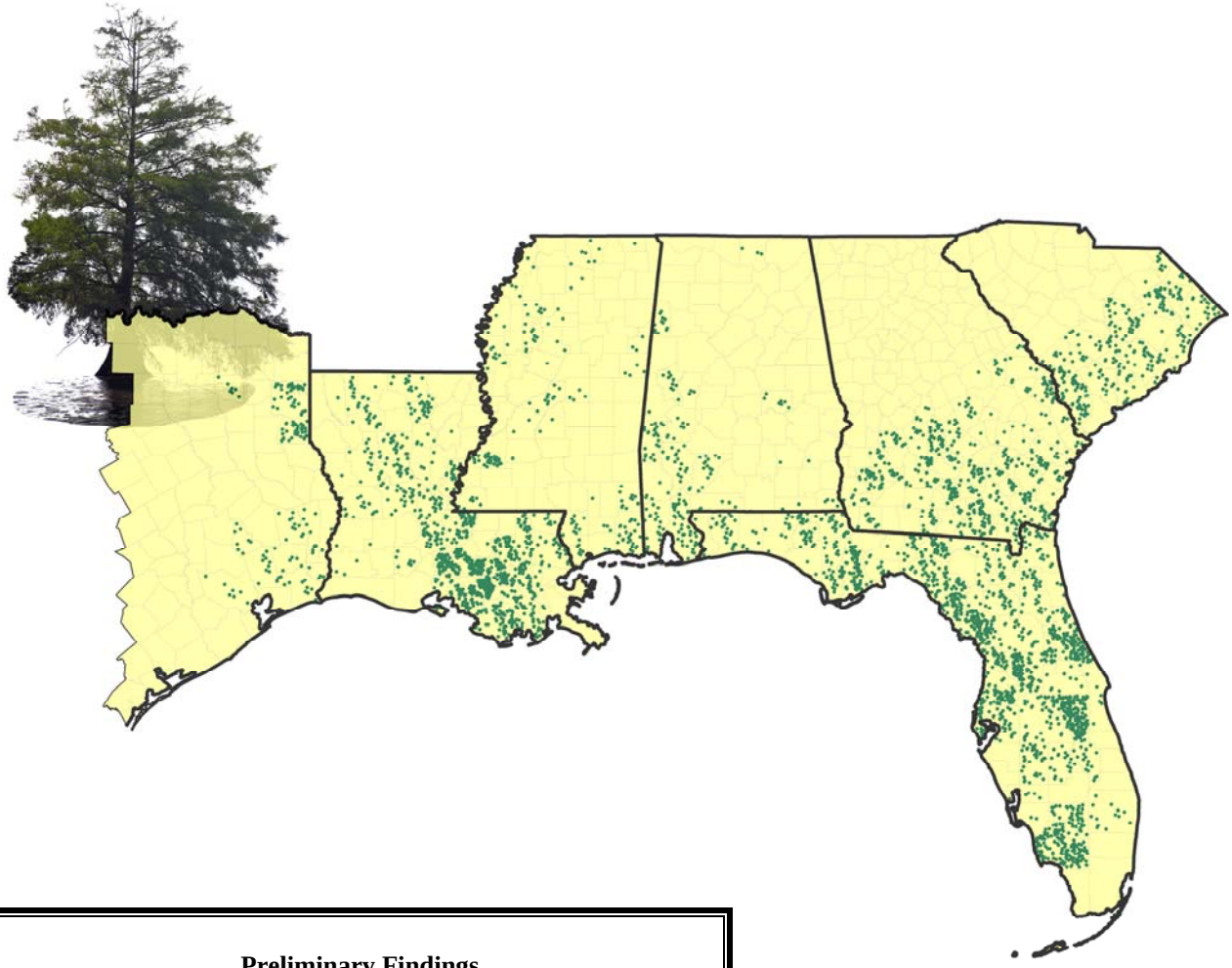

Preliminary Findings

Cypress Study

for

Mulch and Soil Council

Report Date: July 8, 2008

July 8, 2008

Mr. Robert LaGasse
Mulch & Soil Council
10210 Leatherleaf Court
Manassas, Virginia 20111

