

NEW JERSEY PINELANDS

FORESTRY REPORT

Prepared for the  
NEW JERSEY PINELANDS COMMISSION

by  
NEW JERSEY BUREAU OF FOREST MANAGEMENT

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This report is a compilation of information prepared by foresters working for the New Jersey Bureau of Forest Management.

All the foresters in the pinelands area contributed to the report. They in turn relied upon many years of field experience and published information as the basis for their individual reports.

TABLE OF CONTENTS

	<u>Page No.</u>
Executive Summary	I
Introduction	III
List of Tables	VII
List of Figures	IX
Benefits of Forest Land	1
The Forest Resource - Acreage and Wood Volume	5
Pinelands Wood Products, Values, and Industries	13
Pinelands Wood Products	17
Forest Stand Suitability in the Pinelands	21
Silviculture in the Pinelands	25
A. Silviculture	28
B. Silvics of Pinelands Forest Types	31
Forestry in the Pinelands	37
Alternative Forest Management Techniques	39
Issues for the Pinelands	47
Conclusion	49
Appendix	51
A. Reforestation Program	53
B. Selling Your Timber Through the New Jersey Bureau of Forest Management	
C. Glossary	55
D. Bibliography	59

## EXECUTIVE SUMMARY

Forests are an integral part of our environment and should be viewed as plant communities that provide many beneficial services, products, and amenities to the inhabitants of the State.

Foresters believe that the proper application of scientific forest management will conserve and protect the Pinelands for future generations. The traditional uses of Pinelands forests can be enhanced by managing the forest.

Succession, past use, and abuse (especially wildfire) have shaped present conditions in the pinelands. Any strategies developed to retain and enhance Pinelands conditions must coordinate successional trends, forest management principles and disturbances.

Although the region called the "Pinelands" is over 80 per cent forested and contains about one-half of the State's commercial forestland, it is most surprising that probably the most frequently overlooked resource of the Pinelands is in the capacity to grow wood fiber. This capability could supply a substantial proportion of the State's lumber, pulpwood, energy, wood chips, and various other wood products. At the present level of productivity, and on a majority of the forest area, the return is dismally low. The forests of the Pinelands are annually producing wood which has an energy equivalent of  $4.39 \times 10^{12}$  BTU's or equal to 31.4 million gallons of fuel oil. Several studies have indicated that on many areas over the long term, that this growth rate could be increased six to ten times. Of course, this growth would never be used solely for energy production, but it gives an indication of the potential for management of this resource. Forest management would increase the growth and value of other forest products such as sawtimber and pulpwood which have a present mill value of \$207 million and \$125.5 million, respectively. Management would provide additional benefits by maintaining the forests in a healthy condition for other uses.

Who will bear the responsibility for producing this vast wealth of wood products? With almost 70 per cent of the commercial forestland in private ownerships, it is obvious that the residents of this State must rely upon the private landowners to utilize the proper forest management techniques to increase growth and produce the future supplies of wood upon which we will all depend. But these landowners cannot and will not manage their forests unless they are provided adequate economic incentives, favorable land valuation and taxation systems, and the freedom to use proper silvicultural tools and techniques. The technical information and expertise already exists; the Pinelands Commission must develop a climate which will encourage landowners to use the management skill available to improve the forests. These criteria will be of particular importance to those landowners who will be restricted in their land-use alternatives.

There are several concepts, strategies, or recommendations that should be incorporated in the final Pinelands Management Plan.

1. Create a climate in which forest management practices can be used to enhance the pinelands forest in both private and public lands.
2. Designate forested areas set aside for natural areas and for intensive recreation, and apply forest management to the remaining areas for multiple purposes, including wood production.
3. Adopt policies that encourage the utilization of wood harvested by correct silvicultural techniques.
4. Place a forester on the staff of planning authorities.
5. Implement Bureau of Forest Fire Management plans.
6. Control insects and diseases as necessary to protect the forest resource by appropriate silvicultural, chemical, biological, or mechanical means.
7. Taxes should be based on actual land use and productivity.
8. Land use taxes should be used as an incentive to practice forestry.
9. Recognize the existence and importance of indigenous wood using processors and industries.
10. Adopt timber harvesting guidelines.
11. Provide information on improved harvesting techniques and encourage full and proper utilization of harvested trees.
12. Review existing land use regulations to identify those which exclude or impede the application of proper forest management.
13. Continue to update forest resources inventory of the Pinelands.
14. Consider the value of forests in terms of the productive potential for the future and use this value when developing the "formulas" for best land use.
15. Require advice and assistance of foresters in all forest management activities.
16. Encourage appropriate silviculture and the planting of genetically improved seedlings.
17. Increase the use of prescribed burning to include such forest management applications as species control and site preparation.
18. Acknowledge the importance of disturbances in the management of animals and rare and endangered plants.
19. Increase public awareness and understanding of forest management and services. available.

## INTRODUCTION

It is almost impossible to assemble and concentrate the accumulated forestry knowledge on the New Jersey Pinelands on a few short pages. However, basic truths are waiting to be "found" by us all. We hope that this document will serve as a key to the search for a land management policy in the pinelands.

Succession, past use and abuse (especially wildfires) have shaped present conditions of Pine Barren forests; and any policy that would prevent disturbances would create specific conditions on small-size tracts that would fail to provide, over a long period, the diversity of conditions needed by many plants and forms of wildlife. In the author's opinion, planned disturbances that would create specific conditions on small size tracts would be preferable to reliance on chance wildfires. Planned disturbances would provide much greater diversity of conditions, and also permit both sustained populations of a variety of wildlife and the production of wood products for energy and fiber. Such production would provide the income for management costs (Little 1978).

Maximum wildfire protection must be obtained through greatly expanded prescribed or controlled burning primarily for fuel hazard reduction. Forest management could increase direct values, such as products, employment, and value added (through manufacturing), and provide an improved resource base for water reserves, wildlife habitat, diversity of species and recreational facilities (Pierson 1978 - Cumming 1980).

The quality of the forests determines the quality of the goods and services provided by them ... and are proportional to the quality and quantity of the forest resource (Pierson 1978).

The published proceedings of the First Research Conference on the New Jersey Pine Barrens, Atlantic City, 1978, concludes, in part, that "proper forest management and the local implementation of planning guidelines" are the two principles that will be the key to successful planning and implementation in the pinelands. Further it states, "proper forest management ... would help accomplish the following objectives:

- (1) Maintenance of extensive open space.
- (2) Maintenance of hydrolic cycles and water quality above and below ground and in adjacent estuaries and bays.
- (3) Maintenance of ecological diversity.
- (4) Enhancement of habitat for rare and endangered species and for game.
- (5) Economic benefits from underutilized industries derived from cedar, pine and oak.
- (6) Continuance of the life styles of the indigenous people, their social stability and culture.

Testimony in support of proposed ground water quality standards for the pinelands includes as one of five needs, the "Development of forestry - silviculture techniques which embrace the economic harvesting of timber and maintenance of pine and cedar consistent with wildlife habitat protection and recreation " (Merrill 1977).

No large area in the pinelands has escaped cutting or burning within the past century and most have been burned repeatedly at intervals of 10-30 years (Little 1946).

By now, many upland and swamp sites have been subjected to at least five clearcuttings (Little 1978).

The unique vegetation of the pinelands area and its condition is largely a result of indiscriminate cutting and wildfires.

Human activities create disturbances that increase habitat diversity and have increased the types of vegetation in the Pine Barrens (Little 1950 - Foreman 1979).

Management of the woodland resource (forest land) is basic to the environmental and economic requirements of the Pine Barrens (Perry 1979).

Disturbance by fire, lumbering, turfing, agriculture, road clearance and construction of roads and other rights-of-way have produced habitats favorable for the development and establishment of many rare, threatened or distinctive plant species in the New Jersey Pine Barrens (Vivan 1978).

The growing lack of diversity, which has resulted from over-protection of the forest, is at least as responsible for the increasing rarity of endangered plants as is unscrupulous collecting of those plants (Sinton 1978).

Man's influence is responsible for the present condition of the pinelands area. Foresters possess the necessary knowledge enabling them to evaluate the existing vegetation and to make recommendations to perpetuate the unique plant life of the pinelands. The skillful management of the forest can produce many diverse habitats through the natural and planned changes of the forest.

The pinelands possess a mystique that should be understood, respected and utilized. This can be accomplished by using the knowledge gained in the past for a quality environment in the future.

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### LIST OF TABLES

<u>Table No.</u>		<u>Page No.</u>
1	Area of Commercial Forest by County in the Pineland Region	6
2	Net Volume of Growing Stock on Commercial Forest Land in the Pinelands by Stand-Size Classes and Counties	7
3	Net Volume of Sawtimber on Commercial Forest Land in the Pinelands by Stand-Size Classes and Counties	7
4	Net Volume of Growing Stock on Commercial Forest Land in the Pinelands by Tree Classes and Counties	8
5	Net Volume of Sawtimber on Commercial Forest Land in the Pinelands by Species and Counties	9
6	Net Volume of Growing Stock on Commercial Forest Land in the Pinelands by Species and Counties	10
7	Comparative Prices of New Jersey's Forest Products	15
8	Economic Value of Forest Resources in the Pinelands	16

LIST OF FIGURES

<u>Figure No.</u>		<u>Page No.</u>
1	Forest Cover Map of New Jersey	11
2	Primary and Secondary Wood Using Industries of Southern New Jersey	14
3	Site Suitability for Pinelands Forest Types	23

## BENEFITS OF FOREST LAND

Forests are an integral part of our environment and should be viewed as plant communities that provide many beneficial services, products, and amenities to the inhabitants of the state. Man's presence has many detrimental effects on his environment, but with the protection and management of the existing forest land base through comprehensive planning, this natural resource is capable of providing a host of concurrent benefits. Some of the basic benefits are discussed below.

