeast may also be necessary.

6.5 Existing Competition

Sawmill Equipment

The major competitors in the Southeast market include CSMI, and USNR (Irvington Moore and Schurmann), Newnes, Nicholson, VKB, Durand-Raute and Optimil.

Of interest, one American supplier has earned a terrible reputation in the Southeast market, the result of constant changes in corporate structure and management. In the opinion of the mill personnel interviewed, the company has lost its customer focus; has no continuity in its operation; is manufacturing poor quality equipment; and can not be counted on for service or technical support. **This is an example of how not to operate in the Southeast.**

The remainder of the major competitors in the Southeast enjoy a favorable reputation. Success of these companies is contingent on their adherence to the same factors as those perceived important for Canadian suppliers. Notably, when asked what competitive factors were the most critical in the equipment selection process, the general response was:

- Equipment quality, technology and reliability, and;

- **Price.** Premiums for equipment of the above description were expected and acceptable. Most managers had the attitude that "you pay for it now or you pay for it later". However, mill managers quietly conceded that this price premium was typically acceptable to about 10% above the next best price, at which point the equipment selection would be reconsidered.

WCWMSEA's review of the competition in the Southeast market turned up one startling factor: **there are virtually no European competitors in the market.** Despite the success of European sawmill equipment suppliers in other "pine" markets such as Chile and New Zealand, they have not achieved a similar success in the Southeast.

The main reason for this non-success stems from the basic design of European sawing equipment. In Europe, plantation logs are merchandised to ensure a consistency of log size to the mill. Hence, European equipment is designed to handle a larger minimum diameter log, with a narrow range of log diameters. This is a contradiction to the requirements of the Southeast market, which processes a wider range of diameters with a smaller average minimum diameter.

European equipment is typically perceived as being too light to endure SYP processing requirements, and control systems and maintenance are complicated by Southeast standards. Southeast mill managers want equipment that is durable, simple to operate, and easy to maintain.

A list of Southeast equipment suppliers is included in Appendix 7 for the readers reference.

Kilns

The major suppliers of kilns in the Southeast are Wellands and Irvington Moore. McConnell supplied kilns to one of the mills we visited. The other supplier mentioned was COE. However, COE is perceived as a veneer equipment company with an expertise in veneer drying, so market acceptance of its kilns appears low.

Consumables

The major competition in this area comes from Rexnord, Webster and Can-Am. The key competitive factor in the supply of consumables is local supply and price. Mills personnel reiterated that local supply and competitive prices were the determining factors in supplier selection.

6.6 Strategic Implications

Based on the market factors discussed in the preceding two sections, the strategic implications for companies intending to penetrate the Southeast market are outlined below.

- Mill equipment to process SYP must be durable, easy to operate, and easy to maintain. The weight of SYP is significantly different than most of the species of woods process in the Pacific Northwest.

- With some exceptions, local presence is essential to penetrate the local market. Suppliers should be aware of the parochial nature of the market. The geographic size of the market is also a factor for consideration. Representation by sub-region may be prudent.
- Post sale service and technical support is critical. There are case histories of reputable Southeast suppliers that have not maintained this effort, and as a result have lost their market share.
- Local manufacture, fabrication or sub-manufacture were not stressed as factors essential to a local market effort.
- Product quality was noted as the determining factor in equipment selection. Price was the second consideration.

An exception to the above implications are niche market products, or product areas in which there is a thin local supply. In these cases, the sawmill sector is prepared to source supply from a remote location. Geographic consideration is secondary to product selection. The key strategic factor is the ability of the vendor to provide technical support and service on a timely basis, normally within a 24 hour turn around period.

6.7 Creating a Comparative Advantage

The ultimate objective of these reports is to define the market factors critical to the establishment of a comparative market advantage. That is, what does it take to compete in the Southeast market on the same footing as local companies who have succeeded in securing the majority of the market share. Based on the strategic implications noted above, creating a comparative advantage will be influenced by the following.

- Companies should be prepared to invest in the product modifications required by the characteristics of SYP, as the key equipment selection criteria is equipment quality.
- A local presence is essential. A company operation is the preferred set up, as it provides the prospective purchaser the comfort he is dealing with the seller, and not an intermediary. Where an agency agreement is utilized, it is critical that the image of the Canadian supplier not be lost within the agents product mix.
- Highly visible and effective service and technical support is essential. Parts supply on a timely basis is critical. Capable service staff will make or break your reputation in the market, even if your product is of the highest quality.
- Canadian suppliers must break the image of being opportunistic sellers. This reinforces the need for a strong local commitment to the market.
- Suppliers should not underestimate the investment needed to participate in the Southeast market.

If you bring all the above factors together, the only way to be competitive in the Southeast is to make the financial and corporate commitment to an operation in the region. Unless your company enjoys the luxury of a niche product and the market is prepared to entertain foreign supply, your only chance to succeed in the Southeast is to compete on the same footing as local suppliers.

6.8 Project Financing

Project financing is not a competitive factor in the Southeast market.

6.9 Strengths, Weaknesses, Opportunities, Threats (SWOT) Analysis for Canadian Sawmill Equipment Companies.

Strengths

The market perception is that Canadian companies are capable suppliers. This reputation is a function of excellent performance by several Canadian companies with local operations; and market recognition that Canadian companies have leading edge equipment and technology.

With modification, Canadian equipment is ideally suited to the Southeast market. Small log technologies have key applications in Southeast.

Weaknesses

Some market perception that Canadians are opportunistic sellers that do not service what they sell.

Lack of market presence.

Opportunities

The Southeast market is experiencing a boom period.

The goal of the sawmill sector is to improve recoveries from existing log diets. Scanning and optimizing technologies have huge potential.

Computer control systems are in demand, especially for kiln drying and mill process controls.

Threats

Buoyant domestic market is stretching delivery schedules of Canadian suppliers. This reinforces the image that Canadians are opportunistic sellers.

7.0 Forest Harvesting Sector Overview

As discussed earlier in this report, the forest in the Southeast are both softwood and hardwood stands, and in some cases a combination of both. The harvesting equipment used in the Southeast varies based on the location of the softwood and hardwood resources.

The Southeast is typified by flat or rolling topography with very little severe change in elevation. The typical Southern Yellow Pine site, whether natural stand or plantation, is on level well drained land. Where the forest stand diversity exists is in the swamps and marshes that accommodate significant natural hardwood forest stands.

7.1 Harvesting and Thinning Methods

Softwood Harvesting

In softwood forest management, the thinning regimes, both precommercial and commercial, are done on a selective basis. The selective thinning is principally done to maximize the development of the remaining resource. The contractors use rubber tired feller bunchers equipped with felling heads. Equipment brands employed varies by contractor, but on one thinning operation visited, the feller buncher used was a three wheel Hydro-Ax. This feller was selected for its narrow gauge, and competes with both three and four wheeled versions. Shear feller heads are common in pulp applications, but in most cases a high speed circular saw head is mounted on the feller buncher to save fibre.

Of interest, many forest stands, once thinned are used for recreational purposes, primarily hunting. The land is leased to a hunting club for a specified period of time. While it seems unusual, land owners actually thin forests to accommodate hunting leases. While hardly an optimal use of fibre, it is a market reality in the Southeast.

Feller bunchers are normally supported by one or two skidders. On the sites visited the skidders were Caterpillar 518 size machines equipped with hinge style grapples.

Softwood delimiting incorporates equipment unique to the Southeast. The delimiting gate, a product developed in the Southeast, is a grid constructed of square tube and angle iron. The gate structure is anchored by chain to three or four trees. The skidder skids its load past the gate on the skid trail, stops, and backs the trees through the gate. The square tube and angle iron snaps the branches from the tree stem as the force of the skidder drives the bunched trees through the gate. This form of delimiting is by far the most cost competitive in the Southeast.

While the delimiting gates are effective, its use takes a toll on the skidders. As skidders are designed to haul rather than push, the grapples and fenders of the skidders generally develop cracks and require extensive modifications to survive.

The trees, once delimited are bucked to length either manually or with systems similar to the CTR bucking system. Log loaders generally feed the bucking system and load the trucks. Prentice and Barko trailer mounted hydraulic log loaders dominate the market.

The equipment described above is used in selective thinning operations. However, similarly configured equipment would be used to harvest softwood. Like Chile, New Zealand, Australia, and British Columbia, clear cutting is common during Southeast softwood harvesting. Softwood forests are typically on flat well drained land, which accommodates a consistent configuration of equipment. The typical Southern Pine harvesting contractor equipment lists includes:

Rubber tired feller bunchers;
Grapple skidders;
Skidding gates;
Bucking systems and a hydraulic log loader.

It should be emphasized that the typical topography of the softwood forest, and competitive labor rates, **have minimized mechanized harvesting applications.** However, the growing costs of workers compensation insurance is improving the economics of increased mechanization. The contractors interviewed during the market study were analyzing the economics of Scandinavian cut to length systems, processing heads and the other methods to reduce their on the ground work force.

Softwood forest management practises for SYP vary by owner, but most harvesting is done prior to 30 years. Each site has a precommercial thinning and at least two commercial thinnings planned. Pruning regimes are not as predominant as they are in the Radiata Pine forests of Chile and New Zealand, as SYP is self pruning if spaced correctly, and its branches do not tear like Radiata.

The equipment used to reforest the harvested site is consistent to that of British Columbia. The site is cleared with a crawler dozer or skidder equipped with a brush rake. The K-G blade is common in the Southeast for clearing and stump removal. The actual planting sites are established with a bedding plow. The major difference from British Columbia practices is a function of the level terrain in the Southeast, which facilitates the use of a broad range of mechanized planting equipment.

Hardwood Harvesting

The methods and equipment used to harvest hardwood forests vary significantly from the consistent practices employed for softwood harvesting.

Notably, hardwood harvests involve smaller cut blocks of clear cuts and the more selective harvesting by age and specie of hardwood. Equipment used varies based on the harvesting site.

Hardwood forests are typified as upland or lowland stands. Upland forest are commonly dry sites that can be harvested with traditional skidder based operations. Upland hardwood stands account for approximately 75% of the hardwood forest. These stands may also include up to 30% pine concentrations.

The remainder of the hardwood forest is located in lowland sites. These sites are predominantly selective harvest sites. A combination of marsh, swamp, and river or stream lowlands, these sites required specialized harvesting equipment. Low ground pressure tracked or rubber tired equipment is required in most applications.

In the Southeast, it is not uncommon for the skidding to be **performed in the actual waterways**. The logging is undertaken in well planned systematic stages. The land owner will attempt to minimize fishery destruction during construction of the haulage road and during the actual skidding. Logging may be limited to only a few days and at low water to reduce downstream silting of fisheries.