RE: Assessment of the Sustainability of Cypress in seven Southeastern States
(F&W #86-15)

Dear Mr. LaGasse:

Enclosed is our report on cypress in Alabama, Florida, Georgia, Louisiana, Mississippi, South Carolina, and Texas. The overall results of this analysis are:

1) There are adequate cypress resources in these states to support current harvests.
2) Cypress can be regenerated via natural seeding, stump sprouting, and manual planting. In many cases, all three methods may be necessary to provide optimally-stocked stands.
3) Public and private data indicate harvest compliance rates with Best Management Practices for protection of water quality are high with the majority of harvest operations conducted by loggers who have been trained in sustainable forest management and protection of water quality.
4) When harvesting and regenerating cypress stands, it is recommended that landowners consult forestry professionals with expertise in cypress management.

Sincerely,

William F. Miller

cc: Marshall Thomas
Keith Ward
John Godbee
Rob Routhier

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INTRODUCTION

The term cypress is commonly used to refer to both baldcypress and pondcypress. Baldcypress (*Taxodium distichum*) is the more prevalent and widespread species. Depending on the source, pondcypress is considered either a subspecies of baldcypress (*T. distichum* var. *ascendens* or *T. distichum* var. *nutans*) or a separate species (*T. ascendens*). In this analysis and report, the term cypress is used to refer collectively to both baldcypress and pondcypress.

ASSIGNMENT OBJECTIVE

The objective of this assignment is to:

- Evaluate the current inventory, growth, and removals of cypress for the seven identified southeastern states.
- Develop an opinion about the sustainability of cypress in this region.
- Discuss the environmental considerations concerning the sustainable management of cypress.
- Evaluate the prices and markets for cypress.

CLIENT

The client for this assignment is the Mulch & Soil Council.

GENERAL SCOPE OF WORK

To accomplish the objective, we conducted the following research and analyses:

- Discussed characteristics of cypress
- Analyzed the timber resource for current and future availability of material
- Assessed BMP considerations
- Discussed pricing of cypress with procurement foresters, loggers, and F&W local managers.

Each of these topics is discussed in greater detail in the following sections of this report. At the end of the report, we discuss these factors in conjunction with each other and present our conclusion.

EXECUTIVE SUMMARY

The cypress resource in the southeastern states of Texas, Louisiana, Mississippi, Alabama, Georgia, South Carolina and Florida exhibits a favorable ratio of growth to removals (harvests). The latest U.S. Forest Service inventory data indicates growth significantly exceeds removals across all states in the analysis. The large and reasonably well-distributed cypress inventory adds strength (and backup) to the sustainability of this resource.

It is also noted that cypress can and will regenerate in almost all forests by sprouting from harvested stumps, natural seeding, and/or by planting seedlings. The cypress forests that tend to have problems with regeneration are typically affected by man-made changes associated with transportation systems, flood control structures, railroads, and numerous other water flow changes that have occurred over time. These cypress stands can be easily identified, mapped, and avoided. Most cypress forests will successfully regenerate following harvest under appropriate conditions. The Southern Cypress resource has a positive growth-to-drain ratio that provides landowners the opportunity to manage and harvest these lands.

Cypress sawmills in the southeastern states use mostly large cypress trees which generate over 35% or more of waste. The mulch market offers a good market alternative for utilizing this material rather than selling it for energy production or disposing to landfills. Utilization of this resource is economically important to both sawmill and landowner and environmentally responsible.

The cypress resource in this seven state area is sustainable and a management and harvesting program should be encouraged for a continued healthy and viable resource.

CHARACTERISTICS OF CYPRESS

HABITAT

Cypress is primarily limited to the coastal plains and inland waterways and ponds of the southern United States. Its range extends north into southern Delaware on the east coast and into southern Illinois and Indiana along the Mississippi River and its tributaries. It is primarily a wetland species occupying coastal areas, swamps, ponds, and other low-lying sites where moisture is plentiful. Cypress is generally found on elevations of less than 100 feet above sea level, although it has been found at over 1,000-foot elevations in Texas.