### Aesthetics

Where man has cleared the land of forests for other uses, he has always returned to plant trees to enhance and beautify his new surroundings. This beauty is dynamic rather than static with changes occurring each week, each season and each year. Many of the aesthetic values forests offer can be planned for and managed, which makes this specific benefit a valuable tool in an open space program.

### Watershed Protection

The forest community with its variety of tree sizes, lesser vegetation and floor of litter and humus is the most efficient protector of soil and water. Precipitation is intercepted, filtered and slowly infiltrated into the soil. Where adequate forest cover exists, surface runoff is essentially eliminated, thus erosion and sedimentation of watercourses is virtually non-existent.

The benefits are normal groundwater recharge, maintenance of existing water quality, lower flood peaks during storm periods and less change in stream channel alignment and erosion. Any major change from forest cover to other land uses that result in reduced infiltration or exposed soil will understandably reduce the protective watershed benefits provided by forest land.

### Recreation

It is a fact that most recreation areas and parks are forested, providing the most natural setting for outdoor recreation. The demand for increased outdoor recreation facilities will continue due to increasing populations with more leisure time.

### Wildlife Habitat

Forests provide habitat or a necessary segment of habitat for the majority of wildlife in the state, offering food, homes and shelter. Wildlife is a very important part of the ecological community and is largely dependent on adequate areas of forest cover. A reduction in forest land would correspondingly reduce certain wildlife populations.

### Ameliorating Effects on Local Climates

Tree cover has several very beneficial effects on local climatic conditions. Through the photosynthesis process of a tree or any plant, oxygen (O<sub>2</sub>) is released to the atmosphere. Carbon dioxide is removed from the air in this process. The location of forests in relation to highways, roads, and other sources of carbon dioxide can be of great importance for their air conditioning benefits. Air temperatures can be modified, as well as humidity, as a result of the transpiration of water passing from the soil, through the trees and out into the atmosphere. As much as an eight degree difference can result from having a forest cover condition versus an area open to direct sunlight.

### Reduction of Wind Velocity

The extent to which a forest will decrease wind speed is largely dependent on tree density and wind velocity. A wind of four miles per hour might be reduced only slightly. A wind of 30 miles per hour, however, might be reduced to as little as 5 miles per hour in a dense forest.

Windbreaks are frequently planted to protect homes, farmsteads, orchards, fields, industrial sites, playgrounds and other areas from the effects of high winds and drifting snow.

Effectiveness of a windbreak depends primarily on its width, density, height and length. A dense planting of several rows of trees and shrubs will reduce winds of 20 to 25 miles per hour by about 75 percent close to the planting. Even at a distance of 20 times the height of the windbreak, wind will be reduced about 20 percent on the leeward side.

### Air and Noise Pollution Abatement

The strategic location of forest buffer zones of various widths offer many helpful environmental benefits. Trees and associated understory vegetation can filter passing air currents that carry pollen, dust, odors, or excessive heat. When maintained strategically along highways, railroads, industrial areas or other high decibel producing areas, these plant communities break and deflect sound wave lengths, thus dampening undesirable noise.

Residential areas can be protected from undesirable noise from intensive recreation areas by proper placement of forest buffer zones. Trees can play a major role in noise abatement when properly planned plantings are installed.

### Social and Mental Amenities

The benefits of forest land in this area are understandably hard to measure, but their value to the social and mental well-being of the population must be considered. To be able to get away from the speed and humdrum of our technological surroundings to a serene, green forest surely has a desirable effect on one's mental and social attitude.

### Wood Fiber

One need not look beyond the morning newspaper to see some of our many uses of wood fiber. The forests of New Jersey have and will continue to provide wood fiber for many uses. These plant communities are not static and to enable them to provide us with maximum benefits, they will necessarily have to be managed. This will entail certain cultural operations such as pruning, weeding, thinning, and removal of overmature and decadent trees that pose hazards. This wood fiber should be utilized as a product of this natural resource providing employment, products, energy and a dollar return to the owners.

## THE FOREST RESOURCE

Forest land is a basic resource for the environmental and economic requirements of the Pine Barrens. The quality of the forests determines the quality of the goods and services provided by them. The benefits and uses derived by dependent activities, i.e., forest products, water quality, wildlife, recreation, air quality, noise abatement, aesthetics, etc., are proportional to the quality and quantity of the forest resource. Fortunately, forests are viable biotic communities. They are renewable and will respond to management techniques. A well managed forest is a healthy forest and provides the greatest opportunity for recreation, wildlife, water quality and other uses. The protection of this resource from wildfire, insects and disease is paramount. This protection is necessary not only to insure the benefits of the forest, but also to reduce the loss of life and property.

These tables showing pinelands acreages and wood volume have been developed using the following procedures and assumptions:

- (1) Tables were derived using data obtained from The Timber Resources of New Jersey, USDA Forest Service Resource Bulletin NE-34, 1974.
- (2) Pinelands acreage was obtained by planimeter measurements of the map, Pinelands of New Jersey, prepared by the Pinelands Commission. At this date, there are no official acreages for each county.
- (3) The percent of Pinelands with forest cover was determined for each county by using the Forest Cover Map of New Jersey, prepared by the New Jersey Bureau of Forest Management. These percentages were then applied to county Pinelands acreages to determine forest land acreage.
- (4) Commercial forestland was determined by assuming that non-commercial acreage is uniformly distributed throughout the pinelands. Ten percent (5% natural areas and 5% intensive recreation areas) of each county's pinelands forested acreage was subtracted to derive pinelands commercial forest land.
- (5) Pinelands commercial forest land volumes were then interpolated using pinelands commercial forest acreage/county commercial forest acreage ratios.

Table 1

Area of Commercial Forest by County in the Pineland Region  
Pineland Acreage  
(Pinelands Protection Act Boundaries)

County	Total Acreage Thou. Ac.	Forestland Thou. Ac.	Area %	Commercial Forestland Thou. Ac.	% Privately Owned
Atlantic	246.4	169.9	74	152.9	91
Burlington	336.7	282.8	84	254.5	46
Camden	54.6	31.7	58	28.5	48
Cape May	34.2	27.4	80	24.7	73
Cumberland	45.6	41.0	90	36.9	81
Gloucester	33.2	19.6	59	17.6	96
Ocean	183.0	173.9	95	156.5	81
TOTAL	933.7	756.3	81	680.7	Av. 69

Non-Commercial Forestland 77.2  
Natural Areas & Intensive Recreational  
Total Forestland 762.7



Table 2

Net Volume of Growing Stock on Commercial Forest Land in the Pinelands  
by Stand-Size Classes and Counties, 1972  
(In Millions of Cubic Feet)

<u>County</u>	<u>Sawtimber Stands</u>	<u>Poletimber Stands</u>	<u>Other Stands</u>	<u>TOTAL</u>
Atlantic	37.3	44.8	42.3	124.4
Burlington	47.0	39.4	65.1	151.6
Camden	6.8	6.5	8.2	21.4
Cape May	6.8	8.4	5.9	21.0
Cumberland	11.4	11.4	9.9	32.6
Gloucester	7.5	6.4	4.0	17.9
Ocean	<u>21.6</u>	<u>22.4</u>	<u>39.1</u>	<u>83.1</u>
TOTAL	137.5	138.5	173.5	449.6

Table 3

Net Volume of Sawtimber on Commercial Forest Land in the Pinelands  
by Stand-Size Classes and Counties, 1972  
(In Millions of Board Feet)<sup>1</sup>

<u>County</u>	<u>Sawtimber Stands</u>	<u>Poletimber Stands</u>	<u>Other Stands</u>	<u>TOTAL</u>
Atlantic	123.6	55.8	63.0	242.4
Burlington	146.0	55.5	90.5	292.0
Camden	20.2	10.3	10.8	41.3
Cape May	22.4	10.4	8.8	41.7
Cumberland	34.7	16.8	12.9	64.6
Gloucester	25.0	7.9	4.9	37.8
Ocean	<u>65.6</u>	<u>32.1</u>	<u>54.9</u>	<u>152.6</u>
TOTAL	435.1	187.6	244.7	867.4

<sup>1</sup>International ½ inch rule

Table 4

Net Volume of Growing Stock on Commercial Forest Land in the Pinelands  
by Tree Classes and Counties, 1972  
(In Millions of Cubic Feet)

<u>County</u>	<u>Sawtimber Trees</u>	<u>Poletimber Trees</u>	<u>Total Growing Stock</u>
Atlantic	53.5	70.9	124.4
Burlington	69.7	81.9	151.6
Camden	10.3	11.1	<b>21.4</b>
Cape May	8.8	12.2	21.0
Cumberland	15.3	17.3	32.6
Gloucester	8.0	9.9	17.9
Ocean	<u>36.6</u>	<u>46.5</u>	<u>83.1</u>
TOTAL	201.0	248.6	449.6

Table 5

Net Volume of Sawtimber On Commercial Forest Land in the Pinelands  
by Species and Counties, 1972  
(In Millions of Board Feet, International 1/4-Inch rule)

County	Yellow Pine	Other* Softwoods	Total Softwoods	White Oaks	Red Oaks	Hickory	Soft Maples	Sweet- Gum	Other Hardwoods	Total Hardwoods	All Species
Atlantic	66.4	9.7	76.1	43.1	85.6	2.9	10.4	17.9	6.3	166.3	242.4
Kingston	93.5	10.5	104.0	50.5	91.6	3.5	15.5	14.6	11.6	188.1	292.1
Green	14.5	2.8	17.3	6.0	10.9	.5	1.6	3.3	1.6	24.0	41.3
May	10.8	1.8	12.6	7.5	14.5	.4	1.9	3.7	1.1	29.0	41.3
Perland	19.0	4.8	23.8	11.7	18.7	.5	3.2	3.6	2.8	40.7	64.4
West	7.7	1.8	9.6	7.8	12.6	.1	2.9	2.6	2.0	28.2	37.8
...	56.9	6.3	63.2	19.7	44.4	2.4	4.9	14.3	4.0	89.4	152.6
TOTAL	267.1	37.3	304.4	145.5	277.2	10.3	40.3	60.1	29.1	563.0	867.4

\*This is mostly cedar.