One site visited featured a Bell Track feller buncher for selective felling. A tracked Bell was used to reduce ground pressure, and its ground clearance allowed greater mobility in the swamp.

The felled trees were skidded in the waterways of the swamp by two Timberjacks equipped with low ground pressure floatation tires and hinge style grapples. The most notable feature of the skidders was the wide floatation tires mounted on the skidders. At the landing, the trees were delimbed, bucked to length and loaded. This operation is considered a typical waterway hardwood operation.

In contrast, shovel logging is used to harvest hardwood in lowlands characterized with high soil moisture contents. On these sites, any equipment sitting on one spot for any period of time will be enveloped by the soil. To combat this condition, a growing number of contractors are utilizing "shovels", 60,000 pound excavators converted (on the West Coast) to hydraulic heel boom log loaders.

On these sites, trees are clear-cut in small blocks by a tracked feller buncher. One operation visited was using a newer Timbco. The shovel loader accumulates the logs in piles, and swings the logs from drag line pad to drag line pad to minimize soil compaction. If the ground is more stable, the loaders will shovel using only track pad width to minimize soil compaction.

The hardwood products sector is a significant opportunity in the Southeast sector, to the extent that hardwood forestry sites are managed and planted. The growing cycles vary by specie with an average harvest age of 60 years. Hardwood plantation management programs are designed to maximize growth by minimizing rot.

7.2 Use of Contractors

All the thinning and harvesting is contracted. Typically, the large integrated forest operators manage their resources in-house and contract site prep, planting, thinning, and harvesting. It is traditional for long term relationships to result in long term harvesting agreements. These long term agreements and contracts are essential for the contractors to secure financing for equipment purchases.

Forest owners, particularly the larger integrated firms, manage their resource from nursery to harvest, and attempt to specify equipment selection at all stages of management. Conversely, the contractor uses the equipment that he can cost effectively operate to compete per the terms of the contract. One piece of equipment the forest owner will enforce is feller buncher head selection. Shear heads are accepted for pulp wood, but saw heads are preferred to save fibre in saw logs.

7.3 Existing Equipment

While most major harvesting lines are represented by comprehensive dealer networks in the market, the list below highlights the equipment operating on the sites visited.

Feller Bunchers: On the sites visited only two tracked feller bunchers were seen, namely Bell and Timbco. Rubber tired feller bunchers are more common, particularly three wheeled Bell and Morbark units, and four wheeled Hydro-Ax and John Deere machines.

Skidders: Caterpillar, John Deere, Clarke, and Timberjack all equipped with hinge style grapples.

Loaders: Trailer mounted Prentise and Barko loaders.

Hydraulic Log Loaders: Kobelco and Link-Belt equipped with Pierce Pacific logging fronts.

Portal Cranes: Almost all mill in the Southeast are equipped with at least one portal crane. Kockums, Fulghum, and Harnischfeger cranes were commonly equipped with Mack Grapples.

Wheel Loaders: Common in all the mills visited. A wide variety were seen with an equally wide variety of attachments manufactured by an even greater range of attachment manufacturers.

7.4 Existing Competition

Like British Columbia, all the major harvesting equipment manufacturers are represented through traditional networks. Where the Southeast differs from Chile, New Zealand, Australia, or British Columbia, is with the number of attachment manufacturers that service the region.

For WCWMSEA members like IMAC, the number of competitors in this region make it essential to find the right person to service the area. The attachment manufacturers active in the area, most with a resident representatives, are Pemberton, Rockland, JRB, International, Young, Pierce Pacific, Esco, Rotobec, and American Coupler.

7.5 Channels of Distribution

Local representation is critical to success in this market. Like most of the markets visited on the Association's market studies, Canadians are viewed as opportunistic sellers. Locals are knowledgeable about the Canadian equipment available, but a perception of sporadic support tends to minimize any real commitment to Canadian products.

7.6 Customer Service Expectations

Most harvesting contractors are well equipped to handle traditional servicing requirements. The equipment in use is simple to operate and easy to service.

Availability of parts and prompt service are market expectations. Harvesting contractors are sensitive to the delivery time required for spare parts, so an established network is essential when contractors make equipment selections.

7.7 Customer Training Requirements

As more sophisticated equipment is introduced, more training will be required. The typical contractor requires little operator or service training. In discussions with harvesting contractors and operators of mobile mill equipment, training was not an issue. Parts service remains the priority.

7.8 Financing Requirements

Generally, a harvesting contractor's ability to finance equipment purchases is directly related to the contracts negotiated with the timber owner. In most cases the harvesting contractor will negotiate a financing package with a bank using the harvesting contract as security.

Caterpillar and John Deere dealerships have the ability to offer a range of financing packages including purchases, rent to own, and lease agreements.

In some instances the forestry company may incorporate the equipment financing as part of the harvesting contract. This has been done to encourage the purchase of specific equipment desired by the timber owner. In these instances, the harvesting contractor would have his payments deducted from the contract payments.

For WCWMSEA members, although financing is important in equipment selection decisions, providing a financial package is not an essential requirement. There are a number of well established financing entities in the market with whom the harvesting contractors have established relationships.

7.9 Sales Potential

Given the physical size of the Southeast market, it is unrealistic to project sales levels for WCWMSEA's existing harvesting equipment members. Alternatively, it would be more appropriate to relate sales potential to market potential for specific equipment manufacturers.

Skidders

Potential for special application skidders like the KMC exists in hardwood operations. Environmental concerns about wetland harvesting conditions are creating a significant market opportunity for tracked skidders. The anticipated environmental concern about tire rutting in softwood applications will favor the use of tracked skidders in the future.

Mechanized Felling

With the market acceptance of the Timbco feller buncher and the introduction of shovel logging techniques, there is an emerging market for West Coast style excavator conversions and feller heads in the hardwood forests.

Attachments

Grapples, hydraulic log loaders, wheel loaders and skidders, are common in Southeast forests. All sawmills (wheel loaders) and harvesting operations (hydraulic log loaders and skidders) include grapples in their operations.

To access this market, a continuous presence in the market is required. It is important to know that Canadian products from Quebec, and products from Washington and Oregon, are common in the Southeast. Therefore, with the proper distribution and representation this market is viable for Western Canadian suppliers.

This is also true for attachments utilized in site preparation and road building.

Trucks

The Southeast is typically a Class 8 truck market. Average timber hauls to mill are 50 miles one-way. Given the volume of wood harvested and transported, a huge market exists for planned replacements of transport equipment.

In conclusion, the Southeast market for harvesting equipment is equal too or better than the market in Western Canada.

7.10 Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis for Canadian Harvesting Machinery Suppliers

Strengths

Proven and durable products.

Equipment designed and recognized as efficient and cost effective.

Weaknesses

Limited representation or continued presence in Southeast market.

Canadian companies viewed as opportunistic sellers.

Established keen competition from local manufacturers, who enjoy market patronage.

Opportunities

Trend to more labor cost reduction methods.

Trend by mills to demand better quality logs through equipment specification to reduce log damage.

Threats

Well established and highly competitive supplier base and dealer network.

Harvesting equipment market is extremely price sensitive.

APPENDIX

8.1

CONVERSION TABLES

CONVERSION TABLES

SOUTHEAST UNITED STATES MARKET REPORT

1 ACRE	=	0.405 HECTARE
1 HECTARE	=	2.471 ACRES
1 CUNIT	=	625 BOARD FEET
1 CUNIT (SOLID)	=	2.832 CUBIC METRES
1000 BOARD FEET (LUMBER, FULL SAWN)	=	2.358 CUBIC METRES
1000 BOARD FEET (LOGS, AVERAGE)	=	4.530 CUBIC METRES
1 CUBIC METRE (LUMBER)	=	424 BOARD FEET

APPENDIX

8.2

TRIP ITINERARY

TRIP ITINERARY

DATE	NAME	TITLE	COMPANY	ADDRESS	CITY	STATE	ZIP
APRIL 25/A.M.	JERRY M. BROWN	MANAGER	MID-SOUTH ENGINEERING CO.	2814 MALVERN P.O. BOX 1399	HOT SPRINGS	ARKANSAS	71902
	AL McINVALE	MANAGER	MID-SOUTH ENGINEERING CO.	2814 MALVERN P.O. BOX 1399	HOT SPRINGS	ARKANSAS	71902
	LARRY STEVENS	PRESIDENT	MID-SOUTH ENGINEERING CO.	2814 MALVERN P.O. BOX 1399	HOT SPRINGS	ARKANSAS	71902
APRIL 25/P.M.	EMIL LYNCH	MAINT. ENGRG. MANAGER	WEYERHAUSER FOREST PRODUCTS CO.	P.O. BOX 7	MOUNTAIN PINE	ARKANSAS	71956
APRIL 26/A.M.	M.D. BUD SHRUM		THE BOWLIN CO. INC.	P.O. BOX 3007	SHREVEPORT	LOUISIANA	71133-3007
	CHARLES F. BOWLIN JR.	PRESIDENT	THE BOWLIN CO. INC.	P.O. BOX 3007	SHREVEPORT	LOUISIANA	71133-3007
APRIL 26/P.M.	JOHN M. EUBANKS	MANAGER ENGINEERING	INTERNATIONAL PAPER	P.O. BOX 3001 3000 KNIGHT OFFICE PLACE	SHREVEPORT	LOUISIANA	71130-0001
APRIL 27/A.M.	JAMES L. COWAN	PRODUCTION SUPERINTENDENT	POTLATCH CORPORATION	P.O. BOX 390	WARREN	ARKANSAS	71671
APRIL 27/P.M.	MR. HERMAN BOYKIN	PLANT MANAGER	GEORGIA PACIFIC	P.O. BOX 1511	EL DORADO	MISSISSIPPI	71731-1511
APRIL 28/A.M.	MR. JAMES EDWARDS	SUPERVISOR	C/O MARTCO SAWMILL	P.O. BOX 70	MORROW	LOUISIANA	71356
APRIL 29/A.M.	MR. BUTCH MORGAN	SAWMILL MANAGER	C/O MARTCO SAWMILL	P.O. BOX 70	MORROW	LOUISIANA	71356
	MR. CRAIG MAY	MAINT. PLANNER	CAVENHAM FOREST IND.	P.O. BOX 235	FERNWOOD	MISSISSIPPI	39635
APRIL 29/P.M.	MR. GENE LAYTON	OFFICE MANAGER	GEORGIA PACIFIC	P.O. BOX 551	COLUMBIA	MISSISSIPPI	39429
	MR. H.C. HERRON	PLANT MANAGER	GEORGIA PACIFIC	P.O. BOX 551	COLUMBIA	MISSISSIPPI	39429
MAY 2/P.M.	MR. J.W. COLE	PLANT MANAGER	FEDERAL PAPER	P.O. BOX 1437	AUGUSTA	GEORGIA	30903
MAY 3/P.M.	MR. ED EARLEY	FORESTER	DEMPSEY WOOD PROD. INC.	DRAWER 38	ROWESVILLE	SOUTH CAROLINA	29133-0038
MAY 3/A.M.	MR. ROBERT A. DRUMMOND	CONSULTING FORESTER	MILLIKEN FORESTRY COMPANY INC.	P.O. BOX 23629	COLUMBIA	SOUTH CAROLINA	29224-3629
MAY 3/A.M.	MR. CHESTER M. KEARSE, JR.	OWNER	KEARSE MANUFACTURING COMPANY INC.	P.O. BOX 138	OLAR	SOUTH CAROLINA	29843
MAY 3/A.M.	BO SECKINGER	CONTRACTOR	COLLUM LUMBER MILLS INC.	BOX 535	ALLENDALE	SOUTH CAROLINA	29810

APPENDIX

8.3

MEETING NOTES

MEETING NOTES
SOUTH EAST UNITED STATES MARKET STUDY

April 25, 1994

Mid-South Engineering Co.
Hot Springs, Arkansas
Jerry L. Brown, Manager
Al McInvale, Manager
Larry Stevens, President

Most of the softwood timber resource is privately owned, and with few government controls.