While cypress trees can survive sub-freezing temperatures, extreme cold weather limits the maturation of the seeds, limiting natural regeneration to the warmer climates of the south. Figure 1 shows naturally-regenerated cypress in a Florida swamp.

Figure 1. Typical Florida 3rd growth cypress-gum swamp regenerated naturally.

REPRODUCTION

Reproduction via seed

Mature trees produce seed most years with good seed production occurring every three to five years. Cones of cypress mature in late fall to early winter. Seed dispersal depends primarily on floodwaters. The seeds do not germinate in standing water; however, floodwaters move the seeds to the edge of the ponds at the high water levels. The seeds then sprout in these moist soils when the waters recede. The seedlings must then grow fast and tall enough to remain above successive floods or they will likely not survive being overtopped with water for extended periods. However, they will tolerate some short-

term submergence (<45 days). Low-level (below seedling canopy) flooding may even help limit competition from other species.

While cypress seedlings in nurseries may grow 30 to 40 inches in the first growing season, typical natural growth the first year is 8 to 14 inches and 16 to 24 inches the second year.

Cypress has evolved with flood pulsing, whereby floodwaters, occurring periodically and at different levels, distribute the seeds and then recede allowing the seeds to germinate and grow. In dry years, the water level may drop significantly allowing seeds to germinate in the normally inundated areas. In permanently flooded swamps (often an unintentional result of man-made structures) where the water is not allowed to rise and fall significantly, no reproduction will occur within the boundary of the water. In these cases, seeds will only germinate where the land and water meet and the permanently inundated cypress will gradually disappear due to attrition.

Vegetative reproduction

Cypress will reproduce vegetatively via stump sprouting. However, sprouts from very old (60+ years) trees generally grow slower than sprouts from younger trees and are more susceptible to wind damage.

Several studies have been conducted on the survival of cypress stump sprouts. Conner et al. (1986) found a significant percentage (80%) of stumps sprouting after harvests in a study in Louisiana; however, four years following the harvest only 25% of the stumps had living sprouts. In a study of stump sprouting in Florida, Ewel (1996) found 17% of sprouts surviving a few years after harvest. A study in Alabama (Gardiner et al. 2000) reported good seedling regeneration following a clearcut, but found stump sprouts constituted only 7% of the reproduction. While we found relatively few studies on stump sprouting survival, these tend to support anecdotal evidence indicating low survival rates of sprouts on many sites. Therefore, based on studies we have reviewed, it appears most successful natural regenerated cypress stands depend on a combination of vegetative sprouts and natural seedlings. Figures 2 and 3 illustrate 12-year-old sprouts from a clearcut in Florida.

Figure 2. Cypress stump with 12-year-old sprouts

Figure 3. Cypress reproduction in a 12-year-old clearcut in Florida. The stand was a wet area, but soils are dry due to long-term drought. The dry conditions allow encroachment by non-wetland plants and diminish the cypress' growth.

Artificial regeneration (Planting)

Planting cypress is a viable alternative to natural methods and is the only option in certain situations, such as permanently-flooded areas. However, due to the slow growth rate of cypress, very long rotation lengths, and the high cost of regeneration on cypress sites, planting cypress may not be economically feasible for timber production.

For improved survival rates and growth on sites subject to flooding for long durations, it is recommended to use seedlings with heights exceeding 3 feet and minimum root collar diameters of 0.5 inch. A spacing of 8 feet by 8 feet is recommended.

Discussion

There has been little research conducted on survival of cypress reproduction. Evidence shows that cypress will regenerate naturally via seed and stump sprouting and that it is possible to successfully plant cypress.

When planning for a cypress harvest, the landowner, foresters, and others involved should consider factors such as the season, available soil moisture, ages of the trees being cut, intensity of the harvest, potential of flooding, and ability for the water to recede. Depending on the factors present and results desired, perhaps only one regeneration method or a combination of two or all three methods may be necessary to yield adequately-stocked regeneration. Just like regenerating pine or hardwood stands, proper planning and execution is important to obtain desired results. However, because there has been little research on cypress regeneration, the knowledge-base for very precise answers is not wide-spread. Therefore, it would benefit the landowner to contact professional foresters who are familiar with the considerations and the various regeneration methods available.

