Mississippi Delta Forest Inventory

MISSISSIPPI INSTITUTE FOR FOREST INVENTORY

State of Mississippi
Delta District
Forest Inventory
2009

Acknowledgments

The Mississippi Institute for Forest Inventory acknowledges the College of Forest Resources and the Forest and Wildlife Research Center at Mississippi State University for continued assistance and support with development of the timber inventory methodology and software. The inventory would not be possible without the cooperation of public agencies such as the Mississippi Forestry Commission and their efforts in providing MIFI an operational platform and dramatically increasing the public's awareness; and, the Mississippi Automated Resource Information System (MARIS) for providing auxiliary data. Our sincerest thanks are extended to the Land, Water, and Timber Resources Board of the Mississippi Department of Agriculture for the financial assistance they have provided to MIFI. Finally, MIFI extends a sincere debt of gratitude to private landowners in providing access to measurement plots.

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Executive Summary

The 2008 - 2009 inventory season as well as the 2009 calendar year presented significant challenges and changes for the Mississippi Institute for Forest Inventory. A virtual collapse in the World Economy stalled interest in the development of alternative energy sources for both domestic and foreign markets. MIFI received the fewest number of new requests for resource analyses as the availability of capital for construction disappeared. The transition from interest in establishment of cellulosic ethanol conversion facilities to power generation facilities was the only new activity generated.

In addition to completion of the Delta District Inventory, MIFI collaborations with the Stennis Space Center to provide a portal for hurricane damage imagery for assessment, the MSU College of Forest Resrouces for assessing the impacts of biomass utilization on the forest industry landscape in Mississippi, and MSU Department of GeoSciences to develop a risk mapping system for hurricane damage; have all progressed to the point that materials are being distributed.

After the incorporation of MIFI into the Mississippi Forestry Commission, under the direction of the new State Forester, Charlie Morgan, MIFI experienced a realignment of responsibilities. The Executive Director's role was expanded to include oversight of the combined Forest Management and MIFI Division. The Director of Operations' role was expanded to strengthen the geo-spatial and inventory components of the MFC. MIFI's contribution to the MFC mission was expanded to development of a Spatial Technology Unit that directs the acquisition and deployment of GPS and GIS technology within MFC. Additionally, the U.S. Forest Service Forest Inventory & Analysis program in Mississippi is part of the Spatial Technology Unit.

The conclusion of the Delta inventory marks the end of the first cycle of the MIFI inventory system. A complete statewide forest resource assessment providing detailed information for traditional forest products and biomass potential as a monumental accomplishment. This achievement is even more astounding considering that it was attained at a cost of less that $3.3 million dollars. The remarkable characteristics of this particular inventory are the precision it provides for volume estimates at the county level. As markets continue to develop in the stabilized landscape of forest products the ability to refine supply analyses within a 5 or 6 county drain area is unprecendented, even at a global scale. The importance of this inventory system will continue to increase as the importance of non-traditional markets (e.g. carbon trading) continues.

The inventory for each district is delivered both in writing and via the World Wide Web. MIFI's website has undergone significant renovation and is now considered to be the first stop for understanding the forest resources of the state. Our Web site is the primary tool for retrieving inventory information for prospective economic development clients. Our interface allows the user to analyze inventory results and query specific geographic locations. To learn more about MIFI or access the inventory interface, visit our Web site at www.mifi.ms.gov.

Respectfully,
Mississippi Institute for Forest Inventory

Additional information about any aspect of this survey may be obtained from:
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Remote Sensing

MIFI represents an advancement of forest inventory philosophy, the first production scale integration of satellite remote sensing and forest inventory. Neither of the technologies can separately answer the two most important questions posed with forest resource assessment: 1) How much volume is present? and 2) Where is that volume located? These two technologies are brought together through the use of a Geographical Information System (GIS). By combining spatial data as derived from satellite imagery through classification, and Global Positioning System (GPS) linked attribute data obtained from ground measurements; the GIS answers the questions associated with the forest resource assessment.

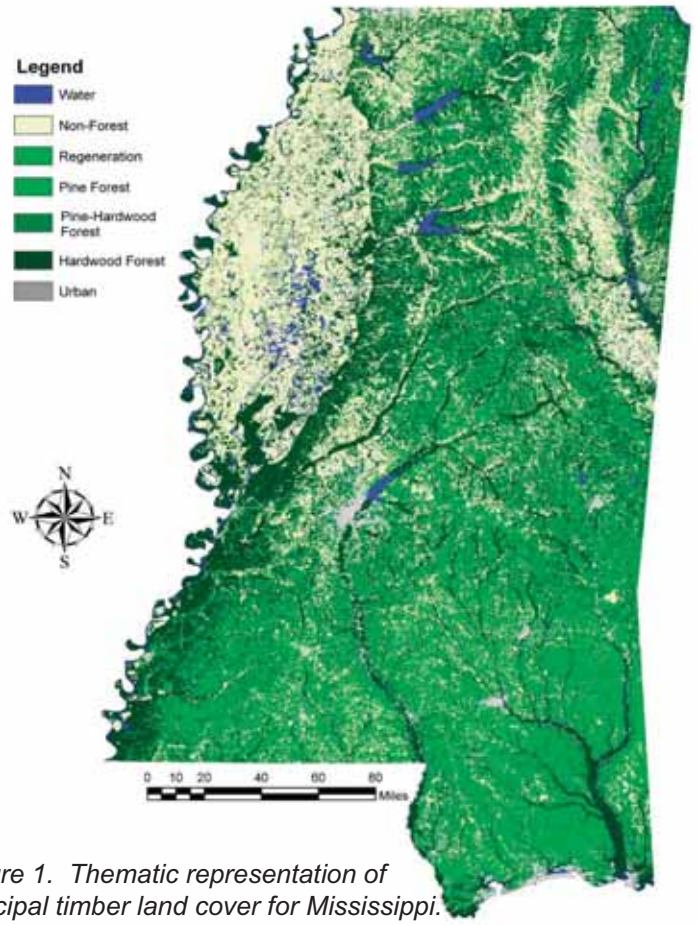


Figure 1. Thematic representation of principal timber land cover for Mississippi.

Area

The total productive land area of Mississippi is 30,521,018 acres. In 2003, the area of forestland totaled 19.79 million acres or 64.85% of the land area in MS. Pine forests cover 6.62 million acres or 33.45% of the forested area. Hardwood and oak-pine timber types combine to occupy over 53.11% of the state's timberland or 10.5 million acres. Land that is regenerating as forest area but is yet unclassified is 2.66 million acres or 13.45% of the current forested area.