Most of the plantations are Southern Yellow Pine, mostly loblolly but also some slash. Northern areas (e.g. Missouri) also have jack and red pine. Ideal plantation rotation occurs at 35 year growth.

There is an over abundance of hardwood that is being under utilized in the market. There are evolving hardwood applications in OSB, Parallam and plywood, using second growth poplar. Like aspen, it has a 40-50 year rotation. The majority of the hardwood market now is in oak products.

In the estimation of Mid-South, the Southeast region is producing approximately 13 billion board feet of lumber per annum. It is estimated that this number could increase to 14.5 billion with improved recoveries in the mill. Mid-South believes the top end to the market is 16 billion board feet. With a trend to engineered products, lumber production could decrease over the next five years.

Integrated mills have a big advantage in the Southeast, forcing out many of the smaller independents. There were three green field projects last year but modernization's were the trend in the sawmill sector. Expenditures for optimization are increasing with log prices.

Mid-South believes that at this point in time the U.S. has better sawmill recovery rates than B.C., because of the plantation supply of timber, and the fact small timber is going to pulp mills. Mid-South feels the old generation KCC Chip-N-Saw is on the way out, and sharp chains are on the way in. Mid-South also feels that curved sawing is the wave of the future.

Trends in the industry include new engineered products, small log retrofits, and a boom in OSB although Mid-South believes there is a market skepticism about the use of OSB.

Canadian companies in the Southeast have acquired the following reputations: "They don't service the market well, and they are perceived as being too far away". Mid-South did elaborate on a couple of WCWMSEA companies that have been successful in the Southeast, as a result of technology and service. Examples of two Canadian companies with bad reputations were also provided, these reputations resulting from poor response/service records.

Very little European sawmill equipment is seen in the SE. The predominant reason is the fact European equipment was designed for different log diameters than those of the Southeast. Valon Kone had to adjust to SYP processing requirements when it first entered this market.

COE is the leader of choice. Three-quarters of the world production of LVL is in North America, one-half of which is in Truss Joist MacMillan.

MS believes log prices will go down in the fall, and rebound in December/January.

In most house construction in the SE, studs are Canadian, beams and trusses are SE product. Finger jointing is developing in Southeast as a result of the need to process waste materials.

Cogeneration is not a big market in the SE, as it is not yet economic. Power is still inexpensive, with coal generated the cheapest.

Kilns: 100% of lumber production is dried. Limited hot oil kiln use. Major players are Wellands and Irvington Moore. There is no current expansion in the kiln business, as companies are upgrading kilns to improve production. Computer control systems have a huge application in this regard.

Arkansas is experiencing a 30% forestry sector growth. One in six jobs in the State is a forestry job. Growing stock has increased 15-20% since 1930. 160,000 private independents own 57% of the forest. GP has 600,000 acres and IP has 1.2 million acres. 58% of the Arkansas forest is hardwood.

Thinning of plantation forest occurs twice, first at 12-15 years, second at 18-20 years. 600-800 stems per acre are planted, thinned to 150 on first thin, 80 on the second and final thinning.

April 25, 1994

Emil Lynch, Maintenance/Engineering Manager
Weyerhaeuser Forest Products Company
Mountain Pine, Arkansas

This site includes a sawmill and a plywood mill.

The sawmill produces 68 million board feet per year on one 8 hour shift, with some weekend overtime as dictated by market demand. The plywood mill runs seven days per week.

The sawmill processes softwood only. The log diet averages 14 inch diameters with the smallest top six inches. Logs are debarked after bucking, maximum tree length is 60 feet. Log volume in the yard varies but it is commonly one month inventory.

All harvesting is done by contractors. Climate is fairly dry from May to November, forests are closed in wet months, December through April. Three-quarters of logs are bought from independent log suppliers. Weyerhaeuser will provide only 20% of its log supply from its forests until the turn of the century, at which time its forest will mature and it will have "wood aplenty".

It is likely year 2000 supply of new timber will require sawmill upgrading, due to smaller log diameters.

The existing sawmill equipment includes:

2 30 inch Cambio debarkers.

1 Nicholson A5 22 inch debarker.

1 KCC Mark II Chip-N-Saw.

2 Letsons & Burpee 8 foot band saws, with Weyerhaeuser designed "Accu-Ray" Transverse scanning.

KCC resaws with ATI optimization.

USNR carriage, edgers with scanning.

Salem resaws.

2 Irvington Moore trimmers.

Irvington Moore bin drop sorters, PLC upgraded.

Consumables (bearing and chain) are bought based on price sensitivity for annual supply, but Rexnord is a favored brand.

Lumber produced includes 1, 2, 1.25, 1.5, all in widths of 4 or 10.

Chips are railed to pulp mills. Dried chips are also used for particleboard.

Emil Lynch feels Chip-N-Saws are on the way out over the next 5-10 years. He also felt that useful life of a scanning system is 5 years.

All lumber produced in this mill is destined for domestic house construction. Some is high grade material, but none is stress graded. No export products are produced.

The plant is buying hog fuel to run two boilers on site for kilns and veneer dryers. There are 2 Welland and 3 Irvington Moore, all steam. Hog fuel is \$10-12 ton, and the price is expected to rise.

Weyco has 9 mills in South. Each mill works independently. Engineering is done locally by contractors. Major decisions will be coordinated through mill group.

An attempt is being made to merchandise logs so that log supply will better match mill scheme. At the moment, maximum log haul distance is 50 miles. Increasing this limit to 100 miles is under review.

Service: USNR is good, but weak in going beyond existing product line. The company flaw is its poor flexibility and poor follow up. Its strength is its total product line and reasonably good product. CSMI has bad image because of constant change in product line and management structure.

Operators in this mill earn \$9-10 hour, with a 50-60% burden for benefits.

Average annual capital budget is less than \$1 million. However, the budget in the last two years was about \$2 million annually.

Upgrade priorities include new sorter, and scanning at trimmer. Newnes is the leading candidate for the sorter, as Irvington Moore has a "black mark" at this mill.

April 26, 1994

M.D. Bud Shrum, Manager
Charles F. Bowlin Jr., President
The Bowlin Company, Inc.
Shreveport, Louisiana

Bowlin Company is one of the leading engineering consultants in the Southeast. The company's expertise is in sawmill design and log processing technologies. The company has also designed OSB plants and plywood mills. The company uses an external for design service. Bowlin also has a shop that manufactures materials handling equipment, and it subcontracts some equipment manufacture.

In Shrum's opinion, the headrig of choice is the sharp chain. Some double end dogging has developed. Curved sawing has yield applications for Southern yellow pine, as 8-10% yield improvements are predicted. However, economics of system are not yet proven.

Bowlin Co. has no stereotype in preferred mill equipment. Will design based on product specs. Note: Shortly after the date of this meeting, Bowlin lost the design contract for Georgia Pacific's El Dorado, Arkansas, U.S.\$33 million modernization. Apparently, Bowlin insisted on a mill design that was unacceptable to GP, and would not entertain GP's design philosophy. GP decided to look for an alternate engineering consultant.)

Major equipment suppliers include CSMI, USNR, Newnes, VKB. Europeans have not been successful, because equipment is too sophisticated for maintenance requirements in Southeast. Market wants simple durable equipment. Down time is a key issue. Zero down time is always the target. Companies are willing to pay extra for equipment that can make that claim, although they are price conscious.

Original Valon Kone equipment in south was designed for European market, the company had to redesign to suit market factors.

Most vibrating conveyers in the market are considered too light with significant breakdown problems. There is a need for heavy duty equipment, even at an additional cost, to prevent down time.

In SE, government timber is not an issue. Processors have large fee land holdings or buy from independents. Larger companies own 500 - 1.5 million acres, 20,000-40,000 acres are coming into rotation annually.

9 new OSB plants are being considered for the Southeast, as well as 1 particleboard plant. Several new sawmills are expected, but none defined as yet. Reman will develop over the next decade. It is a market niche on which nobody has capitalized.

Crystal Ball Predictions: Present level of activity will continue for 2-3 more years. Deferred maintenance is happening and it is exhausting the pipeline for parts and materials.

Perception of Canadian Suppliers: Both gentleman conveyed a mixed bag of performance. They contested that Canadian suppliers don't do what they say they will do. They feel performance is the issue. CSMI has as poor a reputation as

possible, and across the industry sector, the company is not trusted. Apparently, there remains a perception in the market that Kockums supplies Canadian clients first. This image problem has spread to other Canadian suppliers, as a general market perception. Canadian suppliers rated highly include Newnes and VKB.

(Shrum used an analogy to describe the industry emphasis put on hardwood and softwood sawmills by the forestry sector). The hardwood industry is in the Chevrolet Geo range, while the softwood industry is in the Oldsmobile range.

Bowlin Co. feels that there will be several green field projects, totalling U.S. \$250 million, to use the new rotations of plantation resource. Upgrades will be in the \$25-30 million range. (No time frame was noted for these expenditures.) Shrum stated that 90% of Chip-N-Saws will be replaced to optimize recovery. Sharp chains and bandsaws will be the replacements.

Kilns: Wellands and Irvington Moore have market share. CSMI, through Hemco, are not successful. COE is not viewed as being price competitive, as it is viewed as a company that makes its money on veneer lathes and dryers.

Cogeneration: Region not as active because States have not passed laws, and power companies have resisted buying power. There is no perceived need for cogen, as there is no power shortage.

Consumables: On the bearing side, Rexnord seen as the leader in the market. In Chain, names noted were Rexnord, Webster, Portalloy and Can-Am, in that order.