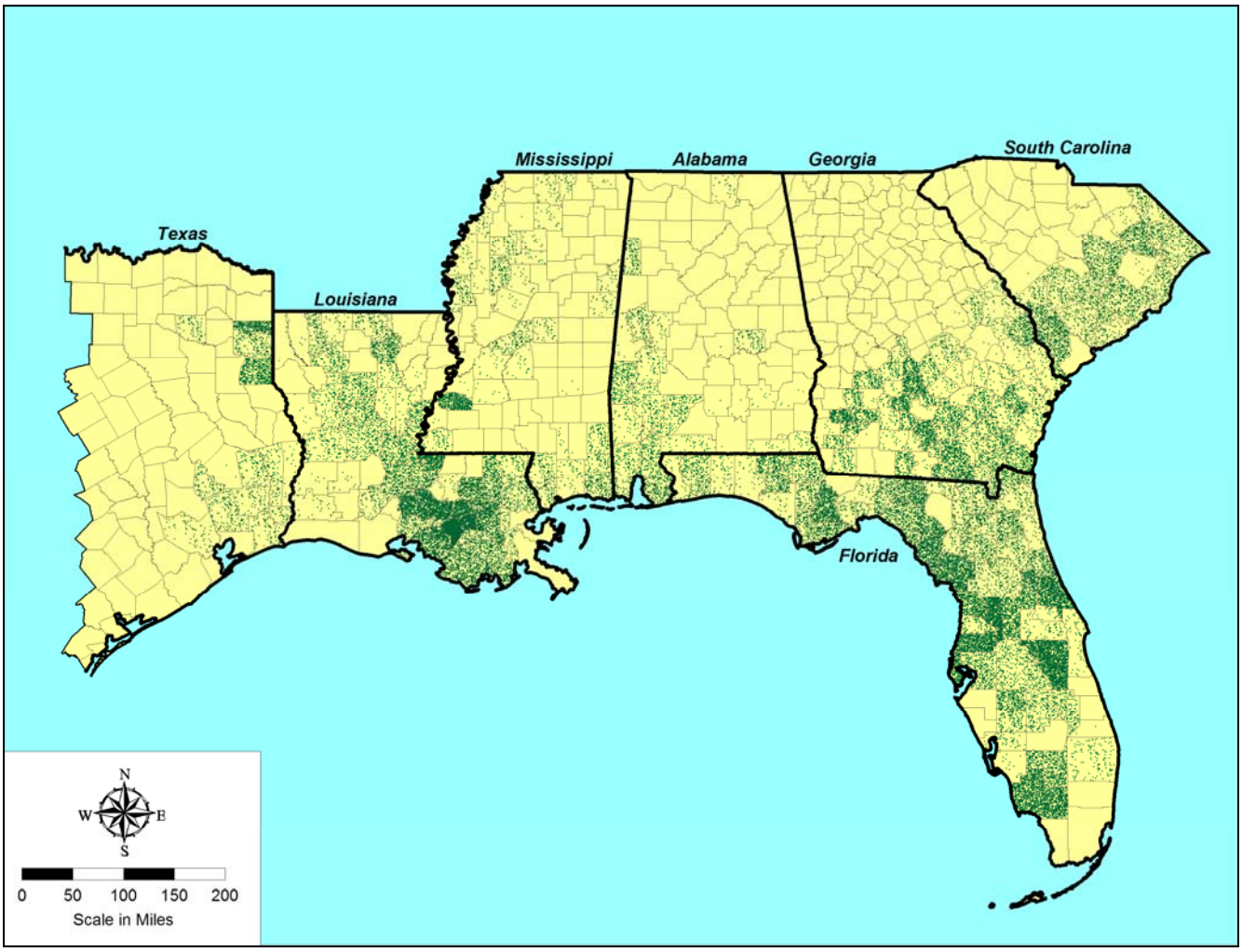
Research has shown that it will take approximately 20 to 25 years depending on site quality to grow a 6" dbh (diameter at breast height) cypress tree – about 30 years to reach 8" dbh. Sawtimber could reach 12" dbh in 50 years on a good quality site and closer to 60 years on a poorer (flooded) site.