Table 6

Net Volume of Growing Stock on Commercial Forest Land in the Pinelands  
by Species and Counties, 1972  
(In Millions of Cubic Feet)

County	Yellow Pines	Other * Softwoods	Total Softwoods	White Oaks	Red Oaks	Hickory	Soft Maples	Sweet-Gum	Other Hardwoods	Total Hardwoods	Species
Atlantic	31.1	4.7	35.8	23.6	33.3	1.4	12.4	11.7	6.0	88.6	12
Chilmington	47.3	5.4	52.8	26.3	36.0	2.0	15.0	9.4	10.2	98.7	15
Madison	7.1	1.2	8.3	3.3	4.9	.3	1.7	1.5	1.4	13.1	2
DeWitt	4.8	.7	5.5	4.0	5.8	.2	2.1	2.2	1.0	15.6	2
Wilkes	8.5	1.9	10.4	6.4	7.9	.4	3.0	2.1	2.5	22.2	3
Winchester	3.1	.7	3.8	3.4	4.8	.1	2.2	1.8	1.6	14.0	1
York	29.5	3.1	31.6	12.4	18.8	.9	7.1	7.3	5.1	51.5	8
TOTAL	129.6	17.6	147.2	79.1	110.9	5.3	43.5	43.5	35.9	277.5	449

\*This is mostly cedar.



Figure 1

FOREST COVER MAP  
of  
NEW JERSEY  
showing  
ALL FORESTED AREAS  
prepared by  
THE BUREAU of FORESTRY  
FOREST MANAGEMENT SECTION

Black indicates forest cover

NEW JERSEY DEPARTMENT OF FORESTRY AND WILDLIFE  
DIVISION OF FORESTRY  
HARRISON, N. J.  
1958

## PINELANDS WOOD PRODUCTS, VALUES, AND INDUSTRIES

The following section outlines uses and values of wood products associated with the pinelands region of our state. These uses reflect one aspect of forest management and this is product economics. They are dictated by the needs and values our society places on wood in its various forms. The economic values indicated are often correlated with the forest lands ability to provide a range of products, services, and objectives. Product values are one consideration in the forest manager's ability to apply certain prescriptions to forest land and achieve a set of objectives.

It should be noted that many wood using industries in Southern New Jersey not physically located within the pinelands boundaries rely on the pinelands resource for raw material necessary for their businesses. This is especially true in the case of primary processors including logging companies, sawmills, firewood processors, and pulpmills. Processors characteristically tend to locate closer to sources of labor and demand rather than raw material supply.

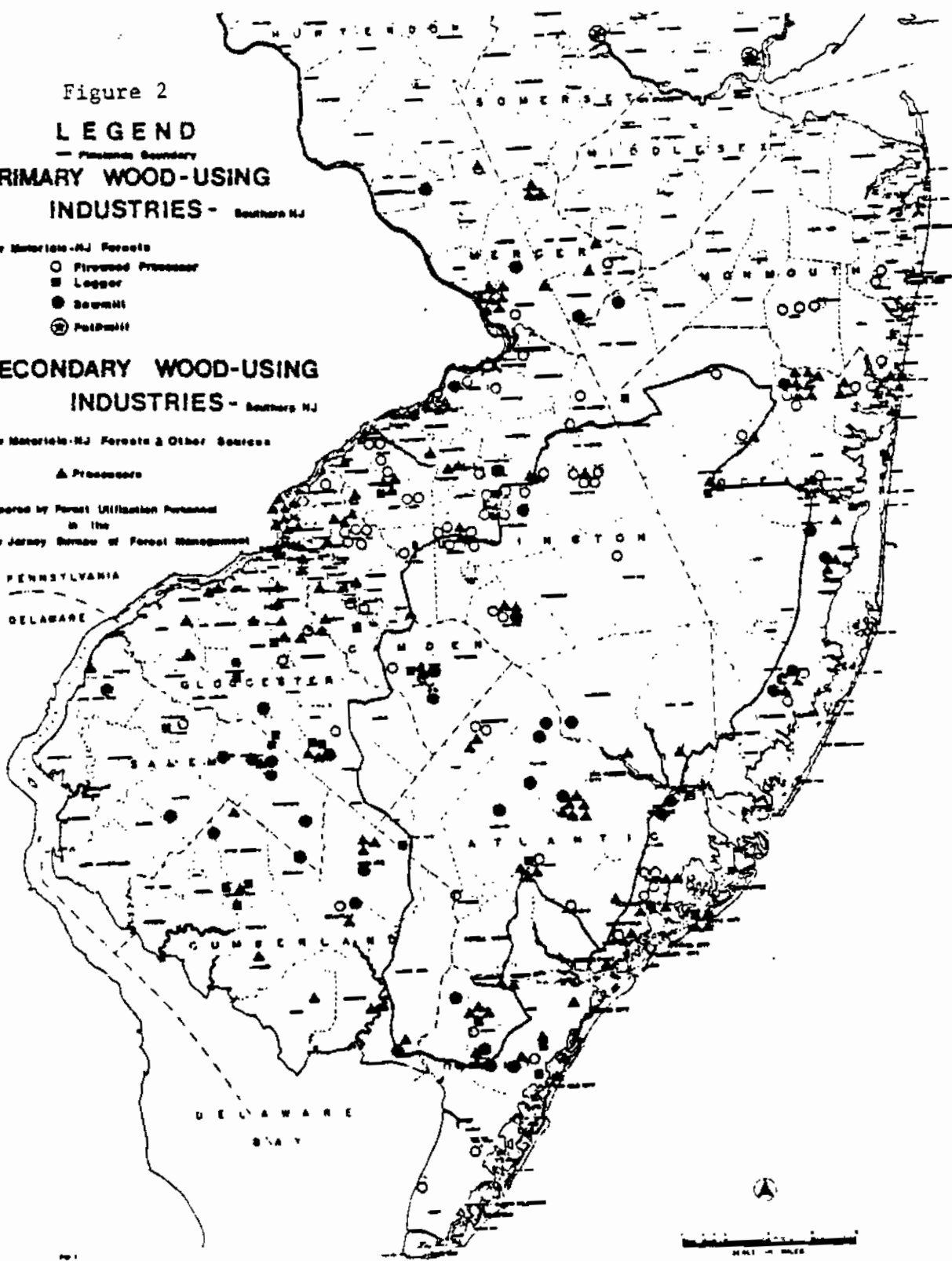
Figure 2  
**LEGEND**  
 - Political Boundary  
**PRIMARY WOOD-USING INDUSTRIES - Southern NJ**

- New Materials-NJ Forests
- Pilewood Processor
  - Logger
  - Sawmill
  - ⊗ Pulp Mill

**SECONDARY WOOD-USING INDUSTRIES - Southern NJ**

- New Materials-NJ Forests & Other Sources
- ▲ Processors

Prepared by Forest Utilization Personnel  
 in the  
 New Jersey Bureau of Forest Management



NEW JERSEY BUREAU OF FOREST MANAGEMENT

Table 7 COMPARATIVE PRICES OF NEW JERSEY'S FOREST PRODUCTS\*

<u>PRODUCT</u>	<u>STUMPAGE PRICE PER UNIT OF SALE</u>	<u>STUMPAGE PRICE PER CUBIC FOOT</u>	<u>DELIVERED PRICE PER UNIT OF SALE</u>	<u>DELIVERED PRICE PER CUBIC FOOT</u>
CEDAR	\$20/Cd.	\$.222	\$60/Cd.	\$.667
CHIPS	\$6/Cd.	\$.066	\$24/Ton Pine \$16/Ton Hardwood	\$.648 Pine \$.496 Hardwood
FIREWOOD	\$7.50/Cd.	\$.083	\$45/Cd.	\$.50
FURNANCE POLES	\$2.50/Ton	\$.078	\$19/Ton	\$.589
PILING	\$85/MBF	\$.527	\$.53/Linear Foot	\$.96
PULPWOOD	\$6/Cd.	\$.066	\$17/Ton Pine \$10.50/Ton Hardwood	\$.459 Pine \$.326 Hardwood
SAWTIMBER	\$85/MBF	\$.51	\$170/MBF	\$1.02
VENEER	-----	----	\$600/MBF	\$3.60

\* These are 1978 forest product prices obtained by the New Jersey Bureau of Forest Management through the cooperation of New Jersey's forest product industry. These values are only averages and will vary within the State.