April 26, 1994

John M. Eubanks
Manager Engineering
International Paper
Shreveport, Louisiana

John opened the meeting by offering the fact he was looking for equipment for a log merchandising facility for a sawmill and OSB mill. He is also looking for small log processing technologies for a proposed new sawmill. Eubanks mentioned he was considering two Western Canadian engineers for the merchandising facility. IP is currently using a consultant from Fredericton, New Brunswick, for OSB work.

International Paper's Southeast operations are as follows:

- 9 sawmills, with production ranging from 75-140 million board feet, on two 8 hour shifts.
- 1 OSB facility.
- 2 plywood mills, located on sawmill sites.
- 2 pole treating facilities.
- 2 lumber treating facilities.
- A green field OSB facility, in Texas, to be kicked off in July 94.

(Note: the OSB facilities are pine, not hardwood.)

The smallest diameter logs processed by IP's chip & saw facilities are 9 inches, and 12 inches on band saw mills.

Eubanks felt that end dogging had defined advantages in sawing, but the systems remain price prohibitive. He noted that these systems make it easier to scan logs. Alternatively, he acknowledged that sharp chain saws with an extended infeed were the current headrig of choice. He also noted that many mills are adopting curved sawing, as there is a a lot of sweep in southern yellow pine.

Equipment Notes: Eubank communicated his observations that ARI and USNR were the best systems for scanning; CAE for flakers; Optimil for infeeds. All equipment evaluation is done at the mill level, with assistance by the corporate office.

IP is upgrading its existing facility in Henderson, Texas, in both primary and secondary breakdown.

IP is moving toward log merchandising, so all scanning will be done in the wood yard, and not in the log yard.

IP's mills produce primarily dimensional lumber, 2 inch standard and 1 inch fall down. Widths include 2, 4 6 and 12 inches. Lengths are 8 - 20 feet. Most of the lumber is produced for the domestic market, but one band saw line in Arkansas produces about 50,000 board feet a day of pine for export to Germany, England and Italy.

Most of IP's plantations are in the 18-20 year old range. Thinning regimes occur at 15 and 23 years. IP is a net buyer of logs, from wherever they can be sourced. The

company is currently in the market to buy logs. IP processes only pine, no hardwood.

Market Trend: Eubank would not venture a guess as to where the market will go. With timber prices going up in the West, he felt this was a major advantage to the Southeast mills. He did not feel offshore pressure was a factor in the local market.

Opinion of Canadian Suppliers: Eubank noted that he has had good luck with Canadian suppliers. The equipment purchased in the past was invariably of good quality. Pricing has always been competitive (not based on exchange). Canadian suppliers have to be competitive in IP's bid process. Eubank encourages new players in the market. He just bought a German dryer. He also mentioned that he has a high opinion of one particular WCWMSEA company, and that the company's location in B.C. is not an issue in selecting it as a supplier.

He noted that there are few European suppliers of sawmill/plywood equipment in the market, and all IP's equipment has been purchased from North American suppliers. He feels the failure of the Europeans is the result of poor marketing, citing Linck's failed attempt at market penetration. He did not cite equipment weakness as a reason for non-success.

Eubank commented on the proposed boom of OSB. He noted he knew of 12 new facilities planned in the SE. He felt OSB was a superior product, and the strength is as good as plywood. He feels plywood will become a niche market product.

Eubank noted that IP has used HALCO for sawmill modeling, and that PS&E is on bidders list for OSB facilities.

He was interested in the WOOD TECH show in September, as he wants to meet consultants with OSB capabilities.

April 27, 1994

James L. Cowan
Production Superintendent
Potlatch Corporation
Warren, Arkansas

In late January, Potlatch started up a new sawmill and planer mill operation on this site. At the time of this meeting, the old sawmill was still in operation, but it is scheduled to be closed once the new mill had been debugged and is producing at capacity.

The new mill is designed to produce 103 million board feet per year. Potlatch claims the new mill will "achieve 40% more production with only 5% more logs than currently used on the site". This may be achievable because the old mill is processing large diameter logs with old steam carriages. Rerouted to the new mill, recoveries on these larger logs should be high.

We toured the mill and it was an excellent facility, well designed with a highly functional work flow, complete with an overhead crane to move material and equipment.

Log Diet: Cowan felt the diet for the new mill was small, as the average log volume was about 67 board feet. Minimum diameter processed in the new mill is 5.5 inches, smaller diameters to the chipper. It should be noted that pulpwood is culled from saw logs in the yard. The log diet for the new mill will change once the old mill is closed, as the average log volume in that mill is 115 board feet.

The new mill processes 10-20 foot lengths. Log yard lengths are up to 67 feet, with no merchandising in the forest.

New mill scans logs on the top step of the step feeder. The feeder is a local clone, and it is running too slow. Mechanically, the valves and hydraulics were loose, and it had a vibration at the end of the stroke.

The mill has one VKB Mark V 35C debarking line, operating at 270 feet per minute.

New Mill Equipment:

The mill engineering was done by Mid-South.

CSMI Slant Head Rig Carriage.

CSMI Sharp Chain System with a Twin MacDonough 6 foot band saw. Kockums Double Horizontal 6 Ft Resaw, roll bed infeed.

1 CSMI Edger optimizer. Cants from headrig go to CSMI versa gang line, slabs go to CSMI edger.

Trimmer and sorter (60 bin) both CSMI, 100 lugs per minute in trimmer.

Lumber sizes: 1x4, 1x12 in 8's through 16's. 2x4, 2x12 in 8-20's. 1.25 in 8-16 lengths. Most production is for the domestic market, but some product is exported to Mexico. The new mill is not dimensional lumber driven. It is geared to produce what is moving in the market. Low inventory is a target.

Mill is running 2 shifts per day, 5 days per week. It hopes to evolve into 14 hour shifts once the mill is running smoother. Norm has been 8 hour shift, then maintenance. Site currently employs 204 people, some of whom will be lost from the old mill when it is closed. Wage rates are in the range of U.S. \$8 - 12.20 per hour, with Sawyers and Sharp Chain operators at the top of the scale. The mill is unionized and Cowan feels the agreement has taken incentive/performance factors out of the mill operation. Use of incentives and benefits is lost in this milieu.

Recovery rate 65% lumber, 11% by weight is bark and sawdust, chips are 1.7 tons per thousand board feet. There is a 6-7% loss green to dry. The mill processes mostly loblolly. It is expected to take 1 year to hit production targets established for the mill.

New mill has high temperature Welland kilns with computerized control systems. Older kilns are still in operation drying 1 inch material. Mill has an on-site power plant.

Equipment Purchase Decisions: Hemco and CSMI equipment was purchased on the basis of reputation. USNR and Applied Theory were perceived as a good product with strong post sale support. The descramblers have not been a success, as more durable equipment will be required to move the densities of SYP. Cowan cited that SYP weighs 68 pounds per cubic foot, or 5.2 pounds per board foot green; 2.3 lbs per board foot dry.

The new carriage headrig is targeting 700 logs throughput per shift. The sharp chain capacity is 6 logs per minute by design.

Canadian Suppliers: Cowan recognized Newnes, VKB and Nicholson. He felt service was key market factor for Canadian supplier success, noting that VKB did an excellent job servicing its debarker. He felt the key features for sawmill equipment are structural integrity, user friendly control panels. His attitude is you pay for the right equipment now, or you will pay for it down the line.

April 27, 1994

Herman Boykin
Plant Manager
Georgia Pacific Sawmill
El Dorado, Arkansas

GP is planning to construct a new mill on the El Dorado site. The roof on the existing facility was destroyed during an ice storm last winter, and existing mill remains in operation with make-shift replacement roofing. The decision to construct the new mill was made before the roof damage occurred.

Existing sawmill operates on two 8 hour shifts per day. It is over 20 years old, and it has 2 headrig carriage breakdown lines. Horizontal and vertical resaws are used for secondary breakdown. Maximum log length is 8 feet, 6 inch minimum diameter. No treating is done on site.

The mill is exporting 20 million board feet of grade cuts to Italy, Spain and Germany. Lower grade cuts are also going to the Caribbean and Mexico.

Bowlin recently lost the design contract for the new mill. Apparently, Bowlin would not accept GP's philosophy on how the mill should be designed. GP's focus for the new mill will be grade cuts for export, so scanning technology will be emphasized to the max. Targeted capacity is 102 million board feet per annum.

Piece count will be important, due to smaller log diet. New mill will have a small log line that will process logs up to 16 inch diameter. Larger logs will go to a headrig carriage. Because the mill is product driven, it will have a quad instead of a twin to allow flexibility. Curved sawing is a key item.

All merchandising will be done in the log yard, no bucking will be done in the forest. Boykin feels improve scanning now available will be key. He has stayed abreast of the trends by attending industry seminars.

Equipment selection process will be based on:

- 1 - Lowest price/delivery; and;
- 2 - Service.

Boykin mentioned that he would pay an extra 5% to get the right equipment. Board feet per man hour is the key equation.

Canadian Suppliers: Boykin has no particular stereotype of Canadian suppliers. Distance is not a factor in selection process. He recognized that most key items are supplied locally.

He had no feedback on European suppliers. He feels quality of product is the key, and stereotype is that Europeans have not met that requirement. However, in general he is not familiar with European equipment as there is little in the market, hence its capability/quality is unknown.

Market Trends: Boykin feels market will be good for several years. Sustained yield is the key factor. Maximize production from existing input of logs will be an industry goal. It means more optimization in the sawmill sector.

Log Supply: El Dorado mill stores 7-8 million board feet on wet deck, rotating the stock in summer and building up in the fall for the winter harvesting closures. Not all logs processed are from GP land. In a 125 mile radius of the mill, GP has 1.7 million acres of plantation. However, at the current moment, GP buys 50% of its logs on the open market.

Boykin noted that a lot of forests are owned by oil companies, who manage forest professionally based on BMP, or "Best Management Practices". Pruning and thinning are key components of this practice, hence excellent quality of timber. Boykin feels corporations are the best stewards of land because they can provide best management of the resource. He noted that thinning is done for pulp, but primarily to optimize the remaining growing stock.

GP Structure: Plants make equipment decisions. GP allows decentralized decision making. GP has its own export division. He was not familiar with any decisions that had been made by GP regarding OSB.

April 28, 1994

Mr. James Edwards
Supervisor
Roy O'Martin Lumber
Morrow, Louisiana

Note: The MARTCO site includes a hardwood sawmill and a waferboard mill. Edwards is the Supervisor of the hardwood mill, which was the facility we discussed and toured.

Log diet for the mill included several hardwood species, including red oak and a variety of other oaks, sap gum, ash, hickory, and tupalo. The day of our visit the mill was processing sap gum.

Martco has a large forest holding. Most log sorting is done in the forest.