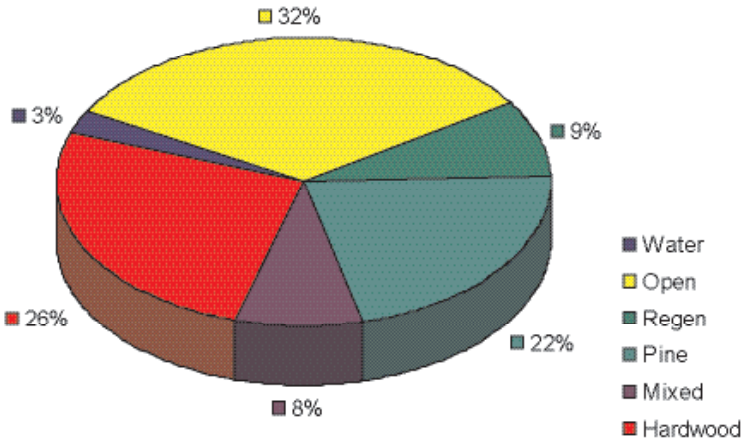


Figure 2. Mississippi land cover classification.

Ownership

Parcel ownership for land in Mississippi is predominated by family. Traditional family legacy subdivides large holdings into smaller parcels. Families acknowledge the legal distinction in ownership of the land but continue to manage the parcels as contiguous properties.

Mississippi has only recently begun transitioning to a digital format for property records. However, corporate and governmental ownership records are available in geo-referenced digital formats and MIFI has focused on the use of these records to create ownership descriptions. By process of elimination, the non-industrial private land ownership patterns can be discerned.

- Corporate timberland currently accounts for 3.1 million acres.
- Publicly owned federal timberland currently accounts for 2.2 million acres.
- Publicly owned state timberland currently accounts for approximately 1 million acres.
- Native American timberland in Mississippi amounts to approximately 25,000 acres.
- Almost 80% of the timberland in Mississippi is owned by private citizens.

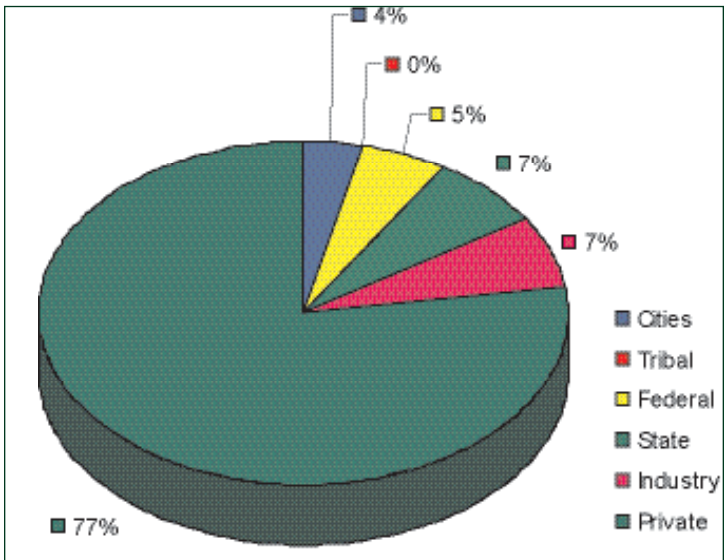


Figure 3. Mississippi land ownership patterns.

Growth

Sustainability of the forest resource is necessary to foster economic viability. Archival satellite imagery is used to assess the trend in resource utilization. The trend analysis utilizes satellite imagery that is classified into a forest/non-forest map of the state on an approximate 5-year cycle dating from 1973 to present.

Timber growth rates represent a return on investment realized as the increase in volume over a given length of time and reported as an annualized percentage rate. The ability to quickly and repeatedly determine growth rates in the market mandate the prevalence of softwood growth rates. This is not to say that hardwood growth rates are of less importance, but, the requirements to measure hardwood annual growth in the field are prohibitive thereby restricting the data collection efforts to the hardwood species that have the greatest economic value.

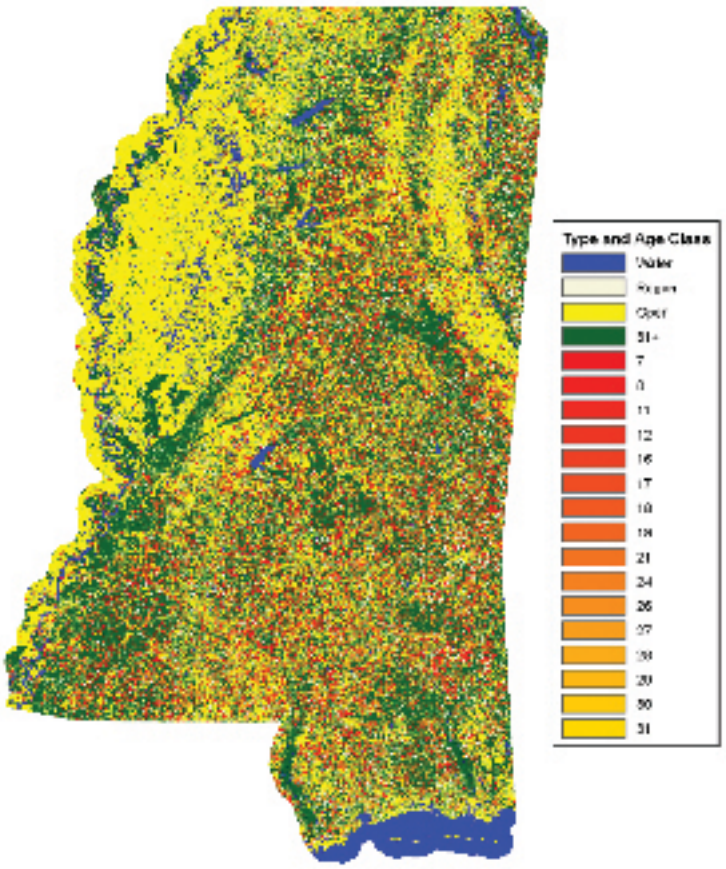


Figure 4. Type and ages of Mississippi forests.

- Softwood growth rate for the Delta MIFI District is 7.50%.

- Hardwood growth rate for the Delta MIFI District is 2.00%.

These growth rates can be compared to the interest rate paid upon a savings account and provide useful tools for investment analysis. The average current rate for a 5-year IRA CD is 4.00%. Pine timber production that is twice as profitable when compared to a savings account represents a competitive alternative for investors.

Figure 4 demonstrates the age distribution of Mississippi's forests. It also depicts the focus of harvesting activity throughout the years. The majority of harvesting occurs in a band in the center of the state from North to South and in the lower portion of the state below the I-20 corridor.