Table 8

Economic Value of Forest Resources in the Pinelands

<u>County</u>	<u>Sawtimber 11'+ Stumpage Value</u>	<u>Mill Delivered Value</u>
Atlantic	28,254,000	56,508,000
Burlington	35,904,000	71,808,000
Camden	4,896,000	9,792,000
Cape May	4,437,000	8,874,000
Cumberland	7,344,000	14,688,000
Gloucester	4,029,000	8,058,000
Ocean	<u>18,666,000</u>	<u>37,332,000</u>
	\$103,530,000	\$207,060,000

Product values consider hardwood sawtimber, pine sawtimber and piling markets.

<u>County</u>	<u>5-10" Poletimber Stumpage Value</u>	<u>Mill Delivered Value</u>
Atlantic	8,158,000	36,750,000
Burlington	9,179,000	41,350,000
Camden	1,143,000	5,150,000
Cape May	1,343,000	6,050,000
Cumberland	1,809,000	8,150,000
Gloucester	1,076,000	4,850,000
Ocean	<u>5,161,000</u>	<u>23,250,000</u>
	\$27,869,000	\$125,550,000

Product values consider firewood, pulpwood, pulp chips, and markets.

The present market value of the designated pinelands forest resource in economic terms is approximately \$131,000,000 with a mill delivered value exceeding \$332,000,000 for primary markets. Further value projections such as secondary production market values are indeterminable due to the extremely diverse product ranges.

These figures deal only with poletimber (5-10" DBH) and sawtimber (11"+ DBH) stock. Therefore, these resource value figures can be considered conservative because growing stock in the (2-4.9" DBH) class are not considered in the computations. However, this material does have stumpage and mill delivered values in the pulpwood industry, firewood industry, and certain landscaping and primary processing markets.

## PINELANDS WOOD PRODUCTS

### Sawtimber

Both hardwood and softwood sawtimber are annually marketed and processed within the pinelands region. Products include grade lumber, pallet stock, equipment mats, construction timbers, landscaping ties, siding, posts and many specialty products manufactured to specifications. Most of these sawmills provide not only primary products (lumber) but also manufacture secondary products (pallets, fencing, etc.), thereby providing a two-fold area of supply to individuals and industry alike. Their raw material is acquired largely from within the pine region. Their importance in providing employment, products, and services in New Jersey is tied directly to the pinelands resource and its continued flow of raw material.

### Cedar

Although often sawn into wood products as sawtimber, Atlantic white-cedar has special markets, management practices, and properties which warrant its separation from the general category of sawtimber. Many established sawmills deal solely in cedar and cedar products. In a roundwood form, it provides naturally durable posts for fencing, poles for shade tree stakes, channel, and shellfish bed makers, and rustic furniture products. In a sawn form, cedar products include fencing styles in many forms, shingles, boat boards, lath material, blueberry flat stock and lumber for a wide variety of special products. The pinelands region provides most of the Atlantic white-cedar in our state. Its continued production relies heavily on the application of sound forest management practices.

### Firewood and Wood Energy

Since the energy crisis of 1973, wood fuel as an energy source has been steadily rising. The private and commercial demand on the pinelands resource has directly reflected this trend. In 1979, 2,484 cords of firewood were provided to state residents from within this pinelands region through the Homeowner Firewood Program. This represents 85% of the total state volume provided under this program. Also, the entire volume of firewood harvested

from this region in 1979 by both private and commercial means is estimated at 32,000 cords. In purely economic terms, this material provided a caloric value equivalent to 4.6 million gallons of fuel oil.

Increased application of forest management principles could result in increased quantities of firewood availability and at the same time increase the quality and quantity of the pinelands forest resource base.

#### Piling

Piling is produced from both hardwood and softwood species. Trees fitting the piling category must satisfy very particular specifications. Grain deviation, taper, diameter, bole length, and clear height are all factors in classifying piling stock. For the most part, New Jersey's piling demand comes from other states where processing companies are geared to manufacture piling products on a large scale. The pine region does have the potential of producing piling quality raw material from its resource, however, the level of forest management would need to be increased greatly to produce sufficient quantity to attract corporate investment in the area.

#### Veneer

The veneer industry in New Jersey is concerned largely with the hardwood resource and the export trade. A veneer log is currently the highest quality log and must satisfy maximum log specifications to qualify. New Jersey has three veneer exporting companies; one is located on the fringes of the pinelands region. The total annual harvest of hardwood veneer in New Jersey is approximately 1,500,000 BF, however, only a minor percentage is acquired within the pinelands region. Veneer production within this region is one of potential rather than present day practices.

#### Pulpwood

Pulpwood is a major market for pinelands region forest resource production. Its demand comes from paper product manufacturing corporations who use this material for pulp production. A number of major pulpwood suppliers are located within the pinelands region and operate solely in logging, processing and marketing of pulpwood. The pinelands region presently supplies the great bulk of in-state demand for this material and also supplies several out-of-state corporations with pulpwood for producing a wide range of paper based products.

#### Wood Chips

Wood chips are produced within the pine region from roundwood harvested or cleared for roadway or powerline rights-of-way construction, housing development, farm field reclamation, etc. Markets for wood chips have increased substantially over the last five years. New developments in the management of sewage sludge, utilizing wood chips to facilitate the composting of sludge material, have created some new markets in recent years.

There may be additional sewage treatment facilities in operation soon which will be composting sludge and requiring wood chips for their processing. The pine region is presently a major state source of supply of wood chips.

Other markets for this product include roofing shingle manufactures which use wood chips to produce pulp necessary to manufacture their product - three such manufacturing corporations are located in New Jersey.

Landscaping companies also use wood chips for mulching around planted stock and for soil erosion control on steep embankments.

These and other wood chip uses make it a highly marketable material today and one with an even greater future potential.

## FOREST STAND SUITABILITY IN THE PINELANDS

Systems of land evaluation attempt to assess the suitability of land for man's use (or protection). However, land use depends on the interaction of a number of variable factors and not upon a single attribute, such as soil type, which can be mapped in broad categories.

Some of the present day forest stands in the pinelands are not always the best for a specific site. Past disturbances have changed the vegetation greatly. The pinelands have been cut over numerous times. Many wildfires of various intensities and frequencies have burned and reburned extensive areas again and again over the years since Europeans settled here and even before that time. Differences in fire history of individual tracts have made great differences in forest composition. Other man and animal disturbances have also changed the composition of the herbaceous understory and ground cover as well as the forest stands.

However, on the excessively well-drained, dry sites, so common over a large section of the pinelands, forest cover continues to be the best use of the land. The flora which has survived is generally well adapted to the present extremely poor growing conditions - better than cultivated plants without expensive improvements. By its very nature, the forest cover protects the soil and the water stored underground and screens them from pollution.

In the pinelands the average ground water level strongly influences what kinds of trees are best suited to the site, and thereby, what kind of forestry can be practiced in an area. Upland stands occupy sections where the winter water table generally remains at least one and one half feet often six feet or more, below the ground surface. They are located on the generally coarse sands and gravels, (podsoils) admittedly with lenses of clay in spots.

### Upland - Oak-Pine

On much of the moderately drained soils through the well drained and excessively drained soils, a major forest grouping is a combination of tree oaks and pines. Oaks are black, scarlet, post, chestnut, white, and in the southern portion southern red (Quercus velutina, Q. coccinea, Q. stellata, Q. prinus, Q. alba, Q. falcata). Pines are often mostly pitch (Pinus rigida), or mostly shortleaf (P. echinata), or a mixture, although in some stands especially in the fringe areas Virginia pine (P. virginiana) is an important component. Diameters of trees depend on the length of time since the last cutting or severe fire. Many of the oaks are 2 to 12 inches in diameter (breast height, or 4½ ft. above ground). Pines are usually larger than the

oaks, with many of them between 6 and 16 inches in diameter. Consequently, even though the oaks are more numerous, the pines contain more volume of merchantable wood.

#### Upland - Pitch Pine - Scrub Oak

On much of the moderately drained soils through the well drained and excessively drained soils, a second major forest grouping is a combination in which pitch pine and scrub oaks (bear, Q. ilicifolia; blackjack, Q. marilandica; dwarf chinkapin, Q. prinoides) predominate. Some stands may contain an occasional shortleaf pine or some stems of tree oaks, especially black and post. While this type is favored by droughty sites, its present distribution is mostly the result of more frequent severe fires than have occurred in oak-pine areas. Present productivity is low as the result of sprout origin of many pines, damage to crowns of surviving pines, and low stocking. Many of these stands have only 6 cords of pulpwood per acre when 60 years old, while seedling-pine stands undamaged by fire would have 30 cords or more per acre when 40 years old on the same soils.

#### Lowland - Pine Lowland

On wetter portions of the moderately drained soils through the poorly and very poorly drained soils, there is a major forest grouping known as the pine lowlands. Pitch pines dominate, although there may also be some hardwoods (red maple, Acer rubrum; black gum, Nyssa sylvatica; sweet bay, Magnolia virginiana; and in the fringe areas red gum, Liquidambar styraciflua). Most of those hardwoods are adapted to the wetter portions. Drier portions may have a few oaks. Many of these sites today have relatively small, crooked stems of pitch pine - sprouts from the last wildfire. However, pitch pine grows well on these sites, and if started as seedlings and never damaged by severe fires, can reach diameters of 14 to 20 inches, sizes suitable for sawtimber.