The mill is producing 120,000 board feet of red oak per 10 hour shift, 2 shifts per day, 4 days per week. Mill produces 140,000 board feet of sap gum per shift.

The mill produces random width materials to order. Quality rules everything in this mill. The smallest size processed is 3.25 inches, largest is 12 inches wide. Railroad tie standard is 8x10 or 7x9. Note that all production is to client specifications.

Products include railroad ties, lumber for furniture, molding, flooring, and paneling. There are two certified graders on the green side. Almost all of the production is dried in kilns. The exclusion is railroad ties, which are shipped green and treated off site. Edwards noted that some product went to Japan, but he was not sure which products were exported.

Edwards clarified that the hardwood market does not share the instability of the pine market. Prices are high and very stable, primarily because random size cuts are made for customers on an order basis. Martco's sales arm is located in Alexandria, LA.

Mill Equipment:

1 Rosser Debarker, 10 inch diameter minimum, 50 inch maximum, 10 foot length minimum, 22 feet maximum. Average length is 16 feet. Lengths processed over 18 feet are typically by special order.

Logs are bucked first. Scanning is used throughout the mill.

2 USNR slant head rig carriages, and 1 vertical resaw.
Schurmann Top Arbor board edger, ATI optimized.
Schurmann Gang cant edger.
Hemco scanner on LSI trimmer.
LSI 30 bin green sort.
Dried lumber is grader sorted.

Edwards noted that most equipment in the mill is from the U.S.. He was not that familiar with brand names, because most of his experience had been on the plywood mill side. He was completely unfamiliar with Canadian sawmill equipment suppliers.

April 29, 1994

Mr. Craig May
Maintenance Planner
Cavenham Forest Industries
Fernwood, Mississippi

The Cavenham mill began operation in 1984. May joined the mill in 1987. The operation was well managed and extremely well organized, a fact May took notable pride in. The site has a sawmill and a planer mill.

The mill produces 180 million board feet annually, 2 ten hour shifts per day, 5 days per week. Site employs 175 people in total.

Log Diet: All southern yellow pine. Minimum 6 inch top. Average log size is 10 inch top. Large end butt 28 inches. The mill was designed to process 10-12 inch logs. Sawmill lengths minimum 12 feet, maximum 20. Tree lengths trucked up to 60 feet max. Some precuts are made in the forest. 75% of timber at mill is tree length.

Lumber produced includes 1.25, 2 inch in 4 - 12 inch widths, in 8 - 20 lengths. All lumber is kiln dried, direct fired.

Mill Equipment:

Tree length debarking is done by 2 Cambio Super 30's, with VKB infeeds.

ATI OPCON scanning in-line after debarking.

1 KCC carriage, Salem upgrade, with ATI scanning.

1 Sharp Chain made by KCC (Canada), twin chipping heads, step disk.

Cants go through 2 Schurmann gangs, 8 inch and 12 inch, optimized with ATI scanning.

Side boards to a Schurmann edger, ATI optimized.

Hemco transfers and decks.

Irvington Moore trimmer, 70 lugs per minute, ATI optimized.

Hemco sling sorter, 72 lugs per minute

5 McConnell direct fired high temperature kilns, 230-240 F, 24 hour cycle, dried to 17% moisture content.

Planer mill has a Newman 990.

Cavenham looked at all equipment when it was building this plant. Company did not have equipment stereotypes when shopping.

Harvesting & Timber Supply: Cavenham owns land that produces about 40% of its log supply, the remainder comes from independents. All harvesting is contracted. Cavenham has moved away from the use of shearing heads and back to circular saw heads, because of fibre lost in the cut. The mill keeps stores about 7,000 cunits (19,820 cubic metres) of logs in the yard. That represents about seven days inventory, which is roughly 1,000 cunits per day. An additional 6,000 cunits are kept under water as a reserve.

Cavenham has a stud mill in Holden, Louisiana, and 2 other contract mills. Cavenham is owned by Hanson, a large conglomerate that also own Smith Corona (typewriters), Peabody Cole, Jacuzzi.

There is no energy plant on site. Hog fuel is trucked to paper plants for \$6-7 per ton. Hog fuel can not be landfilled in Mississippi.

Image of American operations of Canadian Suppliers: In general, image is good. Local supply was mentioned as the critical marketing factor. Good service and follow-up is also important, one day service is the standard noted. Companies including VKB, Newnes were noted.

May stated that he feels there is a price/quality relationship in equipment supply. His instinct makes him opt for the best system, if it is within a 10% variance of the lowest price. Durability of equipment is key when processing SYP.

Cavenham has a \$1 million per year upgrade budget, but this typically does not include major capital items.

April 29, 1994

H.C. Herron, Plant Manager
Gene Layton, Office Manager
Georgia Pacific
Columbia, Mississippi

Note: This mill is 25 years old and is in serious need of updating. It is of the same vintage and need of upgrading as the GP mill at El Dorado. In our tour of the mill, it was not uncommon to climb over wood strewn on the cat walks.

Log diet: Small end 5 inch minimum, 18 inch butt maximum, all SYP. Maximum 60 foot tree length. Bucking to length is a manual decision. Debarking is done after bucking.

Production: 8 - 20 foot lengths in the sawmill, 2 - 20 foot lengths in the planer mill. 1x4, 2x4, 2x6. Annual production is 108 million board feet, 2 ten hour shifts per day, 5 days per week. 108 people employed on site. Some production is exported, but neither Layton or Herron were sure of product or markets.

Mill Equipment:

Two VK 600 debarkers.
One KCC Mark II Chip-N-Saw.
Cants go to a KCC single vertical arbor.
Side boards go to a KCC optimized edger.
Hemco optimized trimmer.
Hemco sling sorter.
3 kilns, 18-22 hour cycle, to 12-15% moisture.
Shavings are burned in boiler house.

Planner is a Newman 990.

Mill has no on site energy system. GP paper mill uses chips. Hog fuel is sold for \$6-8 per ton. It was noted that GP's historical focus has been on paper, and Chip-N-Saw lines were employed to simplify production of chips for the paper mills.

Virtually no capital expenditures have been made on the mill over the last 5 years. Annual capital maintenance is about \$200,000 per year. GP plans to replace KCC optimized edger at some point in the future, at a budgeted cost of U.S. \$1 million.

Layton noted that equipment purchase decisions opt for proven technology, and he won't sacrifice quality for price. However, he then qualified there will be a price sensitivity factor in equipment selection decision.

Major investment decisions are made by GP engineering staff, smaller investment decisions are made at the mill level. GP mill personnel do travel to identify equipment trends.

Layton noted that this mill does not have a familiarity with Canadian suppliers, largely because of low exposure to their products.

Note: Opportunity for member companies, GP is looking for an optimized edger for this facility.

May 2, 1994

J.W. Cole
Plant Manager
Federal Paper
Augusta, Georgia

This site included a sawmill as well as a large paper mill. Federal is a public company that trades on the NYSE.

Mill produces 500,000 board feet per day, averaging 17 hours production per day in 2 shifts. 125 plant hourly staff, 15 salaried, for 140 in total. It is a unionized mill, but only forty of total mill complement are in the union. Pay scales are relatively low, so most of the mill workers can not afford to strike. Average mill wage is U.S. \$9.10 per hour. Good benefits package. High turnover in entry level positions, but senior positions are stable.

Log Diet: All log supply is loblolly SYP. 20% of supply is from Federal Paper plantation, 80% is from independent private owners. All logs are tree length, except bad logs which will be bucked in the forest. 6 inch top minimum, 22 inch butt maximum. Logs are debarked before bucking. Mill keeps three day inventory in yard under a rotary crane.

Production: Logs are scanned front end, after debarking, by an AST scanner. Lumber is processed in 8-20 foot lengths, and the mill is now producing 2x4 and 2x10, although it has cut 4x4, 6x6 and 1x6. All production is for the domestic market.

Mill Equipment:

Nicholson A5 27 inch debarker, Excel Engineering control cab.
USNR sharp chain, with ATI scanning.
Cants go to USNR Reducer Band Saw (RBS), ATI optimized.
Boards go to Schurmann Optimized edger.
CSMI trimmer with Hemco scanning.
LSI 55 bin sorter and stacker.
Kilns are Irvington Moore, fueled with green saw dust. Drying to spec of less than 19% moisture.

Supplier Perceptions: CSMI is good at selling, but lousy at support and service. Equipment has bad electronics and controls. Canadian companies need to represent themselves, and they need to have a strong connection to their Canadian operation. Canadian suppliers need to have a local office and they must maintain an individual identity. Don't use USNR or CSMI to represent your equipment.

Consumables: Use whatever is available locally, including gear boxes, sprockets, sheaves, chains, and bearings.

Equipment price is always a secondary issue to quality. In the capital cost versus performance trade-off, performance is always the key factor.

Federal Paper has approved funding to rebuild the edger optimizer. No pattern in mill equipment decisions. Federal has 5 sawmills. One mill selected ATI, another

Hemco, and another bought CSMI edger/scanner. Cole noted that he felt that sharp chain systems have run their stretch. He feels that sharp chain limits small log production. He feels that Chip-N-Saw systems are good producers but at poor quality levels. Cole thinks there is a need for a piece of equipment somewhere between these two systems.

In addition to 5 sawmills, Federal also has 2 pulp mills, and 1 recycling mill. Forest holdings total 1.5 million acres in Georgia, and North and South Carolina. Logs may travel as far as 60 miles to mill.

It is Coles opinion that sawmills have never made this much money. He believes that larger efficient mills will survive, smaller mills will be forced to close. He pointed out that GP is culling pulp logs for its sawmills, hence producing lumber at pulp log prices.

Federal Paper would like to avoid the need to put logs under water, as water has to be recollected.

Hog fuel goes to the on-site paper mill for \$7 per ton. Both hog fuel and chips are trucked across the site.

Federal Paper has implemented a strong customer focus, packing product with bar coding to measure inventory levels. Federal is responsible for maintaining inventories in key client facilities.

Market acceptance of finger jointing is a problem, primarily at the consumer level where product knowledge and perception is poor.

Federal Paper personnel will travel to define and identify equipment specifications. Cole noted that he saw VKB debarkers at the Union Camp sawmill in Virginia, and he was impressed with their operation.

Harvesting: Cole noted that harvesting is done by contractors, and typically on a price basis. Federal is still using shearing heads in the forest.

Cole noted that OSB acceptance in Georgia is high. With additional plants, market acceptance will increase based on price sensitivities. With higher supply, price should go down, acceptance up.

Mill Evolution: Fifteen years ago, mills in Southeast were lumber driven. Today, they are becoming product driven. This appears to be following a global pattern. Coles feels that trends will be a) drying for quality and b) remanufacturing of new products.