Economic Impact

Roundwood production is the mainstay of Mississippi's forest-based economy. Hardwood and softwood production supply the markets for everything from furniture and flooring raw material to construction grade solid wood products.

- Forestry, logging, primary wood products, and furniture manufacturing contribute between $11 and $14 billion annually to the State's economy.
- Traditionally, between 50,000 and 60,000 individuals are directly employed in logging, forestry and other wood-processing industries with a combined income of $ 1.1 billion.
- Approximately 66,000 individuals are indirectly employed in secondary value added and materials handling related positions.

Available information pertaining to growth rates, harvest volumes, regeneration practices was collected to develop a growth to drain ratio. This measure of sustainability is a way of determining if the forest is being utilized to its maximum potential without creating conditions that will result in the total loss of forest resources in the future. The growth to drain ratio for the Delta Region of Mississippi is 2.1. This number means that this region of the state is producing approximately 100% more volume than is being utilized.

Forces of Change

Mississippi's forestland is dynamic and constantly changing. The primary driving force in change is the human element. Population centers are expanding and the resulting landscape is a mixture of forest and urban land cover often within close proximity to each other.

Natural forces typically do not result in loss of forestland. Insects and disease are always present and often influence stand structure throughout all stages of development. Flooding is the primary natural force that impacts the Delta Region of Mississippi. Although this does cause some localized damage with uprotting of trees, the primary change is beneficial because the sedimentation from a flood revitalizes the soil with nutrients. Tornadic activity, though severe, is restricted to small areas and does not impact the forest at the landscape level.

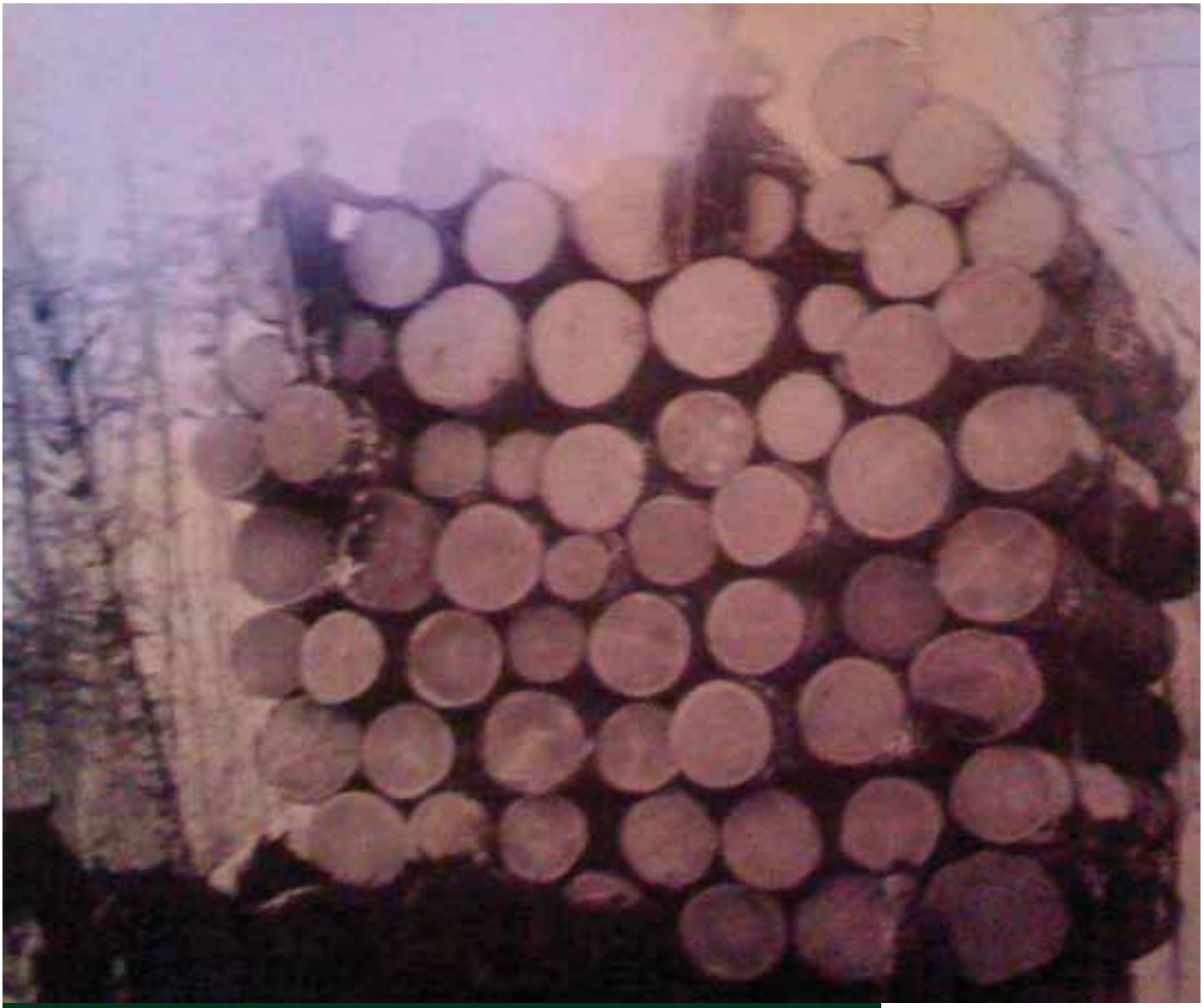
Whether natural or human induced, long-term or short-term, permanent or temporary, Mississippi's forestlands are changing constantly. These changes are reflected in the current condition of the State's forests as evidenced by trends in land use; stand composition; estimates of wood volume; and rates of net annual growth, removals, and mortality. The effects extend to overall forest health, as well as water quality, recreation potential, future timber availability and other aspects of forestland use and condition.

A Brief History of Mississippi Forests

From the earliest occupation of Mississippi by Native Americans, the forests have been the primary livelihood. Wood products were used to manufacture dwellings and wildlife in the forest represented both a source of food and trade goods. If by definition a "virgin forest" is a forest that has been uninfluenced by humans, then virgin forests have not existed in Mississippi since the pre-Colombian era.

Agriculture was the major force that shaped early Mississippi landscapes. The practice of slash and burn agriculture practiced by early settlers resulted in a highly fragmented landscape of forests that exhibited all the stages of succession. At the beginning of the 20th century, large lumbering firms of the Northeast and Great Lakes regions were looking for new resources as the large growth timber of those regions became exhausted. The presence of rail networks and largely untapped reserves of timber in the Southeast attracted their attention. Thus, mechanized timber production began in Mississippi.