#### Swamps - White Cedar, Hardwood, or Mixed

In the swamps occur Atlantic white-cedar (Chamaecyparis thyoides) stands, hardwood stands (red maple, black gum, sweet bay, and in fringe areas red gum), or mixed stands. Many of these stands are on muck soils. Sediment deposits in swamps, as from agricultural or other clearing, have favored swamp hardwoods over cedar, especially in the fringe areas. Cedar is the most highly valued tree for this area. In contrast, associated hardwoods are often so defective that they are seldom harvested. Where there is no surface water flow within the swamp, the water table may vary greatly and these sites may be more favorable for hardwoods such as the gums and red maple.

### Fringe Areas

Very narrow areas around the outside of the pinelands do support some good hardwood stands, mainly because they are located on heavier, more fertile soils. Such are the sites where the pinelands border on the glauconitic soils of the "greensand" belt. Oaks and red gum will grow well, even on poorly drained sites. Tulip poplar (Liriodendron tulipifera) occasionally occur in small numbers. The area occupied is insignificant compared to the total pinelands area.

Figure 3 Site Suitability For Pinelands Forest Types

	PINE	OAK-PINE MIXTURES	OAK	MAPLE-GUM- MAGNOLIA	WHITE- CEDAR
UPLAND	X	X	X		
LOWLAND	X			X	
SWAMP				X	X

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## SILVICULTURE IN THE PINELANDS

There is extensive information on the best forestry practices for the pinelands. The U.S. Forest Service Research Station, the New Jersey Bureau of Forest Management and scientists from Rutgers and other universities in the Northeastern United States have done extensive research into best silvicultural methods for managing pinelands' forests. Also, the results and experiences of decades of the Bureau's forest management on State Forests and privately owned lands are on record.

The "island" of poor sandy soils which is called the pinelands, supports vegetation quite unlike that of the surrounding lands and thus requires a much different type of silviculture. Forest management should favor pines over the oaks because they can make much better use of the poor growing conditions (Moore 1939). Pine produces material suitable for sawlogs and piling, attains larger sizes in less time, is more fire resistant, and with the right conditions, reproduces itself readily from seed. Pure stands of pine should be thinned at least midway in the growth cycle to prevent stagnation and to favor development of the best individuals.

Most of the hardwoods are sprouts off old stumps created by repeated cutting and/or fires. Those stumps, and thus the trees that grow from them, have lost much of their vigor as a result of this repeated resprouting. Trees cannot maintain themselves indefinitely by this form of reproduction. Where repeated crops of sprouts have reduced or will reduce the vigor of oaks, partial cuttings that favor large crowns and lengthening the rotation to produce larger trees will favor acorn production and the establishment of oak seedlings to rejuvenate the stand.

An important management goal is to supply both oak and pine, because of expected demands for oak fuelwood and for good quality pine in piling, pulp, and lumber. Some stands could be predominantly oak, others predominantly pine of seedling origin, and still others a mixture. At least some of the release of pines from competing oaks could be achieved through fuelwood cuttings.

The pines are intolerant of shade, and therefore, require even-aged management for their regeneration. Harvest cuttings must be accompanied by vigorous methods of hardwood control, such as prescribed burning, herbicide application or mechanical preparation.

In newly established pine stands, the extent of competition from oak sprouts varies greatly - being dependent on the age and vigor of the previous oaks when cut, on extent of site preparation, and on the size and vigor of the pine seedlings. In some areas, it is necessary to cut back or chemically control the oaks if relatively pure pine stands are desired. As the pines get larger, prescribed burning will reduce wildfire hazard, and at the same time, help control oaks and create a seedbed for pine seeds. On upland sites in the pinelands, prescribed fires in the winter are recommended (Little 1953). Fires in the stands where the overstory is not susceptible to serious injury, mainly affect small reproduction, shrubs, and duff. Prescribed burning, especially repeated burns, can provide a good catch of pine reproduction in cutover areas because many of the pines will be seedlings or seedling sprouts present before cutting as the result of periodic burns. A deep burning prescribed burn at the end of a rotation may be necessary to get adequate pine reproduction in the wet parts of pine lowlands.

In the pineland swamps, Atlantic white-cedar is usually the most valuable tree that can be grown. It is necessary to manage cedar stands carefully to obtain regeneration and new growth. The cedar should be managed in even-aged tracts and harvested by some modified method of clear cutting (Little 1950). For stands less than five or six acres in size, the entire stand may be clear-cut, provided mature white-cedar occurs in clumps, or on the fringes and edges, particularly the west side of the area that has been harvested. Such a seed source seems desirable in case the usually large amounts of viable seed in the forest floor under mature stands fail to provide an adequate number of cedar seedlings. For larger cedar stands in one swamp, the manager might use a system of strip cuttings progressing from east to west, or southeast to northwest. The strips should be as short as possible because exposure and windthrow often cause large losses in the residual stand along the edge of clearcut areas. In mixed stands of cedar and hardwoods, some method of reducing the number of hardwoods should be undertaken because the cedar is very intolerant of the hardwood shade. According to Little, cleanings are an absolute necessity, along with slash disposal after harvest cuttings, in mixed stands if the next crop is to contain a high proportion of white-cedar (Little 1950). All hardwood stems plus some of the taller shrubs, should be eliminated from the stands. When a well stocked stand of Atlantic white-cedar reproduction three to four feet tall covers most of the area, the stand can generally maintain itself without further cleanings.

Conversion of some hardwood swamps to Atlantic white-cedar may be desirable. The swamp hardwoods are of low commercial value and larger trees, especially red maple, often have extensive rot. They do protect the watershed, but have little additional value except for aesthetics. In areas where white-cedar is to be introduced by artificial means, complete removal of the present growth is not necessary if it is killed back so that cedar seedlings can overtop it (Little 1950). The white-cedar would then be introduced by seeding or planting.

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## Silviculture of Pinelands Forest Types

### I. White-Cedar

#### A. Harvest Methods -

1. Clearcut.
2. Selective cutting subjects residual stand to possible windthrow and hastens succession to hardwoods.

#### B. Intermediate Treatments -

1. Thinnings not usually recommended.
2. Weeding - removal of hardwoods which are competing with young white-cedar.
3. Protect from fire, prescribe burn the perimeter.

#### C. Regeneration -

1. Site Preparation -
  - a. Fell all remaining trees.
  - b. Prescribe burn all slash.
  - c. Seedlings result from readily abundant natural sources. After mature stands are cut, many seedlings start from viable seeds stored in the forest floor.
  - d. Prevent excessive browsing by deer.
  - e. Control of hardwoods.

### II. Pine

#### A. Harvest Methods -

1. Clearcut. (Pine is intolerant to shade from any residual stand)
2. Seed-tree harvest.

#### B. Intermediate Treatments -

1. Thinning performed to attain desirable level of stocking, if necessary.
2. Weeding or thinning to remove poorly formed and defective pines and to remove competing hardwoods.
3. Prescribed burning periodically throughout growing cycle after pines have reached suitable size.

#### C. Regeneration -

1. By seed - prescribe burn prior to harvest. \*Control hardwood sprouts after harvest.
2. By planting - drumchop and/or burn after harvest. \*Control hardwood sprouts.

\*Many areas will not require such control measures until they reach a size that fuelwood may be harvested.

### III. Pine-Oak, Oak-Pine Mixtures

#### A. Harvest Methods -

1. Seed-tree harvest.
2. Selective cut.

#### B. Intermediate Treatments -

1. Prescribed burning - none in some areas; periodic in some areas for fuel reduction and pine-seedling establishment.
2. Thinning where desirable to shape composition, favor seed production, salvage dying trees, or increase growth of residual trees.

#### C. Regeneration - Natural Regeneration

Reinforcement planting with superior stock.

### IV. Oak

#### A. Harvest Methods -

1. Clearcut.
2. Selective cut.

#### B. Intermediate Treatment -

1. Exclude wildfire, prescribe burn as required for protection.
2. Thin and weed to maintain appropriate stocking.

#### C. Regeneration - Natural sprouting and seed.

### V. Maple-Gum-Magnolia

#### A. Harvest Methods -

1. Clearcut.
2. Selective cut.

#### B. Intermediate Treatment - Remove undesirable species.

#### C. Regeneration - Natural Regeneration to Favor Cedar.

Note: Unless markets change, any cutting or intermediate treatment of maple-gum-magnolia stands, will probably not be economically feasible; if conditions change, strong consideration should be given to establishing Atlantic white-cedars on suitable sites.



## FORESTRY IN THE PINELANDS

The purpose of this section of the report is to explain what forestry practices are being advocated by foresters and what practices are being accomplished by landowners in the pinelands.

### Reforestation

This is a forestry practice accomplished in cooperation with the Bureau of Forest Management. This management recommendation is a favorite of landowners and requires little encouragement from the forester. As fields and areas are abandoned from other agricultural uses, planting the area with trees is highly desirable. Because of national publicity and conservation education, practically everyone is aware of the benefits that planting trees provide. Other forest management practices are not readily understood by the public. In seven counties that contain portions of the pinelands, 228 acres of reforestation have been accomplished annually by private landowners during the past 15 years.

### Timber Stand Improvement (TSI)

This is an operation that includes pruning crop trees, cleaning saplings stands, thinning pole and small sawtimber stands, removing culls and cutting all stems two inches and larger after a regeneration cut. This generally constitutes the removal of trees from a stand at a cost to the landowner that are otherwise not merchantable for such products as small sawlogs, pulpwood, fence posts and firewood.