May 3, 1994

Bo Seckinger
Harvesting Manager
Collum Lumber Mills, Inc.
Allendale, South Carolina

Seckinger is responsible for log supply for this mill. He took us to a logging site near Allendale. It was a thinning operation in a SYP plantation. The equipment included:

- 1 Hydro-ax feller buncher with a shearing head.
- 1 Caterpillar 518 grapple skidder.
- 1 Prentice 210C loader, with CTR bucking system.

There was only one surprise on this site. Tree delimiting was performed by the skidder pushing its haul of trees through a delimiting gate (that was secured between two trees) that simply snapped the limbs off. When we inquired why this method of delimiting was practiced, we were informed that it is purely a function of economics. It is cheaper to have a chain saw operator clean up the limbs than is to own and operate a mechanized delimitter. Because price is the key factor in harvesting contracting, mechanization is not economically feasible.

May 3, 1994

Chester M. Kears Jr.
Kears Manufacturing Co., Inc.
Olar, South Carolina

Kears Manufacturing is a small (and old and dilapidated) specialty hardwood mill producing veneers for chairs and seat backs. The company is a leading North American supplier of seats for sports stadiums, theatres, etc. It was hard to believe that this antiquated small operation was such a thriving viable niche market business.

Kears mentioned that he was in the process of replacing his veneer equipment. He was leaning toward COE as the supplier.

The reason we visited this operation was to see a lowland hardwood harvesting site. Several miles from the mill, in the middle of a river lowland/swamp area, Kears was selective harvesting older hardwood trees. The equipment used included:

- 1 Bell tracked feller with a chain saw felling head.
- 2 Timberjack skidders equipped with ground pressure floatation tires and hinge grapples.
- 1 Prentice loader with CTR bucking system.

The Bell feller was identical in design to the three wheel Bell fellers, except that it was tracked. Tracks were used because of the wet conditions and the environmental concerns about damage caused by tire rutting.

The large wheeled skidders were capable of hauling logs from anywhere on the site, which was largely inundated with standing water or running streams. The skidder used the solid stream bottoms to manoeuvre in the conditions. Using stream beds as a route of travel is widely used in the Southeast in these type of conditions.

Our consultant for the day, Rob Drummond (Milliken Forestry) indicated that this type of operation was typical of a hardwood harvesting site in lowland locations. It was the assessment of the study team that this type of operation, fording streams and swamp areas, would not be permissible in Canada.

May 3, 1994

Ed Earley
Forester
Dempsey Wood Products Inc.
Rowesville, South Carolina

Drummond arranged this visit to illustrate another common type of Southeast harvesting operation. Earley was managing a "shovel" logging hardwood harvesting site in soft soil. Although it was a lowland operation, the site was not inundated with water. Instead, the soil had a high moisture content, and equipment will sink if left in one spot for any period of time. Shovel logging is referred to as "hoe chucking" in Western Canada.

This site was small block clear cut. It featured a tracked Timbco Feller Buncher equipped with a Quadco feller head. The shovel was a Link Belt LS 3400 equipped with a Pierce loading front with a live heel and grapple.

The shovel moved to one end of the felled site, where it started stacking logs within its boom reach. It then continuously moved these piles, a boom length at a time, to the landing. This constant moving of the excavator prevents its tracks from sinking to a point where it becomes mired in the soil.

In wetter conditions, the excavator will lay down drag line pads of logs or wood grates to act as a road bed. The excavator will continue to alternatively move the road bed, and then the log piles, until the logs have reached the landing.

APPENDIX

8.4

AVERAGE WOOD DENSITY

AVERAGE WOOD DENSITY

	AIR DRIED (kg/m ³)
WESTERN RED CEDAR	380
YELLOW CYPRESS	480
DOUGLAS FIR	540
WESTERN HEMLOCK	480
WESTERN LARCH	640
LODGE POLE PINE	460
PONDEROSA PINE	510
SPRUCE ENGELMANN	450
SPRUCE SITKA	430
RADIATA PINE	660
SOUTHERN YELLOW PINES	655

APPENDIX

8.5

MAJOR FORESTRY CORPORATIONS

MAJOR FORESTRY CORPORATIONS IN U.S. SOUTH

Approximate Forest Holdings

	U.S. SOUTH (Ha)	TOTAL (Ha)
CHAMPION INTERNATIONAL	767,500	2,427,000
GEORGIA-PACIFIC	2,317,000	2,693,000
INTERNATIONAL PAPER	2,385,000	2,511,000
LOUISIANA-PACIFIC	436,000	630,000
TEMPLE-INLAND	769,500	769,500
WEYERHAEUSER	N/A	2,270,000
WILLAMETTE	351,000	484,000
POTLATCH	207,000	595,000
BOISE CASCADE CORPORATION	182,000	1,115,000
	7,415,000 *	14,218,500

* Weyerhaeuser figures not included.

MAJOR FORESTRY CORPORATIONS ACTIVE IN SOUTHEAST U.S.

CHAMPION INTERNATIONAL CORPORATION
ONE CHAMPION PLAZA
STAMFORD, CONNECTICUT 06921

TELEPHONE: 203-358-7000

PRODUCTION FACILITIES

Sawmills

Champion, 11 producing 635 million board feet in 1992.

Weldwood, 8 producing 873 million board feet in 1992.

Plywood Mills

(Softwood), Champion, 5 producing 1.220 billion square feet, 3/8 inch basis in 1992.

Weldwood, 2 producing 350 million square feet, 3/8 inch basis in 1992.

OBS, Weldwood, 1 producing 122 million square feet, 3/8 inch basis in 1992.

TIMBERLAND OWNED AND CONTROLLED, 5,994,000 ACRES

EMPLOYEES, 1992 - 27,300

GEORGIA PACIFIC CORPORATION
133 PEACHTREE ST. N.E.
ATLANTA, GEORGIA 30303

TELEPHONE: 404-521-5555

PRODUCTION FACILITIES:

Sawmills, 43 mills producing 2.568 million board feet in 1992.

Plywood mills (softwood), 18 mills producing 5,133 billion square feet, 3/8 inch basis in 1992.

OSB, 4 plants producing 1.011 billion square feet, 3/8 inch basis in 1992.

TIMBERLAND OWNED AND CONTROLLED, 6,649,000 ACRES.

**INTERNATIONAL PAPER COMPANY
TWO MANHATTANVILLE ROAD
PURCHASE, N.Y. 10577**

TELEPHONE: 914-397-1500

PRODUCTION FACILITIES:

Sawmills, 11 mills producing 898 million board feet in 1992.

Plywood mills (softwood), 2 mills producing 525 million square feet, 3/8 inch basis in 1992.

TIMBERLAND OWNED AND CONTROLLED 6,200,000 ACRES.

**LOUISIANA-PACIFIC CORPORATION
111 S.W. FIFTH AVENUE
PORTLAND, OREGON 97204**

TELEPHONE: 503-221-0800

PRODUCTION FACILITIES:

Sawmills, 46 mills producing 1.85 billion board feet in 1992.

Plywood mills (softwood), 17 mills producing 2.85 billion square feet, 3/8 inch basis in 1992.

OSB, 17 plants producing 2.85 billion square feet, 3/8 inch basis in 1992.

TIMBERLAND OWNED AND CONTROLLED, 1,555,300 ACRES.

EMPLOYEES, 1992 - 11,500.

**POTLATCH CORP.
ONE MARITIME PLAZA
P.O. BOX 193591
SAN FRANCISCO, CALIFORNIA 94119**

TELEPHONE: 415-576-8800

PRODUCTION FACILITIES:

Sawmills, 5 mills producing 401 million board feet in 1992.

Plywood mills, softwood, 2 producing 331 million square feet, 3/8 inch basis in 1992.

OSB, 3 plants producing 1 billion square feet, 3/8 inch basis in 1992.

TIMBERLAND OWNED - 1,469,000 ACRES.

EMPLOYEES, 1992 - 7,000

TEMPLE-INLAND INC.
303 S. TEMPLE DRIVE
P.O. DRAWER "N"
DIBOLL, TEXAS 75941

TELEPHONE: 409-829-1313

PRODUCTION FACILITIES:

Sawmills, 5 mills producing 540 million board feet in 1992.

Plywood, 1 mill producing 265 million square feet, 3/8 inch basis in 1992.

TIMBERLAND OWNED - 1,900,000

WEYERHAEUSER CO.
TACOMA, WASHINGTON 98477

TELEPHONE: 206-924-2345

PRODUCTION FACILITIES:

Sawmills, 34 mills producing 2.992 billion board feet in 1992.

Plywood mills (softwood), 6 mills producing 1.112 billion square feet, 3/8 inch basis in 1992.

OSB, 5 plants producing 1.234 billion square feet 3/8 inch basis in 1992.