CYPRESS INVENTORY ANALYSIS

Inventory

The following map illustrates the general location and concentration of cypress in the seven states included in this analysis.

Figure 4. Map of cypress growing stock locations and concentrations of volume.
Each dot represents 5000 tons, Green dots are growing stock, Dots are randomly located within counties.



Cypress occurs primarily in the lower elevations of the Coastal Plain and in the river systems. The inventories of cypress growing stock (5”+) in the southern states from South Carolina through east Texas are shown in Table 1.

Table 1. Cypress growing stock inventories by state.

State	Inventory (Tons)	Percent of Total
Alabama	9,272,113	4.6%
Florida	79,457,293	39.0%
Georgia	28,498,623	14.0%
Louisiana	52,650,773	25.9%
Mississippi	9,745,275	4.8%
South Carolina	15,669,894	7.7%
Texas	8,197,153	4.0%
Total	**203,491,123**	**100.0%**

Florida and Louisiana contain the majority of the cypress (65%) and Georgia contributes another 14%. Combined, these three states contain almost 79% of the cypress inventory in the seven states.

Oak-gum-cypress forests total approximately 29 million acres or 14% of the South’s forests. Over the past 100 years vast areas of cypress-tupelo forests in the Mississippi delta have been converted to agriculture in response to increased demands for soybeans and other agricultural commodities. The conversion from forestry to agriculture was driven by the economics of agricultural supply and demand, and was often subsidized by federal and state governments. More recently, these losses have resulted in additional emphasis by environmental groups and public policy makers to expand protection of the remaining cypress forested landscape. Ironically, these efforts often fail to understand that policies which promote the economic use, harvest, and regeneration of cypress forests provide the incentives necessary to retain these areas as forests.

Contributing to land use changes and cypress habitat loss primarily in southern Louisiana is the fact that levees along the Mississippi River have been constructed since the early 1900s. Where formerly the rivers have flooded surrounding areas, cut new channels, and changed courses, these levees have caused the river to remain within the artificial banks (levees) and the sediments are forced down the river rather than being allowed to be deposited outside of the banks during periodic flooding. Subsidence of the land is one result of a lack of replenishing sedimentation as is diminished fertility. As sedimentation along the river is severely reduced, subsidence gradually occurs in the coastal areas, and this ultimately leads to saltwater intrusion into the subsiding lands of the freshwater marshes and swamps.

Interestingly, the federal agency (Corps of Engineers) that has authority for controlling landowner’s activities in wetland areas is the same agency that also controls the levee systems and determines if and when floodgates are opened to allow flooding to occur in the basins that depend on flooding. The COE has the single greatest potential for impacting the health, habitat, and longevity of wetlands in south Louisiana.

Growth and Removals

Figure 5 below illustrates the locations of the primary removals in relation to the location of the cypress growing stock.

Figure 5. Map of cypress growing stock and removals.
Each dot represents 5000 tons, Green dots are growing stock, Red dots are removals, Dots are randomly located within counties, Dots for removals are shown slightly larger than growing stock dots for easy visibility.