Timber Stand Improvement is performed to shift growth to fewer trees of better form and higher value. These alterations in stand density and spacing not only improve the quality and species composition of the stand, but also increase the growth of the residual trees, which ultimately results in a shorter rotation, yielding the highest rate of financial return. Essentially then, the decision to perform TSI is an economic one made by the landowner to obtain a higher return from his woodlot.

TSI is accomplished in young forest stands usually up to 40 years of age. Due to the long rotation before forest products can be harvested so that landowners can receive a return on investments, the Federal Government will help defray the expenses with landowners on a cost-share basis (Forestry Incentives Program). The benefits of TSI work are not readily seen but are recognizable years later when products are harvested. The increased growth rate in the crop trees is easily seen or measured ten to fifteen years after the TSI work is accomplished.

TSI accomplishments in the pine region have increased substantially since the Forestry Incentives Program (FIP) was initiated in 1974. During the past 15 years, landowners have accomplished 1,200 acres of TSI in the pinelands.

### Harvesting

Harvesting is best accomplished when foresters designate the trees to be removed and the overall operation is directed by a timber agent.

### Cordwood Harvesting

Harvesting for pulpwood and firewood is a highly recommended forest practice for the pinelands region and requires advice from a professional forester. Pine is better suited for much of the soils found in the pinelands region, and therefore, is favored over other species. The past history of land treatment, including the influence of periodic forest fires which favor the pine ecology, adds substantially to pine trees dominating much of the forested areas.

The rotation age for pine pulpwood is approximately 25-30 years on most soils. Maintaining full stocking and desirable compositions after a pulpwood harvest is the objective of the landowner. The technique used to accomplish this is the seed tree harvest cut. All tree species 4" DBH and larger are harvested and utilized leaving 4-15 pine seed-trees per acre to help regenerate the area. Prescribed burns before harvest cutting are recommended to prepare seedbeds for the establishment of pine seedlings and to favor their establishment both before and after the cutting.

There is a tremendous increase in demand for firewood. Since pine is favored over oak, harvesting the oak when it reaches cordwood size improves the forest stand. This is done through TSI or commercially through firewood contractors, depending on volume, accessibility, etc. In either alternative, the trees to be harvested are designated by a forester and the volume calculated. Another forest practice to utilize firewood material is to harvest dead oak that has been fire killed or killed through heavy defoliation by the Gypsy Moth. These dead trees, if left standing for a year or more, require little seasoning before being used for firewood.



### Sawtimber Harvesting

In the pine region, sawtimber harvesting falls into three categories: hardwood sawtimber, pine sawtimber, and cedar. Hardwood sawtimber is harvested periodically on the bottomland forest types, mostly in the fringe areas. The stands are selectively marked creating improved growing conditions for the residual stand and improving conditions for proper natural regeneration.

### Pine Sawlogs Harvesting

Pine sawlogs are in demand and are highly marketable, but pine sawtimber stands are scarce because of past cutting and fire history. Mature pine stands can be selectively cut, clearcut, or cut leaving seed trees, depending on forest description. Much of the pine sawtimber remaining in the pinelands region is found on the low lands. Logging these areas is difficult because of the high water table.

Pine is a desired species in the pine region because it can utilize the site better than oak. Pine is used for pulpwood and does grow to sawlog size in 50-80 years. For these reasons, pine is preferred over oak and the management techniques being prescribed at present favor pine regeneration. A seed tree harvest coupled with a prescribed burn preceding the harvest favors pine reproduction. Ensuring the survival and good growth of pine seedlings requires control until the pine has established and is able to maintain its dominance without further aid.

### Atlantic White-Cedar Harvest

Cedar occurs in pure dense stands in many of the swamps in the pine region. Clearcutting is the forest management practice recommended for cedar swamps. By clearcutting cedar swamps, the chances of reproducing the cedar are enhanced. Other methods of management, such as TSI or selective harvest, are not recommended because cedar is highly susceptible to windthrow and understories of hardwoods and tall shrubs are favored. Any appreciable competition of red maple from coppice sprouts or seedlings must be controlled until the cedar is well established. A light prescribed fire immediately following the harvest cut is recommended at times to prepare the ground for good cedar germination. Cedar, because of its thin bark and growing conditions, is highly susceptible to forest fires.

### Prescribed Burning

Prescribed burning is a management practice used to reduce fire hazard. This management technique is highly recommended and extremely beneficial to many woodlands. Natives of the pine region are aware of the benefits that prescribed burning provide. Prescribed burning (RxB) is used in pure pine stands and pine oak stands for two reasons - hazard reduction and regeneration. The soils are generally sandy in the pine region and a considerable proportion belong to the group known as podzols. Podzols are characterized by a bleached surface layer from which the organic matter, clay and iron, have been leached

out and transformed to deeper layers. Frequently, a hardpan is also formed, mostly on poorly drained sites, in the zone where these materials are deposited. In driving through the pine region, this interesting podzol formation may be easily recognized in the road cuts by the layer of white sand on the surface and the dark colored "horizons" below it. The leaves and needles which accumulate on soils of this type do not decay readily but tend to form a mat which is held together by threads of fungus. Where earthworms are present they feed on fallen leaves and transform them into humus. In the white sands of the pine region, however, where surface temperatures reach  $160^{\circ}\text{F}$ , few earthworms can be found, and so where fires do not consume the litter, it accumulates on top of the ground in loose mats of "raw" humus. This condition makes it difficult for pine seedlings to germinate and makes the woodlands hazardous for forest fires. By using RxB in established stands, accumulated litter is reduced, lessening the hazardous conditions and also causing a "break" in the line of flammable material from the forest floor to the crowns of pine trees. Periodic RxB, usually every 3-5 years, reduces the accumulation of litter and helps protect the forest from wild fire.

Periodic burns also favor the establishment of advance reproduction of pine seedlings and seedling sprouts, so reestablishment of pine stands is facilitated. The burning exposes mineral soil, which is conducive to pine regeneration.

#### Insect and Disease Management

Landowners protect their tree plantations and woodlands from insects and diseases through mechanical and/or chemical control. Young reforested areas and Christmas tree plantations are attacked by a number of pests. To protect the trees from being deformed, stunted, or killed by insects, chemical or mechanical controls are implemented. This may require spraying chemicals or cutting leaders or side branches to eliminate pests. Chemical application is done with small hand spray equipment, mechanized ground equipment, or aerial methods both fixed wing and helicopters. It may require spraying parts of the tree or the entire tree depending on the pest. Another way to eliminate certain pests is to cut the tree and burn it after obtaining proper permits. The control work that is accomplished on plantations is usually done on small acreages.

Aerial applications to control Gypsy Moth infestations in the oak-pine forests are usually done on larger acreages. Ground control applications are done on individual lawn trees.

#### Recreation Management Assistance

Recreation management assistance is accomplished on private campgrounds, recreational facilities, school grounds, and other publically owned woodlands. Identification of trees and shrubs for nature trails is done for outdoor education by schools, campgrounds, etc. Site planning to put the campsites on the woodlands that can be best suited for this recreational use is accomplished. How to control site deterioration and eventual problems is accomplished with proper site planning and vegetation selection.



## ALTERNATIVE FOREST MANAGEMENT TECHNIQUES

The "Pinelands Preservation Act" is the culmination of a gradual shifting of attitude and viewpoints that people once held of the Pine Barrens. Where once the vast, forested acreage was seen as building room for this most urban of states, it is now generally perceived that the pinelands must be conserved and managed for the forest-based resources which it can provide. The management plan which will be developed and the regulations which will result from its implementation will provide the incentive to complement this redirected emphasis. These incentives, whether they be tax advantages which permit the retention of forest land, or land use rules which restrict the alternatives, will generate an increased demand for the management that will utilize the potential of the pinelands forests. This will necessitate, not only increased assistance from New Jersey's foresters, but different types of management techniques as well.

It is anticipated that future management techniques, which will reflect the renewed interest in public and private forest land ownership, will focus upon two general areas: (1) utilization of innovative techniques which will confront the problem of low pinelands productivity; and (2) an increase in present management practices which emphasize the growing of marketable forest products.

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Use of Genetically Improved Seedlings - Much research has been performed in developing trees which can utilize the dry, sandy, upland pinelands soils and which can grow at an improved rate. The most promising result of these efforts is the hybridization between pitch pine (*Pinus rigida*) and loblolly pine (*Pinus taeda*). Present studies are indicating that these hybrids grow 25% faster than native pitch pine and exhibit the excellent form of the loblolly pine. Where non-hybrid seedlings are planted, good strains are important, because recent evidence indicates that the best strain of native pitch pine produces trees twice as tall at 50 years as the slowest growing strain.

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Planting Unproductive Areas - There are areas in the pinelands which are so poorly stocked and growing at such a slow rate that they could be effectively described as stagnating. The best approach in these instances may be to simply start over, harvesting what little wood is present, and replanting seedlings to a desirable stocking level using good genetic strains.

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Fertilization - The infertile sands of the pinelands could possibly be made more productive through the use of fertilizers. These could include either chemical formulations or could be an organic type, utilizing a waste product such as sewage sludge. The effects of such treatments are still only partially known.

Prescribed Burning - Fire is presently used solely for the reduction of forest fuels which lessen the danger of wildfire. Its use could be increased to include other forest management objectives such as controlling undesirable species, and for preparing sites for planting or seeding.