Until the late 1930's, the primary focus on forestry was the production of timber with little regard for scientific-based management. Professional foresters began to foster the concept of actively managing pine forestland that could meet the demand for timber related products. As environmental awareness increased, management of forestland began to take a multi-use approach. Aesthetics, recreation, and water quality are principles that professional foresters are now trained to incorporate into their management practices.



The Increasing Role of Hardwood Plantations

The early 20th century saw a major boom in hardwood utilization as the rail system expanded westward and the need for railroad ties and durable flooring for receiving platforms increased. The rich resources of the Delta Region coupled with the convenience of the river system of the Mississippi River and its tributaries were a natural draw for harvesting high quality hardwoods. These practices resulted in a degradation of the forest system because regeneration practices were not implemented to retain the forest in its original structure.

Improved genetics and increased awareness on the benficial role hardwoods have for wildlife habitat are changing the way hardwood forest management is occurring in the Delta Region of Mississippi. The utilization of hardwood plantations for re-establishing native species is being investigated for its economic and land ethic impacts. Hunting leases are offering forest landowners the opportunity to increase earnings from their land that in many instances rival the economic returns of agricultural use.

Additional to the income received from wildlife uses, the ability to create hardwood forests economically from establishment provide additional incentive to keep forest land in forests.

Inventory Methods

The Mississippi Institute for Forest Inventory began the inventory in 2004. The sampling scheme is significantly different than traditional forest surveys, which produced estimates for an entire state. This type of analysis prohibits the estimates of areas equivalent to the size of a county. MIFI directs sampling in a two stage process: analysis of satellite-based remote sensing with statistical validation for depicting the land cover types and subsequent change through time; and intensive ground measurement of the forest timber for a region or district of the state. This information provides statistical precision for county level estimates that can be used for economic development.

The remote sensing effort utilizes the spectral reflectance of vegetation captured in 6 or 7 spectral bands by the LandSat satellite during both active and dormant seasons. Through a combination of band analyses and mathematical modeling, primary classifications of water, non-forest, pine, hardwood, and mixed pine-hardwood classes are obtained. Additional imagery from previous surveys is analyzed and then layered to represent the change in land cover over time. This stacking effect creates another classification, immature forest vegetation, which lacks maturity to allow for assignment in one of the dominant forestland cover classifications.

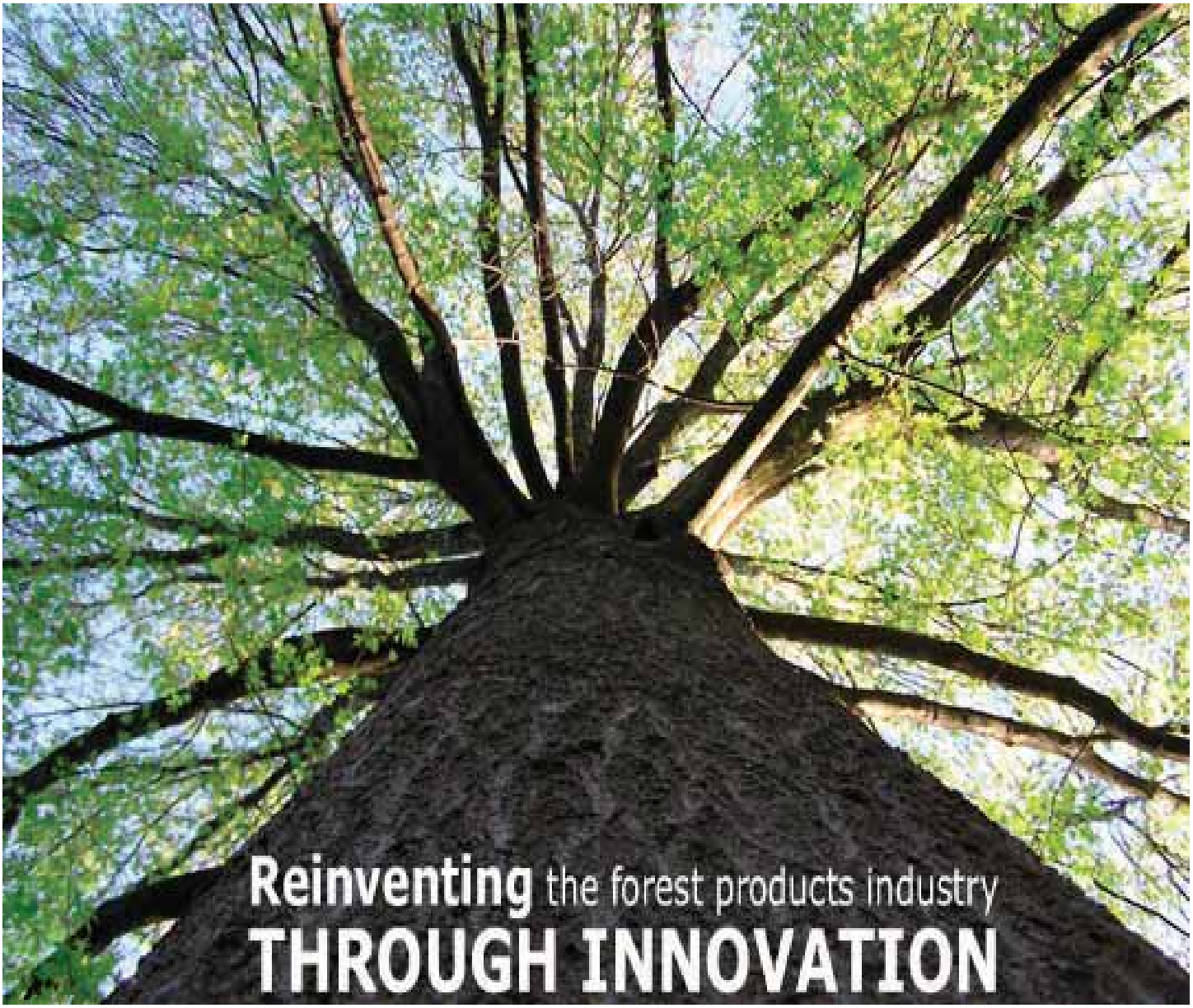
The ground-based measurements were implemented on a one-fifth acre fixed radius plot located randomly from the forest cover classification of the remotely sensed data. Saw timber, pole and veneer volume were sampled and characteristics associated with stand dynamics were measured. A one-tenth acre plot was incorporated to measure the volume of products classes used to produce fiber for the pulp industry. Finally, a one-twentieth acre plot was inventoried to measure non-merchantable stems that range from 1.0 to 4.5 inches in diameter at breast height.