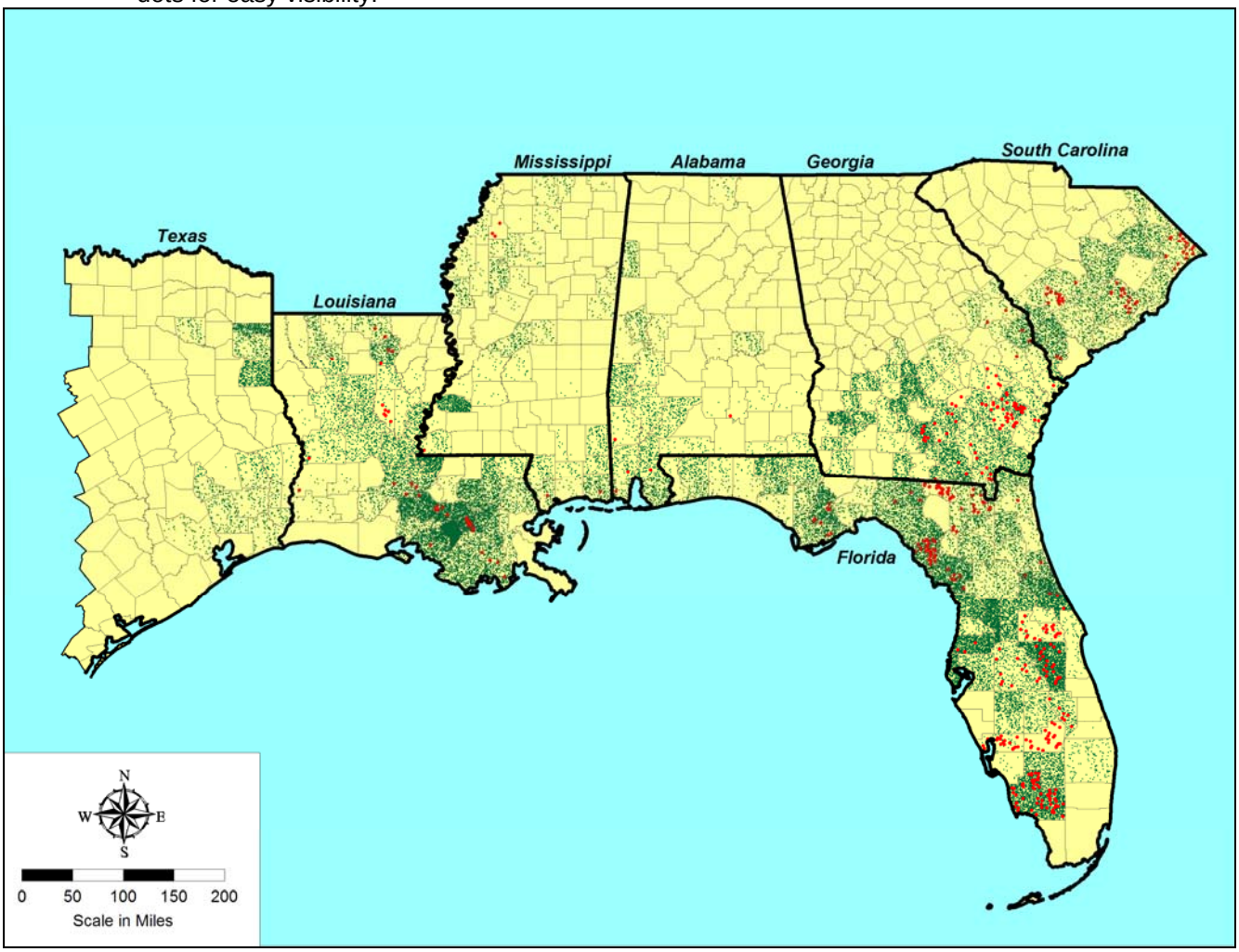


Figure 6 illustrates the locations of the cypress in relation to population densities. The counties with the larger populations generally have low volumes of cypress growing stock. In Figure 7, the locations of the removals are shown in relation to population densities. As revealed in Figure 6, most of the growing stock volume of cypress is located along the coasts, particularly in Florida, which is generally the higher-valued real estate for development. With a few exceptions, these uses do not seem to have caused major conflicts. Cypress favors the lower lands (bottoms, swamps, etc.), while development favors higher-elevation lands. With current regulations against filling in wetland areas, these uses may continue to coexist. Figure 7 shows that most of the removals have taken place in counties with low population densities.

Figure 6. Map of cypress growing stock concentrations in relation to human population densities. Each dot represents 5000 tons, Green dots are growing stock, Dots are randomly located within counties.