Utilization for New Jersey Forest Products - The development of new markets for forest products should substantially increase the intensity of forest management in the pinelands. The need for alternate forms of energy could facilitate the use of previously unmarketable wood in the form of firewood and for the production of alcohol.

Utilization Emphasis on Underused Species - There are some forest types which have previously been economically unuseable, and therefore, have received little management. Once again, the development of new markets may create the need to manage forest types, such as oak or swamp hardwoods, in a manner which will maximize growth and utilization.

## ISSUES FOR THE PINELANDS

### Energy

#### A. Issue Statement

The forest resources of the pinelands region contain a tremendous potential for supplying an energy source to the residents of New Jersey.

#### B. Preception of the Issue

The forests of the pinelands could make a sizeable contribution toward supplementing this state's energy requirements. It is estimated that, with present average growth rates, an energy equivalent of  $4.39 \times 10^{12}$  BTU's (equivalent to 31.4 million gallons of fuel oil) in wood is produced annually. It is also estimated that with forest management this growth rate could be increased ten-fold. Of course, this annual growth should never be totally used for fuelwood, other wood products and forest benefits must also be supplied, but the figures do point out the potential of the pinelands and the importance of some of the questions which have developed concerning energy. What role and to what extent will the forest resources be utilized to supplement our fuel supply? What areas could be used for energy production? How much can be used without decreasing the total supply or the harvest of other forest products? Who should decide what will be harvested? What silvicultural techniques could be employed to increase forest productivity?

#### C. Recommended Strategies

1. Designate forested areas set aside for natural areas and for intensive recreation, and apply forest management to the remaining areas for multiple purposes, including wood production.
2. Adopt policies that encourage the utilization of wood harvested by correct silvicultural techniques.
3. Determine the amount of wood that can be harvested on a sustained basis.
4. Up-date resource data.
5. Answer the questions raised in the perception of the issue.

## Forest Land Policy Formulation

### A. Issue Statement

Foresters should be involved in land-use planning affecting forest land and forest management at federal, state and local levels.

### B. Perception of the Issue

The development of land-use planning, caused either by popular or legal mandate, has been increasing in New Jersey in recent years. These plans often result in policies or regulations affecting the use and management of forest land by direct influence such as zoning and taxes, or indirectly by causing other land uses to become more desirable. Planning should incorporate the technical input and viewpoints of foresters, such as is being requested by the Pinelands Commission.

### C. Recommended Strategies

1. Place a forester on the staff of planning authorities.
2. Foresters should be involved in the implementation of the plans.

## Fire Management

### A. Issue Statement

A comprehensive plan for the management of fire in the pinelands needs to be implemented.

### B. Perception of the Issue

Much of the composition of the pinelands is a result of past use, harvesting and fire and its ecology is dependent upon the presence of fire. A plan and policies for the control of wildfire and the use of prescribed burning must be incorporated in pinelands land management techniques.

### C. Recommended Strategies

1. Increase use of prescribed burning.
2. Implement Bureau of Forest Fire Management plans.

## Insect and Disease Control

### A. Issue Statement

Effective insect and disease control is necessary in forest management in the pinelands.



B. Perception of the Issue

Forest management in the pinelands needs to include the control of outbreaks of insect pests and disease. Increases made in wood fiber production or other amenities such as recreational potential can be lost due to infestations of an insect such as the Gypsy Moth.

C. Recommended Strategies

1. Continue to monitor insects and diseases through existing programs.
2. Control insects and diseases as necessary to protect the forest resource by appropriate silvicultural, chemical, biological or mechanical means.

Forest Land Valuation and Taxation

A. Issue Statement

Forest land should be valued and taxed based on its use and productivity.

B. Perception of the Issue

Forest land and assessment and taxes are not being used properly as an incentive to good management. Existing laws are not being uniformly administered.

C. Recommended Strategies

1. Taxes should be levied based on actual land use and productivity.
2. This land use tax should be used as an incentive to practice forestry.

Wood Utilization

A. Issue Statement

Greater benefits to society from the pinelands wood resources could be realized through more efficient harvesting, utilization and salvage.

B. Perception of the Issue

After a harvesting operation, approximately 40% of the wood from the felled trees will be left at the site. This volume along with the unwanted trees are left to waste. Some of this volume is now being utilized for fuel-wood. However, the timber that loggers do remove from the woods is often used for the wrong product, such as using high quality logs for pallet stock.

Other forms of wood waste result from the clearing of construction sites, fire damage, and insect kills.

Wood resources are also lost during primary and secondary processing. Sawmilling produces slabs and sawdust; and secondary manufacturers of wood products produce trimmings and shavings that are not directed towards appropriate uses.

C. Recommended Strategies

1. Recognize the existence and importance of indigenous wood using processors and industries.
2. Adopt timber harvesting guidelines.
3. Provide information on improved harvesting techniques and encourage full and proper utilization of harvested trees.
4. Incorporate measures in land use regulations which encourage proper forest management and utilization.

Forest Land Regulation

A. Issue Statement

Regulations are being developed that affect forest management techniques.

B. Perception of the Issue

There has been a rapid increase in the number of regulations at the state and municipal level which, either directly or indirectly, have an effect on the use and activities on forest land. But, upon examination or implementation, some of these regulations have proven to be restrictive to proper forest management and detrimental to the resource.

There is a need for local and state regulations which will encourage forest land owners to enlist the assistance of professional foresters in all aspects of their forest management. The lack of such legislative incentives is apparent from the fact that only 15% of the timber harvested in New Jersey is performed with the advice of foresters. And now, with the rising popularity of wood for fuel, there is increasing concern that unregulated and unsupervised cutting may result in long term damage to the forests in the pinelands.

C. Recommended Strategies

1. Review existing land use regulations to identify those which exclude or impede the application of proper forest management.
2. Include Bureau of Forest Management "Best Management Practices" when developing forest land regulations.

## Forest Resource Information

### A. Issue Statement

Forest resource planning and decision making requires current maps and data.

### B. Perception of the Issue

Current resource information is based on forest surveys of New Jersey by the U.S. Forest Service, Northeastern Forest Experiment Station in 1955 and 1971. This data is augmented by the New Jersey Forestry Services periodically. Data for the pinelands region has been derived and interpolated from these sources. There is a need for surveys and mapping of the actual pinelands forest resource in order to provide for more accurate planning and implementation of future forest management activities.

### C. Recommended Strategies

1. Conduct a forest resource inventory of the pinelands.
2. Develop a forest type suitability map.
3. Monitor and document all harvest activities.

## Forest Land Use

### A. Issue Statement

The benefits of forest resources and the potential for forest management should be considered when developing land use guidelines.

### B. Perception of the Issue

The uses of forest lands should be professionally planned to promote long term continuity of forest ecosystems, efficient use of forest resources and optimal benefits for all the people. Forest land-use planning should consider all potential land uses, land capabilities to meet different demands on a sustained basis, degrees of compatibility among uses, and costs and benefits of different use combinations over time.

### C. Recommended Strategies

1. Determine and consider the value of the forest and the productive potential for the future.
2. Utilize these forest valuations when developing the "formulas" which will determine the best land uses.
3. Include foresters in land-use planning decisions.

## Forest Productivity

### A. Issue Statement

Forest productivity is at a level far below its potential.

### B. Perception of the Issue

Although steadily increasing since the early 1900's, the growing stock and productivity of the pinelands is still far below potential. Sample plot studies of growth in South Jersey forests indicate a growth rate of one cord per acre per year on the best old field sites and an average of 0.3 cords per acre per year on the average sites. These figures apply only to the areas which are supporting stands of six cords per acre or better. It is estimated that the area of upland forest falling within this category is not more than 30 percent of the total. On the remaining upland 70 percent, the forest has been so destructively burned and cut that its present productivity does not even approach its potential. These areas exhibit a growth rate of less than .2 cords per acre per year.

The pinelands need to be managed, not only as a recreational or water bearing resource, but for its forest product potential as well. The demand for timber, pulpwood, and firewood will continue to increase and the forests can be developed to supply much of this demand. It is estimated that in many areas over the long term, growth could be increased six to ten times its present rate.

### C. Recommended Strategies

1. Require advice and assistance of foresters in all forest management activities.
2. Encourage planting of genetically improved seedlings.
3. Increase the use of prescribed burning to include such forest management applications as species control and site preparation.

## Level of Forest Management

### A. Issue Statement

Factors affecting forest land ownership and land use have resulted in low levels of forest management accomplished in the pinelands.

### B. Perception of the Issue

The plight of the private woodland owner in the pinelands is not much different than that of owners elsewhere in the United States.

High taxes, low productivity, long time periods to grow crops, high



## CONCLUSION

The pinelands area forest is largely a result of past use and abuse. Wildfire and past cutting practices have had the greatest influence.

Forest management is viewed as a key to the preservation and enhancement of forests.

The pineland's forests have a long history of benefit to the state. With a program that will retain them and encourage management, they will continue to provide goods and services to future generations.

Perhaps the greatest social value of applied forest management would be to the non-industrial users of the forest; the hikers, campers, nature hobbists, and all others who enjoy the beauty of stately trees in well tended forest areas.



APPENDIX





DEPARTMENT OF ENVIRONMENTAL PROTECTION

NEW JERSEY BUREAU OF FOREST MANAGEMENT

REFORESTATION PROGRAM

The Reforestation Program is designed for New Jersey landowners interested in establishing forest plantations.