In the event there was no merchantable material located on a plot, such as following a harvest, a one-hundredth acre plot was established to measure reproduction material that will develop into a future timber stand. A representative sample of the current forest conditions was obtained at each sample location for all timber species, from the smallest seedling to the largest tree encountered on any of the plots. Individual tree attributes measured include species, product, observable damage, diameter at breast height, total height, height to absolute diameter limits for pulpwood and saw timber volume, crown length, bark thickness, 5- and 10-year radial growth, and age. Stand level attributes recorded include slope, size class, apparent stand level damages, over story composition with reference to the remote sensing products, logging operability, physiographic position, Society of American Foresters forest cover type designation, litter depth, and USFS fuel model designation.

To avoid statistical confounding, plots were located within a strictly homogenous stand condition. In the event an operational or management activity has disrupted the proposed plot site (e.g. the establishment of a right-of-way, property thinning, etc.), the plot was shifted a specified distance to the stand that exhibited the higher heterogeneity in volume. Estimates of timber volume and forest classifications were derived from tree measurements and classifications made at these locations. Volumes for individual tally trees were computed using profile equations for each of the 60 major species in Mississippi.

Reliability of Data

The measure of reliability of inventory statistics is provided by sampling errors. MIFI inventories supported by all the allocated sample plots are designed to achieve reliable statistical precision (± 15% at 95% confidence) at the county level for total cubic foot volume outside bark. However, users should note that sampling error increases at the same level of confidence, as the number of plots is lowered by reducing the area. Sampling errors are often unacceptably high for small components of the total resource. The opposite occurs when estimates are derived from larger areas. Sampling errors and confidence limits mean that the chances are 95 times out of 100 that the true population value is within the limits indicated by the range of the sampling error.



Disclaimer: Although portions of this information are derived from MIFI sampling estimation techniques the presumed precision of ±15% sampling error with 95% confidence, it is a statistical estimation and not a 100% census of the forest resources within the inventory region. These estimates are subject to change reflecting changes to the analysis procedures or the data. These estimates are also temporally static and events and circumstances occurring within the inventory region that physically alter the forest resource will not be reflected.

District Volume

Mississippi was divided into five districts based on geography, physiography, economic and political characteristics. The Delta Region if the fifth region to be inventoried. This region was the primary source for the furniture, flooring, and railroad ties manufacturing industry until the recent economic downturn. Other industries that utilize this region are hardwood sawmills and veneer mills as well as industries that produce cask and barrel staves.

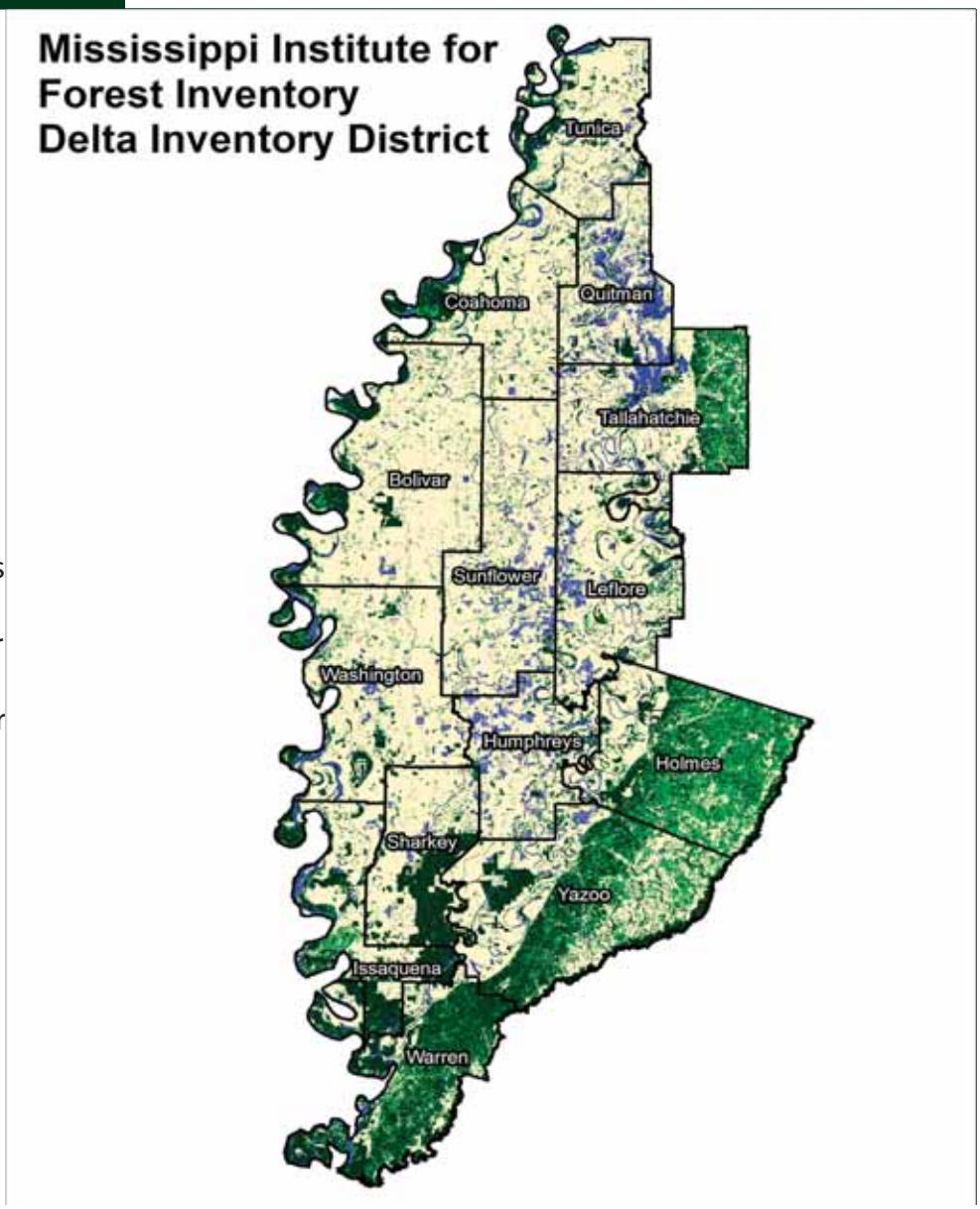


Figure 5. MIFI Delta Inventory District depicting the forest cover and counties inventoried.

The following tables report the forest cover types, volumes, and sampling errors associated with the 20 counties of the Delta MIFI district. Also included are the estimates for pine growth and non-commercial forest regeneration that will provide the future timber supply.

Table 1. Major stratification land cover acreages for MIFI Delta Inventory District.