TIMBERLAND OWNED - 5,604,000

EMPLOYEES, 1992 - 39,022

APPENDIX

8.6

TOP 201 U.S. SAWMILLS

TOP 201 U.S. SAWMILLS

335 MMBF	Pacific Lumber Co.	Scotia, Calif.	52	119 MMBF	Weyerhaeuser Co.	Philadelphia, Miss.
320 MMBF	Simpson Timber Co.	Shelton, Wash.	53	117 MMBF	Sierra Pacific Industries	Susanville, Calif.
257 MMBF	Willamina Lumber Co.	Willamina, Ore.	54	116 MMBF	Hood Industries	Waynesboro, Miss.
250 MMBF	Cowlitz Stud Co.	Morton, Wash.	55	116 MMBF	International Paper Co.	Gurdon, Ark.
236 MMBF	Georgia-Pacific Corp.	Ft. Bragg, Calif.	56	115 MMBF	Federal Paper Board Co. Inc.	Augusta, Ga.
225 MMBF	Seneca Sawmill	Eugene, Ore.	57	115 MMBF	Georgia-Pacific Corp.	Faysua, Ala.
222 MMBF	Champion Int'l. Corp.	Libby, Mont.	58	115 MMBF	J. Paul Levesque & Sons	Ashland, Me.
220 MMBF	Simpson Timber Co.	Korbel, Calif.	59	114 MMBF	Gilde Lumber Products Co.	Gilde, Ore.
212 MMBF	Weyerhaeuser Co.	Green Mtn., Wash.	60	112 MMBF	American Stud Co.	Otney, Mont.
206 MMBF	Georgia-Pacific Corp.	Martell, Calif.	61	112 MMBF	Anthony Timberlands Inc.	Bearden, Ark.
200 MMBF	Stimson Lumber Co.	Gaston, Ore.	62	112 MMBF	Champion Int'l. Corp.	Bonner, Mont.
200 MMBF	Weyerhaeuser Co.	Longview, Wash.	63	112 MMBF	Riverwood Int'l. Corp.	Hultig, Ark.
195 MMBF	RSG Forest Products Inc.	Molalia, Ore.	64	110 MMBF	Idaho Forest Industries	Coeur D'Alene, Id.
190 MMBF	Cavenham Forest Ind.	Fernwood, Miss.	65	110 MMBF	International Paper Co.	Springhill, La.
190 MMBF	Weyerhaeuser Co.	Aberdeen, Wash.	66	110 MMBF	Pope & Talbot	Spearfish, SD
187 MMBF	Philomath Forest Prod. Co.	Philomath, Ore.	67	110 MMBF	Sierra Pacific Industries	Loyalton, Calif.
186 MMBF	Weyerhaeuser Co.	Wright City, Okla.	68	108 MMBF	International Paper Co.	Tuscaloosa, Ala.
185 MMBF	Boise Cascade Corp.	Emmett, Id.	69	108 MMBF	Sierra Pacific Industries	Quincy, Calif.
180 MMBF	Weyerhaeuser Co.	White River, Wash.	70	108 MMBF	TMA Forest Products	Ackerman, Miss.
171 MMBF	Sierra Pacific Industries	Anderson, Calif.	71	107 MMBF	Unich Camp Corp.	Franklin, Va.
165 MMBF	Louisiana-Pacific Corp.	Sandpoint, Id.	72	106 MMBF	Willamette Industries Inc.	Eugene, Ore.
161 MMBF	Michigan-California Lumber	Camino, Calif.	73	105 MMBF	Vaagen Brothers Lbr. Inc.	Colville, Wash.
160 MMBF	Roseburg Forest Prod. Co.	Anderson, Calif.	74	103 MMBF	Boise Cascade Corp.	La Grande, Ore.
159 MMBF	Weyerhaeuser Co.	Dierks, Ark.	75	103 MMBF	Sierra Pacific Industries	Central Valley, CA
154 MMBF	Summit Timber Co.	Darrington, Wash.	76	102 MMBF	Sierra Pacific Industries	Redding, Calif.
153 MMBF	Federal Paper Board Co.	Washington, Ga	77	102 MMBF	Willamette Industries Inc.	Daltes, Ore.
150 MMBF	Federal Paper Board Co.	Riegelwood, NC	78	101 MMBF	Gilman Building Products Co.	Fitzgerald, Ga.
150 MMBF	Manke Lumber Co.	Tacoma, Wash.	79	100 MMBF	Boise Cascade Corp.	Yakima, Wash.
160 MMBF	Rosboro Lumber Co.	Springfield, Ore.	80	100 MMBF	Boise Cascade Corp.	Jackson, Ala.
150 MMBF	Weyerhaeuser Co.	Bruce, Miss.	81	100 MMBF	Cavenham Forest Industries	Holden, La.
148 MMBF	Louisiana-Pacific Corp.	Samoa, Calif.	82	100 MMBF	Cavenham Forest Industries	Silver Creek, Miss.
145 MMBF	Tillamook Lumber Co.	Tillamook, Ore.	83	100 MMBF	Georgia-Pacific Corp.	Bay Springs, Miss.
142 MMBF	Eel River Sawmills Inc.	Fortune, Calif.	84	100 MMBF	Georgia-Pacific Corp.	Bellamy, Ala.
142 MMBF	International Paper Co.	Morton, Miss.	85	100 MMBF	Georgia-Pacific Corp.	El Dorado, Ark.
142 MMBF	Temple-Inland Forest Prod.	Buna, Texas	86	100 MMBF	Louisiana-Pacific Corp.	Oroville, Calif.
140 MMBF	Weyerhaeuser Co.	Cortage Grove, Ore.	87	100 MMBF	Louisiana-Pacific Corp.	Moyie Springs, Id.
133 MMBF	Federal Paper Board Co. Inc.	Newberry, SC	88	100 MMBF	Merritt Bros. Lumber Co. Inc.	Athol, Id.
133 MMBF	Sierra Pacific Industries	Burney, Calif.	89	100 MMBF	New South Inc.	Conway, SC
132 MMBF	RSG Forest Products Inc.	Kalama, Wash.	90	100 MMBF	Packwood Lumber Co.	Packwood, Wash.
132 MMBF	Roseburg Forest Prod. Co.	Dillard, Ore.	91	100 MMBF	Sun Studs Inc.	Roseburg, Ore.
128 MMBF	Georgia-Pacific Corp.	New Augusta, Miss.	92	100 MMBF	Wilkins Kaiser & Olsen Inc.	Carson, Wash.
128 MMBF	Weyerhaeuser Co.	Raymond, Wash.	93	98 MMBF	Gilman Building Products Co.	Dudley, Ga.
127 MMBF	Hanel Lumber Co. Inc.	Hood River, Ore.	94	97 MMBF	Riverwood International Corp.	Joyce, La.
127 MMBF	Weyerhaeuser Co.	Greenville, NC	95	97 MMBF	Sierra Pacific Industries	Lincoln, Calif.
124 MMBF	Temple-Inland Forest Prod.	Diboll, Tex.	96	96 MMBF	New South Inc.	Camden, SC
124 MMBF	Weyerhaeuser Co.	Mountain Pine, Ark.	97	96 MMBF	Trinity River Lumber Co.	Weaverville, Calif.
124 MMBF	Willamette Industries Inc.	Lebanon, Ore.	98	95 MMBF	Commencement Bay Mill Co.	Tacoma, Wash.
122 MMBF	Pope & Talbot	Port Gamble, Wash.	99	95 MMBF	Georgia-Pacific Corp.	Columbia, Miss.
120 MMBF	Louisiana-Pacific Corp.	Ukiah, Calif.	100	95 MMBF	Georgia-Pacific Corp.	Roxie, Miss.
120 MMBF	Temple-Inland Forest Prod.	DeQuincy, La.	101	95 MMBF	JD Lumber Inc.	Priest River, Id.
119 MMBF	Stone Forest Industries Inc.	Orangeburg, SC	102	95 MMBF	Prairie Wood Products	Prairie City, Ore.

TOP 201 U.S. SAWMILLS

103	95	MMBF	Sierra Pacific Industries	Arcala, Calif.	154	75	MMBF	Continental Lumber Co. Inc.	Hill City, SD
104	95	MMBF	Weyerhaeuser Co.	Bainessville, Ga.	155	75	MMBF	Frank Lumber Co. Inc.	Mill City, Ore.
105	94	MMBF	International Paper Co.	Leola, Ark.	156	75	MMBF	International Paper Co.	Sampit, SC
106	93	MMBF	Boise Cascade Corp.	Florien, La.	157	75	MMBF	Louisiana-Pacific Corp.	New Waverly, T
107	93	MMBF	Bowater Lumber	Albertville, Ala.	158	75	MMBF	Scotch Lumber Co.	Fulton, Ala.
108	93	MMBF	International Paper Co.	Maplesville, Ala.	159	74	MMBF	Boise Cascade Corp.	Kettle Falls, Wa
109	93	MMBF	Portac Inc.	Tacoma, Wash.	160	74	MMBF	Fibreboard Corp.	Standard, Calif.
110	91	MMBF	Harwood Products	Branscomb, Calif.	161	74	MMBF	Georgia-Pacific Corp.	Monticello, Ga.
111	90	MMBF	Louisiana-Pacific Corp.	Priest River, Id.	162	74	MMBF	Omak Wood Products Inc.	Omak, Wash.
112	90	MMBF	Louisiana-Pacific Corp.	Walla Walla, Wash.	163	73	MMBF	Bennett Lumber Products Inc.	Princeton, ND
113	90	MMBF	Louisiana-Pacific Corp.	Belgrade, Mont.	164	73	MMBF	Georgia-Pacific Corp.	Warrenron, Ga.
114	89	MMBF	Champion International Corp.	Klickitat, Wash.	165	73	MMBF	Swanson-Superior Forest Prod.	Noti, Ore.
115	89	MMBF	Joe N. Miles & Son	Silver Creek, Miss.	166	72	MMBF	Champion International Corp.	Camden, Tex.
116	89	MMBF	Oregon Cedar Products Inc.	Springfield, Ore.	167	72	MMBF	Croman Corp.	Ashland, Ore.
117	85	MMBF	Harrigan Lumber Co. Inc.	Monroeville, Ala.	168	72	MMBF	Georgia-Pacific Corp.	Philomath, Ore.
118	88	MMBF	Weyerhaeuser Co.	Plymouth, NC	169	72	MMBF	Georgia-Pacific Corp.	Brunswick, Ga.
119	86	MMBF	Friesen Lumber Co.	St. Helens, Ore.	170	72	MMBF	Morton Forest Products Co.	Glide, Ore.
120	86	MMBF	International Paper Co.	Henderson, Tex.	171	72	MMBF	RSG Forest Products Inc.	Mist, Ore.
121	86	MMBF	Joe N. Miles & Son	Bogalusa, La.	172	72	MMBF	Shuqualak Lumber Co. Inc.	Shuqualak, Miss
122	86	MMBF	Owens & Hurst	Eureka, Mont.	173	71	MMBF	Hankins Lumber Co. Inc.	Quilman, Miss.
123	86	MMBF	Union Camp Corp.	Seaboard, NC	174	70	MMBF	Anthony Timberlands Inc.	Malvern, Ark.
124	85	MMBF	Cal-Tex Lumber Co.	Nacogdoches, Tex.	175	70	MMBF	Collins Pine Co.	Chester, Calif.
125	85	MMBF	Del-Cook Lumber Co.	Adel, Ga	176	70	MMBF	Colville Indian Precision Pine Co.	Omak
126	85	MMBF	Gilman Building Products Co.	Maxville, Fla.	177	70	MMBF	Ellingson Lumber Co.	Baker, Ore.
127	85	MMBF	International Paper Co.	New Boston, Tex.	178	70	MMBF	Georgia-Pacific Corp.	Holly Hill, SC
128	85	MMBF	Louisiana-Pacific Corp.	Dcer Lodge, Mont.	179	70	MMBF	Georgia-Pacific Corp.	Russellville, SC
129	85	MMBF	MacMillan Bloedel Inc.	Pine Hill, Ala.	180	70	MMBF	Georgia-Pacific Corp.	Varnville, SC
130	85	MMBF	Portac Inc.	Beaver, Wash.	181	68	MMBF	Georgia-Pacific Corp.	Pearson, Ga.
131	84	MMBF	Diamond Occidental Forest	Passadumkeag, Me.	182	68	MMBF	Georgia-Pacific Corp.	Prosperity, SC
132	84	MMBF	Louisiana-Pacific Corp.	Ft. Bragg, Calif.	183	68	MMBF	Hankins Lumber Co. Inc.	Grenada, Miss.
133	83	MMBF	Riley Creek Lumber Co.	LaCiede, Id.	184	67	MMBF	Georgia-Pacific Corp.	Crossell, Ark.
134	82	MMBF	Gilman Building Products Co.	Lake Butler, Fla.	185	67	MMBF	Georgia-Pacific Corp.	Taylorville, Miss
135	82	MMBF	Langdale Forest Products Co.	Valdosta, Ga.	186	67	MMBF	Weyerhaeuser Co.	Goos Bay, Ore.
136	82	MMBF	Weyerhaeuser Co.	Millport, Ala.	187	66	MMBF	Louisiana-Pacific Corp.	Pilot Rock, Ore.
137	81	MMBF	Brand-5 Corp.	Livingston, Mont.	188	65	MMBF	Deltic Farm & Timber Co. Inc.	Waldo, Ark.
138	81	MMBF	Sierra Pacific Industries	Haylork, Calif.	189	65	MMBF	Georgia-Pacific Corp.	Foresthill, Calif.
139	80	MMBF	Boise Cascade Corp.	Elgin, Ore.	190	65	MMBF	Idaho Forest Industries	Coeur d'Alene, Id
140	80	MMBF	Bowater Corp.	Ashland, Me.	191	65	MMBF	Ochoco Lumber Co.	Prineville, Ore.
141	80	MMBF	Gulf Lumber Co. Inc.	Mobile, Ala.	192	65	MMBF	Plum Creek Mfg. Co. Inc.	Kalispell, Mont.
142	80	MMBF	Plum Creek Mfg. Co. Inc.	Col. Falls, Mint.	193	65	MMBF	Sierra Forest Products	Terra Bella, Calif.
143	80	MMBF	RSG Forest Products Inc.	Estacada, Ore.	194	64	MMBF	Eugene F. Burrill Lumber Co.	Medford, Ore.
144	80	MMBF	Temple-Inland Forest Prod.	Pineland, Tex.	195	64	MMBF	Georgia-Pacific Corp.	Whiteville, NC
145	79	MMBF	Caveham Forest Industries	Warrenton, Ore.	196	64	MMBF	Weyerhaeuser Co.	Kerniah, Id.
146	79	MMBF	Champion International Corp.	Costigan, Me.	197	63	MMBF	Georgia-Pacific Corp.	Woodland, Me.
147	78	MMBF	Champion International Corp.	Citronello, Ala.	198	63	MMBF	Temple-Inland Forest Prod.	Rome, Ga.
148	78	MMBF	Champion International Corp.	Whitehouse, Fla.	199	62	MMBF	Avison Lumber Co.	Molalla, Ore.
149	77	MMBF	Gilman Building Products Co.	Blackshear, Ga.	200	62	MMBF	Pacific Crown Timber Products	Plummer, Id.
150	77	MMBF	Plum Creek Mfg. Co. Inc.	Pablo, Mont.	201	62	MMBF	Rough & Ready Lumber Co.	Cave Junction, Ore
151	76	MMBF	Louisiana-Pacific Corp.	Willits, Calif.					
152	76	MMBF	Medford Corp.	Medford, Ore.					
153	76	MMBF	Plum Creek Mfg. Co. Inc.	Colville, Wash.					