Landowner prerequisites:

1. Willingness to devote at least 1 acre of your land as a forest plantation and follow a planting plan.
2. Agree that trees planted for reforestation will not be dug, potted, or sold as nursery stock for ornamental purposes. However, 50% of the trees may be cut and sold for Christmas trees in a thinning operation.
3. Own a minimum of 5 acres of land to be eligible to purchase seedlings from the State Nursery. Less than 5 acres, a forester will still provide free technical assistance and advise you where you can purchase seedlings from private nurseries.

If you are interested in tree planting and meet the requirements as described above, please fill out and return the attached form.

The procedure will then be as follows:

1. A date will be arranged for a Department Area Forester to go over the property with you and prepare a planting plan. You will receive a copy of this plan.
2. The forester will assist you in completing the seedling order. The order and payment will then be sent to Trenton Headquarters.
3. Upon payment, your trees will be reserved for you to pick up at a central point in your county or at the Washington Crossing State Forest Nursery, in the early spring. You will be notified of the pick-up date.
4. No orders will be accepted after February 1st.
5. Species available from the State Nursery are:

Two year old seedlings of White Pine, Austrian Pine, Pitch Pine, Japanese Black Pine, Japanese Larch, and Norway Spruce and miscellaneous hardwoods - Cost - \$40 per thousand.

Failure to plant trees according to the plan prepared will make you ineligible to receive trees from the State of New Jersey in the future. Our interest is that conservation needs be fulfilled; that trees carefully raised in the Nursery and planted on your property will grow and prosper as a forest plantation. This can be accomplished through careful planning and planting.

BUREAU OF FOREST MANAGEMENT

08/76 - 09/78

## Selling Your Timber

### Through the

### New Jersey Bureau of Forest Management

1. Area Forester meets with landowner to examine woodlot, locates property lines, and explains the procedure of a timber sale conducted through the Bureau of Forest Management.
2. Owner signs necessary agreements (two copies of Agreement Covering Forestry Service and two copies of Timber Agent Agreement) and returns them to Area Forester. The Area Forester cannot proceed with the sale until these agreements are duly signed.
3. The trees to be sold and cut are then designated by the Area Forester. These are the trees selected by a professionally trained Forester to harvest at this time. Only those trees designated can be cut. A timber sale prospectus and map is then mailed to the prospective buyers inviting inspection of the trees for sale. The prospective buyers submit their bids to the designated Timber Agent, who works for the landowner on a commission basis.
4. The Timber Agent submits all bids to the landowner. The landowner notifies the Timber Agent as quickly as possible what bid is accepted. The landowner reserves the right to reject any or all bids.
5. The timber sale contract is then signed by the landowner and buyer and a performance bond (cash deposit) is posted by the buyer.
6. The harvesting operation is carried out under the supervision of the Timber Agent. The Agent measures all the logs and collects the money for the owner.
7. When the harvest operation is completed, the Timber Agent makes a final inspection of the harvested area checking the condition of loading sites, roads, fences, streams, etc. The Timber Agent reports to the owner to advise him that the provisions in the contract were satisfactorily met. The performance bond is then returned to the buyer and the Timber Agent is paid his fee.
8. The Area Forester then makes a final woodland inspection. He confers with the owner for comments and also makes any additional forest management recommendations at that time.

If you have any questions please contact:

January 22, 1973





## GLOSSARY

**Board Foot** - A unit of lumber measurement 1 foot long and 1 foot wide and 1 inch thick, or its equivalent. By forest survey convention, softwoods less than 9.0 inches dbh and hardwoods less than 11.0 inches dbh do not contain board foot volume.

**Cleaning** - A loose term for a cultural operation eliminating or suppressing undesirable vegetation, mainly woody (and including climbers), during the thicket stage of a forest crop.

**Clear-Cutting (System)**- A silvicultural system in which the old crop is cleared over a considerable area at one time; regeneration generally artificial, sometimes raised in conjunction with an agricultural crop, but natural regeneration sometimes possible by seeding from the air - from adjacent stands - or from seed (including cone-bearing slash) and/or advance growth already on the ground.

**Commercial Forest Land** - Forest land that is producing or capable of producing crops of industrial wood (more than 20 cubic feet per acre per year) and is not withdrawn from timber utilization.

**Coppice Shoot** - Any shoot arising from an adventitious or dormant bud near the base of a woody plant that has been cut back.

**Cull** - Any item of production, e.g., trees, logs, lumber, picked out for relegation or rejection because it does not meet certain specifications.

**Drumchop** - To prepare a cutover area for regeneration by rolling a large bulldozer drawn cylinder across slash and remaining trees.

**Even-Aged** - Of a forest, crop or stand, composed of trees having no, or relatively small, differences in age.

Forest Type - A classification of forest land based upon the species forming a plurality of live tree stocking. .

Furnace Poles - Logs used in the process of smelting.

Growing Stock Volume - Net volume in cubic feet of live growing stock trees that are 5.0 inches dbh and over from a 1 foot stump to a minimum 4.0 inch top diameter outside bark of the central stem, or to the point where the central stem breaks into limbs. Net volume equals gross volume less deduction for rot.

Hardpan - Generally, any hard and/or compact(ed) layer.

Hardwood - A conventional term for the timber of broad-leaved trees, and the trees themselves, belonging to the botanical group Angiospermae.

International  $\frac{1}{4}$  Inch Rule - A log rule, or formula, for estimating the board foot volume of logs. Stated mathematically, the formula is  $[(D^2 \times 0.22) - 0.71 D] \times 0.904762$  for 4-foot sections, where D = the diameter inside bark at the small end of the 4-foot section. The International  $\frac{1}{4}$  inch rule is used as the USDA Forest Service standard log rule in the northeastern U.S.

File - A long, heavy timber, round or square cut, that is driven deep into the ground to provide a secure foundation for structures built on soft, wet, or submerged sites. Collectively termed piling.

Podzol - A soil characterized by a superficial layer of raw humus above a generally grey A horizon of mineral soil depleted (by leaching) of Fe and Al sesquioxides and colloids, and overlying a B horizon wherein Fe sesquioxides and/or organic matter have accumulated.

Poletimber Trees - Live trees of commercial species that meet regional specifications of soundness and form and are at least 5.0 inches dbh but are smaller than sawtimber size.

Prescribed Burning - Controlled application of fire to wildland fuels in either their natural or modified state, under such conditions of weather, fuel moisture, soil moisture, etc. as allow the fire to be confined to a predetermined area and at the same time to produce the intensity of heat and rate of spread required to further certain planned objectives of silviculture, wildlife management, grazing, fire hazard reduction, etc. NOTE: It seeks to employ fire scientifically so as to realize maximum net benefits with minimum damage and at acceptable cost.

Primary Wood Using Industry - One that uses wood material in its round form, e.g., sawmilling.

Pulpwood - Wood cut and prepared primarily for manufacture into wood pulp.

Regeneration - The renewal of a tree crop, whether by natural or artificial means.

Rotation - The planned number of years between the formation or regeneration of a crop or stand and its final cutting at a specified stage of maturity.

Round Wood - Of timber and fuelwood, prepared in the round state - from felled trees to material trimmed, barked and cross-cut, e.g. logs, transmission poles, pit props.

Sawtimber Trees - Live trees of commercial species (a) that are of the following minimum diameters at breast height - softwoods 9.0 inches and hardwoods 11.0 inches and (b) that contain at least one 12-foot merchantable sawlog and meet regional specifications for freedom from defect.

Secondary Wood Processing Industry - One that uses used wood in a previously processed form, e.g., lumber, chip, etc.

Seed-Tree Cutting Method - Removal in one cut of the mature timber from an area, save for a small number of seed bearers left singly or in a small group.

Selection (System) - An uneven-aged silvicultural system in which trees are removed individually here and there from a large area each year.

Silvics - The study of the life history and general characteristics of forest trees and stands with particular reference to locality factors, as a basis for the practice of silviculture.

Silviculture - Generally, the science and art of cultivating (i.e. growing and tending) forest crops, based on a knowledge of silvics; more particularly, the theory and practice of controlling the establishment, composition, constitution and growth of forests.

Slash - The residue left on the ground after felling and tending and/or accumulating there as a result of storm, fire, girdling or poisoning. It includes unutilized logs, uprooted stumps, broken or uprooted stems and the heavier branchwood, lighter tops and branchwoods, twigs, leaves, bark and chips.

Softwoods - Coniferous trees that are usually evergreen, having needles or scalelike leaves.



Stocking - A measure of the proportion of the area actually occupied by trees, expressed e.g. in terms of stocked quadrats or % canopy closure as distinct from their stand density.

Strip Cutting - Removal of the crop in strips in one or more operations, generally for encouraging regeneration.

Thinning - A felling made in an immature crop or stand in order primarily to accelerate diameter increment but also, by suitable selection to improve the average form of the trees that remain.

Timber Stand Improvement - A loose term comprising all intermediate cuttings made to improve composition, constitution, condition and increment of a timber stand.

Tree Class - Any class into which the trees forming a crop or stand may be divided for a variety of purposes, e.g. for determining a type of thinning.

Veneer - A thin sheet of wood of uniform thickness produced by a rotary cutting or by slicing, and sometimes by sawing.

Veneer Log - A log considered suitable in size and quality for producing veneer.

Weeding - Generally a cultural operation eliminating or suppressing undesirable vegetation.

Windthrow - (1) Uprooted by the wind. (2) Also a tree or trees so uprooted.

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