Strata	Acres
Non-Forest	3,822,499
Reproduction	234,901
Pine	91,805
Mixed Pine-Hardwood	121,131
Hardwood	1,310,922
Total Forested	1,758,759
Total	5,581,258

Table 2. Corrected forested strata acreage estimates with associated sampling errors.

			Sampling Error		
Strata	Acres	Std. Error	97.5	95	90
Pine	77,638	NS	NS	NS	NS
Mixed Pine-Hardwood	30,355	2,291	17.2	15.0	12.5
Hardwood	1,147,217	17,082	3.3	2.9	2.5
Total	997,429	15,842	3.1	2.7	2.3

NS- Insufficient samples available for computations.

Table 3. Strata level per acre and total area estimates of pulpwood and sawtimber volumes[1] for pine and hardwood species groups with sampling errors.

	Per Acre		Total[2]			
	Pulpwood	Sawtimber	Pulpwood	Error %	Sawtimber	Error %
Pine	1,154.4	1,568.2	509,832	15.7	896,255	27.1
Mixed Pine-Hardwood	819.8	1,051.6	179,407	22.5	248,876	38.8
Hardwood	1,167.1	1,517.6	10,299,421	5.7	13,389,565	7.9
Total	1,157.9	1,509.5	14,534,696	5.4	18,946,898	7.5

1 Volumes are expressed in cubic feet outside bark.

District Biomass

Biomass is the term applied to any organic structure naturally produced on a site. In forestry, biomass typically refers to the trees and their component parts: main stem, branches, and foliage. The importance of estimating biomass relates to the future markets that are being developed for alternative fuel compounds and the current trade markets established for carbon credits. These markets, though common in European countries are just beginning to emerge in the US and Mississippi possesses a sizeable resource base positioned to fully utilize these markets to the economic benefit of its residents.

Table 4. Strata level per acre and total are estimates of stem, branch and foliage weight.[1]

	Per Acre			Total[2]		
Covertype	Stem	Branch	Foliage	Stem	Branch	Foliage
Pine	162,248	29,424	9,641	6,298.3	1,142.2	374.2
Mixed Pine-Hardwood	117,883	24,282	2,532	1,789.2	368.5	85.0
Hardwood	172,816	55,130	3,249	99,128.9	31,622.9	4,520.3

1 Weights are expressed as green pounds outside bark per acre and green tons outside bark for total.
2 Totals are expressed in 1,000s.

Individual County Volume

Table 5. Individual county volume estimates by species group and product class.

Bolivar County

Strata	Acres	Pulpwood Volume	Sawtimber Volume	Sampling Error
Non-Forest	489,547			
Reproduction	14,297			
Pine	125	NS	NS	NS
Mixed Pine-Hardwood	191	NS	NS	NS
Hardwood	76,288	579,733	580,539	19.6
Forested	90,901	579,733	580,539	20.1

Coahoma County

Strata	Acres	Pulpwood Volume	Sawtimber Volume	Sampling Error
Non-Forest	294,635			
Reproduction	13,843			
Pine	131	1,022	1,899	32.5
Mixed Pine-Hardwood	216	NS	NS	NS
Hardwood	65,680	459,312	779,617	16.0
Forested	79,870	460,333	781,517	16.0

Holmes County

Strata	Acres	Pulpwood Volume	Sawtimber Volume	Sampling Error
Non-Forest	181,628			
Reproduction	43,751			
Pine	53,504	428,819	952,350	22.4
Mixed Pine-Hardwood	47,086	112,184	209,819	36.5
Hardwood	165,777	1,616,025	3,884,294	18.4
Forested	310,118	2,157,029	5,046,462	14.8

Humphreys County

Strata	Acres	Pulpwood Volume	Sawtimber Volume	Sampling Error
Non-Forest	235,261			
Reproduction	8,233			
Pine	217	NS	NS	NS
Mixed Pine-Hardwood	671	NS	NS	NS
Hardwood	30,354	298,810	215,464	22.4
Forested	39,476	298,810	215,464	24.5

Volume is reported in hundreds (100's) of cubic feet outside bark.

Issaquena County

Strata	Acres	Pulpwood Volume	Sawtimber Volume	Sampling Error
Non-Forest	156,830			
Reproduction	15,677			
Pine	50	NS	NS	NS
Mixed Pine-Hardwood	1,182	NS	NS	NS
Hardwood	107,492	1,321,499	1,721,624	21.8
Forested	124,401	1,321,499	1,721,624	22.5

Leflore County

Strata	Acres	Pulpwood Volume	Sawtimber Volume	Sampling Error
Non-Forest	319,174			
Reproduction	13,106			
Pine	382	NS	NS	NS
Mixed Pine-Hardwood	592	2,178	4,068	21.6
Hardwood	61,750	520,302	329,580	21.0
Forested	75,831	522,480	333,648	

Quitman County

Strata	Acres	Pulpwood Volume	Sawtimber Volume	Sampling Error
Non-Forest	208,421			
Reproduction	4,811			
Pine	63	NS	NS	NS
Mixed Pine-Hardwood	171	NS	NS	NS
Hardwood	32,490	129,136	343,838	22.7
Forested	37,535	129,136	343,838	22.7

Sharkey County

Strata	Acres	Pulpwood Volume	Sawtimber Volume	Sampling Error
Non-Forest	185,423			
Reproduction	5,869			
Pine	70	NS	NS	NS
Mixed Pine-Hardwood	923	NS	NS	NS
Hardwood	87,357	1,344,572	854,785	16.1
Forested	94,218	1,344,572	854,785	16.4

Volume is reported in hundreds (100's) of cubic feet outside bark.

Sunflower County

Strata	Acres	Pulpwood Volume	Sawtimber Volume	Sampling Error
Non-Forest	417,776			
Reproduction	8,842			
Pine	216	NS	NS	NS
Mixed Pine-Hardwood	323	NS	NS	NS
Hardwood	27,349	92,069	123,285	12.5
Forested	36,730	92,069	123,285	12.4

Tallahatchie County

Strata	Acres	Pulpwood Volume	Sawtimber Volume	Sampling Error
Non-Forest	274,710			
Reproduction	20,554			
Pine	13,473	60,108	132,001	25.7
Mixed Pine-Hardwood	10,614	15,172	21,039	61.4
Hardwood	94,580	681,009	1,789,907	15.7
Forested	139,221	756,287	1,942,948	14.5

Tunica County

Strata	Acres	Pulpwood Volume	Sawtimber Volume	Sampling Error
Non-Forest	239,703			
Reproduction	9,686			
Pine	149	NS	NS	NS
Mixed Pine-Hardwood	145	392	1,087	18.7
Hardwood	56,361	NS	NS	NS
Forested	66,341	392	1,087	19.6

Warren County

Strata	Acres	Pulpwood Volume	Sawtimber Volume	Sampling Error
Non-Forest	111,295			
Reproduction	27,052			
Pine	3,644	18,795	33,743	31.1
Mixed Pine-Hardwood	27,456	49,482	62,287	30.5
Hardwood	225,367	2,633,734	3,646,429	12.9
Forested	283,519	2,702,010	3,742,459	12.6

Volume is reported in hundreds (100's) of cubic feet outside bark.