APPENDIX

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SOUTHEAST U.S.A. COMPETITORS

SOUTHEAST U.S.A. COMPETITORS

MANUFACTURER	PRODUCT
WAGNER ELECTRONIC PRODUCTS 326 PINE GROVE ROAD ROGUE RIVER, OR 97537 TEL: (503) 582-0541 FAX: (503) 582-4138	MOISTURE DETECTION
ISELI & CO AG MASCHINENFABRIK CH-6247 SCHOTZ SWITZERLAND TEL: 011-45-71-22-22 FAX: 011-45-71-46-22	SAW FILING EQUIPMENT STELLITE-TIPPING
WACO JONSEREDS AB BOX 283, S-301 07 HALMSTAD SWEDEN TEL: 011-46-35-22-10-20 FAX: 011-46-35-22-15-80	PLANERS/MOULDERS
PACIFIC/HOE SAW & KNIFE COMPANY 2700 S.E. TACOMA PORTLAND, OR 97202 TEL: (503) 234-9501 FAX: (503) 234-3506	SAW FILING EQUIPMENT

SOUTHEAST U.S.A. COMPETITORS

MANUFACTURER	PRODUCT
VOLLMER OF AMERICA CORP. 1004 PARKWAY VIEW DRIVE PITTSBURGH, PA 15205 TEL: (412) 787-2627 FAX: (412) 787-9610	SAW FILING EQUIPMENT
SCHURMAN MACHINE, DIV. USNR P.O. BOX 310, 558 ROBINSON ROAD WOODLAND, WA 98674 TEL: (206) 225-8267 FAX: (206) 225-8017	SAW EDGERS
LUCIDYNE TECHNOLOGIES, INC. 155 S.W. MADISON AVENUE CORVALLIS, OR 97333 TEL: (503) 753-5111 FAX: (503) 754-0545	SCANNER/ELECTRONICS
APPLIED SCANNING TECHNOLOGY, INC. 145 N. WOLFE ROAD SUNNYVALE, CA 94086 TEL: (408) 733-0300 FAX: (408) 733-0900	SCANNER/ELECTRONICS

SOUTHEAST U.S.A. COMPETITORS

MANUFACTURER	PRODUCT
PALLMANN MASCHINENFABRIK GmbH & CO. KG P.O. BOX 1652, D-66466 ZWEIBRUCKEN GERMANY TEL: 011-63-32-802-0 FAX: 011-63-32-802106	FLAKERS CHIPPERS
WEST SALEM MACHINERY 665 MURLARK AVENUE N.W. SALEM, OR 97304 TEL: (503) 364-2213 FAX: (503) 364-1398	HOGS
MAXI MILL P.O. BOX 823 ALBANY, OR 97321 TEL: (503) 926-4449 FAX: (503) 967-1251	OVERHEAD CARRIAGE
KONE WOOD INC. 2175 PARKLAKE DRIVE N.E. SUITE 250 ATLANTA, GA 30345 TEL: (404) 934-3151 FAX: (404) 934-6674	DEBARKERS CHIPPERS

SOUTHEAST U.S.A. COMPETITORS

MANUFACTURER	PRODUCT
MCDONOUGH MANUFACTURING COMPANY P.O. BOX 510 EAU CLAIRE, WI 54702-0510 TEL: (715) 834-7755 FAX: (715) 834-3968	BANDMILLS HEADRIGS LINEBARS HORIZONTALS CUSTOM MACHINERY
FULGHUM INDUSTRIES P.O. BOX 909 WADLEY, GA 30477 TEL: (912) 252-5223 FAX: (912) 252-1507	CHIPPERS CHIP SCREENS ROSSERHEAD DEBARKERS
DIETER BRYCE INC. P.O. BOX 21184 COLUMBIA, SC 29221 TEL: (803) 772-7533 FAX: (803) 772-0309	CRADLE DEBARKERS
MONTGOMERY INDUSTRIES INTERNATIONAL, INC. P.O. BOX 3687, 2017 THELMA STREET JACKSONVILLE, FL 32206 TEL: (904) 355-5671 FAX: (904) 355-0401	SWINGHAMMER HOGS

SOUTHEAST U.S.A. COMPETITORS

MANUFACTURER	PRODUCT
ARMSTRONG & STELLITE P.O. BOX 3008 PORTLAND, OR 97208 TEL: (503) 228-8381 FAX: (503) 228-8384	SAW FILING EQUIPMENT
BAKER PRODUCTS P.O. BOX 128 ELLINGTON, MO 63638 TEL: (314) 663-7711 FAX: (314) 663-2787	BANDMILLS PORTABLE MILLS
CONSOLIDATED SAWMILL MACHINERY INTL. INC. 2727 EAST GRAND AVENUE HOT SPRINGS, AR 71901 TEL: (501) 262-1010 FAX: (501) 262-4556	CHIP-N-SAWS SHARP CHAIN SYSTEM BANDMILL OPTIMIZED EDGER CURVE SAWING CARRIAGES
NEWMAN MACHINE COMPANY INC. P.O. BOX 5467 507 JACKSON STREET GREENSBORO, NC 27435 TEL: (910) 273-8261 FAX: (910) 273-6939	PLANERS/KNIFE GRINDERS

SOUTHEAST U.S.A. COMPETITORS

MANUFACTURER	PRODUCT
KOENIG, INC. MEMPHIS, TN TEL: (901) 332-0915 FAX: (901) 398-1672	OPTIMIZER EDGER SYSTEM
LIGNA MACHINERY P.O. BOX 4307 BURLINGTON, NC 27215 TEL: (910) 584-0030 FAX: (910) 584-5915	EDGERS SCRAGGS TRIMMERS
CM MACHINERY CORPORATION P.O. BOX 9007 2210 FLACK ROAD MONTGOMERY, AL 36108 TEL: (205) 264-0211 or: 800-633-1960 FAX: (205) 269-2567	HEADRIGS
CORLEY SAWMILL MACHINERY P.O. BOX 471 CHATTANOOGA, TN 37401 TEL: (615) 698-0284 FAX: (615) 622-3258	HEADRIG CARRIAGES EDGERS

SOUTHEAST U.S.A. COMPETITORS

MANUFACTURER	PRODUCT
HI-TECH ENGINEERING, INC. 400 AVIATION PLAZA SUITE C HOT SPRINGS, AR 71913 TEL: (501) 760-1100 FAX: (501) 760-1387	TRIMMER OPTIMIZERS
FORANO INTERNATIONAL TEL: 800-541-9032 (SOUTHEAST U.S.A.)	CANTERS/DEBARKERS CHIP SCREENS
MAC EQUIPMENT CO. 3432 HAYNEVILLE ROAD MONTGOMERY, AL 36108 TEL: (205) 264-9719 FAX: (205) 264-9726	EDGERS
INOVEC 115 WALLIS STREET EUGENE, OR 97402 TEL: (503) 485-7127 FAX: (503) 485-4672	OPTIMIZERS NETWORKS
MAGNUM MACHINERY SERVICES INC. P.O. BOX 1419 MERCER ISLAND, WA 98040 TEL: (206) 454-2350 FAX: (206) 232-4598	LOG SINGULATORS

SOUTHEAST U.S.A. COMPETITORS

MANUFACTURER	PRODUCT
PROGRESS INDUSTRIES INC. BOX 353 TRUSSVILLE, AL 35173 TEL: (205) 655-8875 FAX: (205) 655-8884	DRUM DEBARKERS CHIP SCREENS LOG SCREENS CHIPPERS BARK HOGS CIRCULAR CUT-OFF SAWS VIBRATING CONVEYORS
U.S.N.R. 8205 S.W. HUNZIKER ROAD TIGARD, OR 97223	HEADRIG CARRIAGES CANTERS BANDMILLS EDGERS