Washington County

Strata	Acres	Pulpwood Volume	Sawtimber Volume	Sampling Error
Non-Forest	408,241			
Reproduction	15,314			
Pine	200	1,089	1,930	31.6
Mixed Pine-Hardwood	621	NS	NS	NS
Hardwood	65,254	623,220	610,771	15.1
Forested	81,389	624,309	612,701	15.0

Yazoo County

Strata	Acres	Pulpwood Volume	Sawtimber Volume	Sampling Error
Non-Forest	298,452			
Reproduction	34,306			
Pine	20,012	386,424	95,586	25.3
Mixed Pine-Hardwood	31,483	69,468	20,898	39.4
Hardwood	216,624	3,090,145	2,530,057	15.6
Forested	302,065	3,546,036	2,646,542	14.8

Pre-commercial & Growth Estimates

Table 5. Estimates of pre-commercial stem counts for all species and projected total productivity.

	Number of Stems Diameter Class				5-yr Projected Pine Volume		Annual Growth Rate	
County	1-inch	2-inch	3-inch	4-inch	Pulpwood	Sawtimber	Pulpwood	Sawtimber
Bolivar	3,391	1,865	1,938	2,301	551,925	1,109,968	-1%	14%
Coahoma	1,702	2,147	864	1,723	509,266	1,173,376	2%	8%
Holmes	21,882	10,837	9,217	12,075	2,836,812	7,909,580	6%	9%
Humphreys	876	1,100	471	812	476,712	251,221	-3%	17%
Issaquena	6,999	4,716	3,276	2,929	1,191,379	2,859,685	-7%	17%
Leflore	2,163	1,482	1,342	1,304	420,305	808,687	-4%	19%
Quitman	1,547	850	609	858	192,056	491,223	-11%	31%
Sharkey	3,656	3,100	2,027	2,583	1,195,140	1,888,972	7%	7%
Sunflower	1,659	846	582	700	132,958	209,754	2%	18%
Tallahatchie	8,863	5,238	2,645	5,363	1,085,280	2,791,189	-11%	30%
Tunica	2	2	1	2	483	1,455	-15%	30%
Warren	10,838	6,229	4,549	8,464	2,488,793	6,076,655	-2%	10%
Washington	2,064	1,839	1,936	2,447	707,313	1,074,591	3%	12%
Yazoo	9,904	6,938	4,270	7,725	2,817,424	5,943,107	-4%	18%

Number of stems is reported in thousands (1,000's).
Volume is reported in hundreds (100's) of cubic feet outside bark.

Obtaining Additional Information

To obtain additional assistance with the Dynamic Reporter software, the MIFI web site or to obtain a copy of the Dynamic Reporter Installation on Compact Disc then use the following information to contact the Director of Operations at the Mississippi Institute for Forest Inventory;

Director of Operations
MIFI
301 North Lamar Street, Suite 300
Jackson, Mississippi 39201-1404
(601) 359-2808
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Glossary of Terms

All terms and phrases utilized on the Dynamic Reporter Interface are explained in the Technical specifications located on the MIFI web site at the following link:

www.mifi.ms.gov/Documents/Inventory_Guidelines.pdf

Basal area. The area in square feet of the cross section at breast height of a single tree or of all the trees in a stand, usually expressed in square feet per acre.

Commercial species. Tree species currently or potentially suitable for industrial wood products.

CRP. The Conservation Reserve Program, a major Federal afforestation program authorized by the 1985 Farm Bill.

D.b.h. Tree diameter in inches (outside bark) at breast height (4.5 feet aboveground).

Diameter Class. A classification of trees based on tree d.b.h. One-inch diameter classes are commonly used. For example, the 6-inch class includes trees 5.6 through 6.5 inches d.b.h.

D.o.b. (diameter outside bark) Stem diameter including bark.

Forest Land. Land at least 10 percent stocked by forest trees of any size, or formerly having had such tree cover and not currently developed for nonforest use. The minimum area considered for classification is 1 acre.

Forest management type. A classification of timberland based on forest type and stand origin.

Forest type. A classification of forest land based on the species forming a plurality of live-tree stocking. Major Mississippi forest-type groups are:

Longleaf-slash pine. Forests in which longleaf or slash pine, singly or in combination, constitute a plurality of the stocking. (Common associates include oak, hickory, and gum).

Loblolly-shortleaf pine. Forests in which loblolly pine, shortleaf pine, or other southern yellow pines, except longleaf or slash pine, singly or in combination, constitute a plurality of the stocking. (Common associates include oak, hickory and gum).

Oak-pine. Forests in which hardwoods (usually upland oaks) constitute a plurality of the stocking but in which pines account for 25 to 50 percent of the stocking. (Common associates include gum, hickory, and yellow-poplar).

Oak-hickory. Forests in which upland oaks or hickory, singly or in combination, constitutes a plurality of the stocking, except where pines account for 25 to 50 percent, in which case the stand would be classified oak-pine. (Common associates include yellow-poplar elm, maple, and black walnut).

Oak-gum-cypress. Bottom-land forests in which tupelo, blackgum, sweetgum, oaks, or southern cypress, singly or in combination, constitutes a plurality of the stocking, except where pines account for 25 to 50 percent, in which case the stand would be classified oak-pine. (Common associates include cottonwood, willow, ash, elm, hackberry, and maple).

Elm-ash-cottonwood. Forests in which elm, ash, or cottonwood, singly or in combination, constitutes a plurality of the stocking. (Common associates include willow, sycamore, beech, and maple).

Maple-beech-birch. Forests in which maple, beech, or yellow birch, singly or in combination, constitute a plurality of the stocking. (Common associates include hemlock, elm, basswood, and white pine).

Nonstocked stands. Stands less than 10 percent stocked with live trees.
Pine plantation. Stands that (a) have been artificially regenerated by planting or direct seeding, (b) are classed as a pine or other softwood forest type, and (c) have at least 10 percent stocking.

Natural pine. Stands that (a) have not been artificially regenerated, (b) are classed as a pine or other softwood forest type, and (c) have at least 10 percent stocking.

Oak-pine. Stands that (a) have at least 10 percent stocking and classed as a forest type of oak-pine.

Upland hardwood. Stands that have at least 10 percent stocking and classed as an oak-hickory or maple-beech-birch forest type.

Lowland hardwood. Stands that have at least 10 percent stocking with a forest type of oak-gum-cypress, elm-ash-cottonwood, palm, or other tropical.

Nonstocked stand. Stands less than 10 percent stocked with live trees.

GIS - Geographical Information System. Combines traditional mapping skills with spatially referenced data in a computer to provide advanced maps.

Hardwoods. Dicotyledonous trees, usually broadleaf and deciduous.

Hard hardwoods. Hardwood species with an average specific gravity greater than 0.50 such as oaks, hard maples, hickories, and beech.

Soft hardwoods. Hardwood species with an average specific gravity of .50 or less, such as gums, yellow poplar, cottonwoods, red maple, basswoods, and willows.

Industrial wood. All roundwood products except fuelwood.

Land area. The area of dry land and land temporarily or partly covered by water, such as marshes, swamps, and river floodplains (omitting tidal flats below mean high tide), streams sloughs, estuaries, and canals less than 200 feet wide, and lakes, reservoirs, and ponds less than 4.5 acres in area.

Live trees. All living trees, all size classes, all tree classes, and both commercial and noncommercial species are included.

Log Grade. A classification of logs based on external characteristics indicating quality or value.

Logging residues. The unused merchantable portion of growing-stock trees cut or destroyed during logging operations.

Noncommercial species. Tree species of typically small size, poor form, or inferior quality that normally do not develop into trees suitable for industrial wood products.

Nonforest land. Land that has never supported forests and land formerly forested where timber production is precluded by development for other uses.

Nonstocked stands. Stands less than 10 percent stocked with live trees.

Ownership. The property owned by one ownership unit, including all parcels of land in the United States.

National forest land. Forest land that has been legally designated as national forests or purchase units, and other land under the administration of the Forest Service, including experimental areas and Bank head-Jones Title III land.

Forest industry land. Land owned by companies or individuals operating primary wood-using plants.

Nonindustrial private forest (NIPF) land. Privately owned land excluding forest industry land or forest industry-leased land.
Corporate. Owned by corporations, including incorporated farm ownerships.

State, county, and municipal land. Land owned by States, counties, and local public agencies or municipalities or land leased to these governmental units for 50 years or more.

Primary wood-using plants. Industries receiving roundwood or chips from roundwood for the manufacture of products, such as veneer, pulp, and lumber.

Reforestation. Area of land previously classified as forest that is regenerated by planting trees or natural regeneration.

Remote Sensing. The use of aircraft or satellite imagery to identify and describe the land cover and land use.

Roundwood (roundwood logs). Logs, bolts, or other round sections cut from trees for industrial or consumer uses.

Roundwood chipped. Any timber cut primarily for pulpwood, delivered to non-pulp mills, chipped, and then sold to pulp mills as residues, including chipped tops, jump sections, whole trees, and pulpwood sticks.

Roundwood products. Any primary product such as lumber, poles, pilings, pulp, or fuelwood, that is produced from roundwood.

Saw Log. A log meeting minimum standards of diameter, length, and defect, including logs at least 8 feet long, sound and straight, with a minimum diameter inside bark for softwoods of six inches (8 inches for hardwoods).

Saw log portion. The part of the bole of sawtimber trees between a 1-foot stump and the saw-log top.
Saw-log top. The point on the bole of sawtimber trees above which a conventional saw log cannot be produced. The minimum saw-log top is 7.0 inches d.o.b. for softwoods and 9.0 inches d.o.b for hardwoods.

Sawtimber-size trees. Softwoods 8.0 inches d.b.h and larger and hardwoods 11.0 inches d.b.h. and larger.

Sawtimber volume. Growing-stock volume in the sawlog portion of sawtimber-size trees in board feet.

Seedlings. Trees less than 1.0 inch d.b.h. and greater than 1 foot tall for hardwoods, greater than 6 inches tall for softwood, and greater than .5 inch in diameter at ground level for longleaf pine.

Select red oaks. A group of several red oak species composed of cherrybark, Shumard, and northern red oaks. Other red oak species are included in the "other red oaks" group.

Select white oaks. A group of several white oak species composed of white, swamp chestnut, swamp white, chinkapin, Durand, and bur oaks. Other white oak species are included in the "other white oaks@" group.

Site class. A classification of forest land in terms of potential capacity to grow crops of industrial wood based on fully stocked natural stands.

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

Yellow pines. Loblolly, longleaf, slash, pond, shortleaf pitch, Virginia, sand, spruce, and Table Mountain pines.

Other softwoods. Cypress, eastern red-cedar, white-cedar, eastern white pine, eastern hemlock, spruce and fir.

Spectral reflectance. Sunlight reflected from the ground or canopy of the forest that is recorded by the sensor in the satellite or aircraft that is separated into small classes (bands).

Stand age. The average age of dominant and co-dominant trees in the stand.

Stand origin. A classification of forest stands describing their means of origin.

Planted. Planted or artificially seeded.

Natural. No evidence of artificial regeneration.

Stand-size class. A classification of forest land based on the diameter class distribution of live trees in the stand.

Statistical Precision. The ability to achieve the same results with repeated measurements.

Sawtimber stands. Stands at least 10 percent stocked with live trees, with half or more of total stocking in sawtimber and poletimber trees, and with sawtimber stocking at least equal to poletimber stocking.

Stocking. The degree of occupancy of land by trees, measured by basal area or the number of trees in a stand and spacing in the stand, compared with a minimum standard, depending on tree size, required to fully utilize the growth potential of the land.

Thematic map. Displays complex map data using classes that combine similar data.

Timberland. Forest land capable of producing 20 cubic feet of industrial wood per acre per year and not withdrawn from timber utilization.

Timber products. Roundwood products and byproducts.

Tree. Woody plants having one erect perennial stem or trunk at least 3-inches d.b.h. a more or less definitely formed crown for foliage and a height of at least 13 feet (at maturity).

Tree Grade. A classification of the saw-log portion of sawtimber trees based on: (1) the grade of the butt log or (2) the ability to produce at least one 12-foot or two 8-foot logs in the upper section of the saw-log portion. Tree grade is an indicator of quality; grade 1 is the best quality.

Upper-stem portion. The part of the main stem or fork of sawtimber trees above the saw-log top to minimum top diameter 4.0 inches outside bark or to the point where the main stem or fork breaks into limbs.

Volume of live trees. The cubic-foot volume of sound wood in live trees at least 4.6 inches d.b.h from a 1-foot stump to a minimum 3.0 inch top d.o.b of the central stem for softwood and 4.0 inches for hardwoods.

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