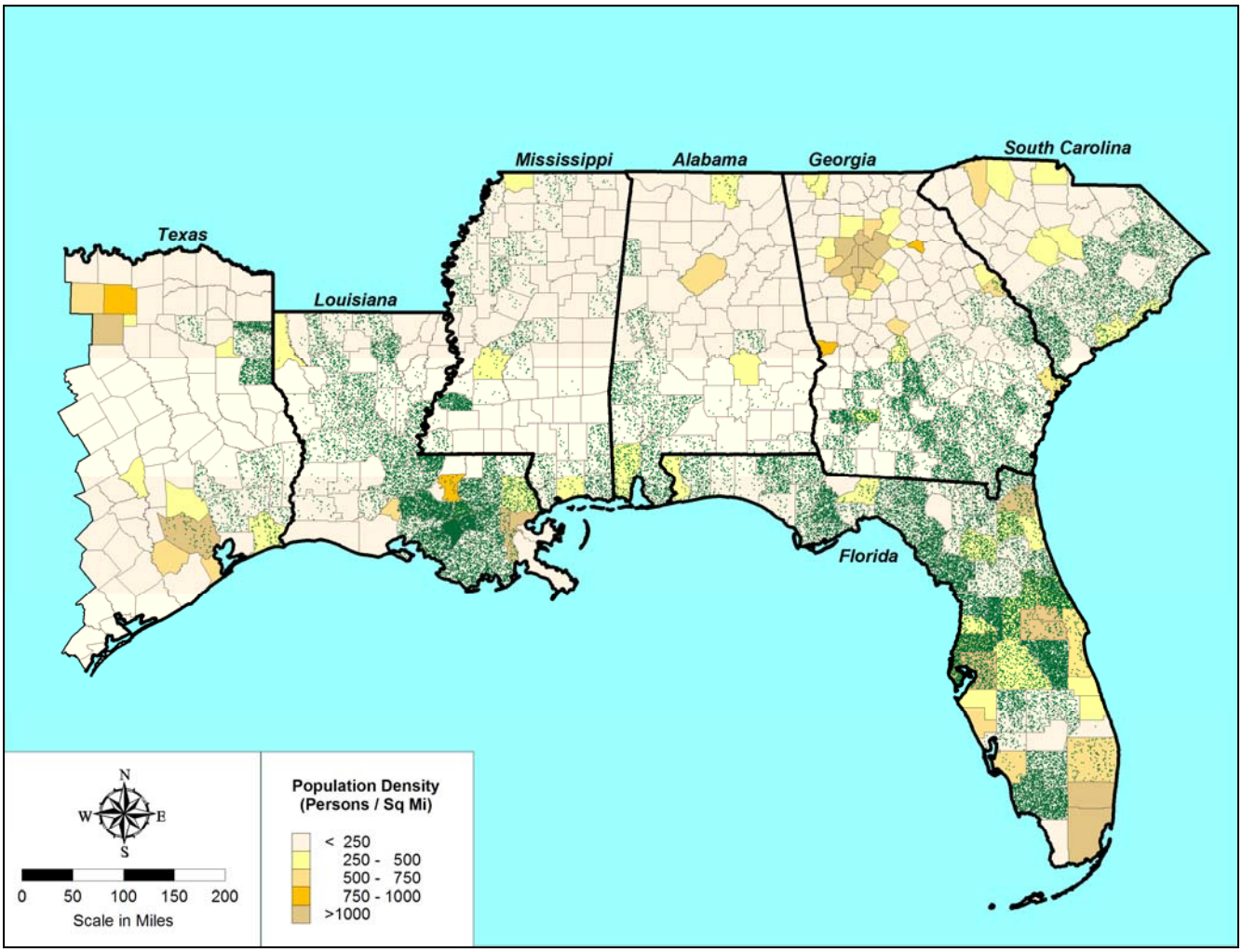
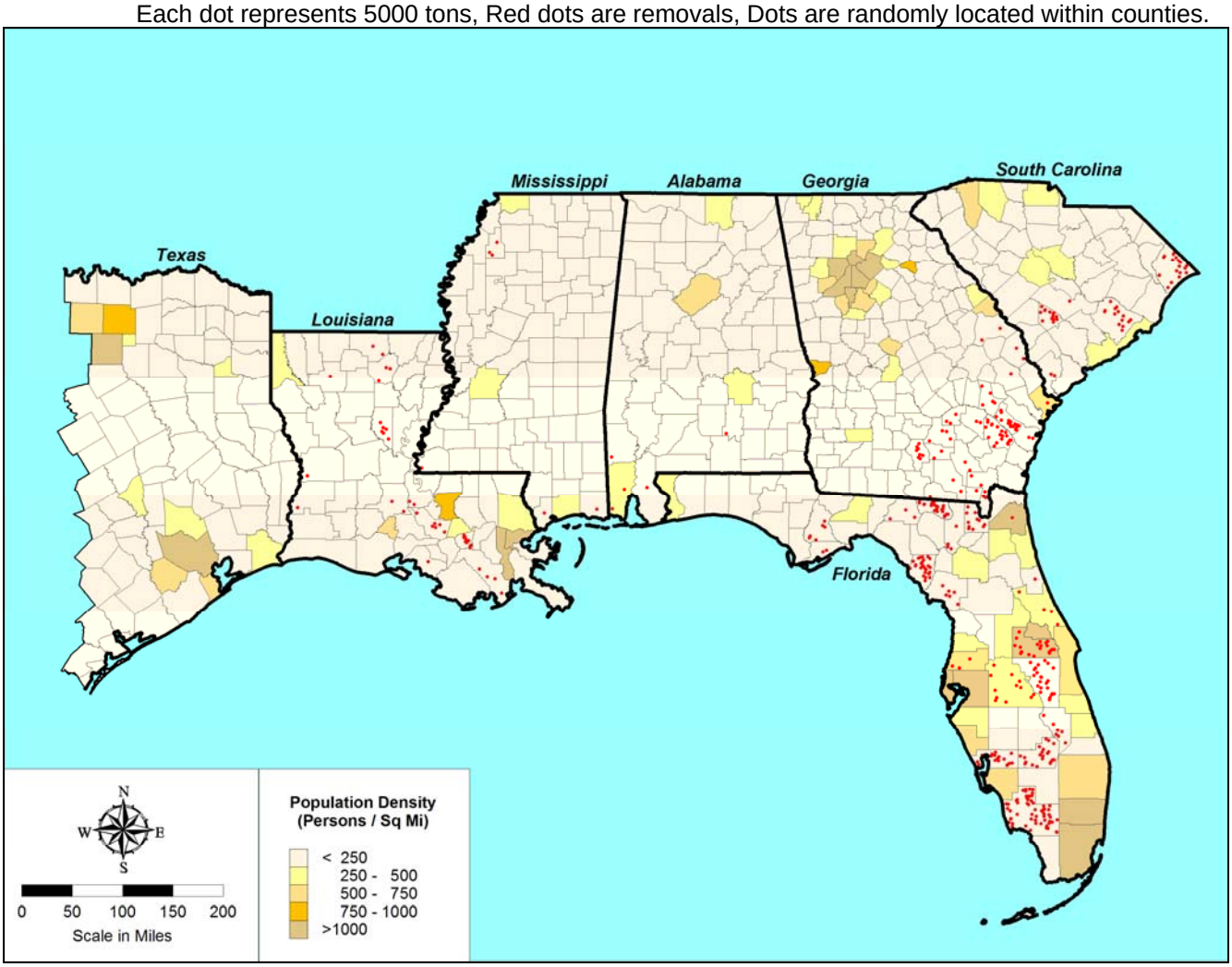


Figure 7. Map of cypress removals in relation to human population densities.
Each dot represents 5000 tons, Red dots are removals, Dots are randomly located within counties.



The following two graphs illustrate the inventory, growth, and removals of cypress within the seven states. The first graph shows the growth and removals in relation to the standing inventory. The second graph shows only the growth and removal relationships.

Figure 8. Relationship between cypress growing stock, growth, and removals by state.

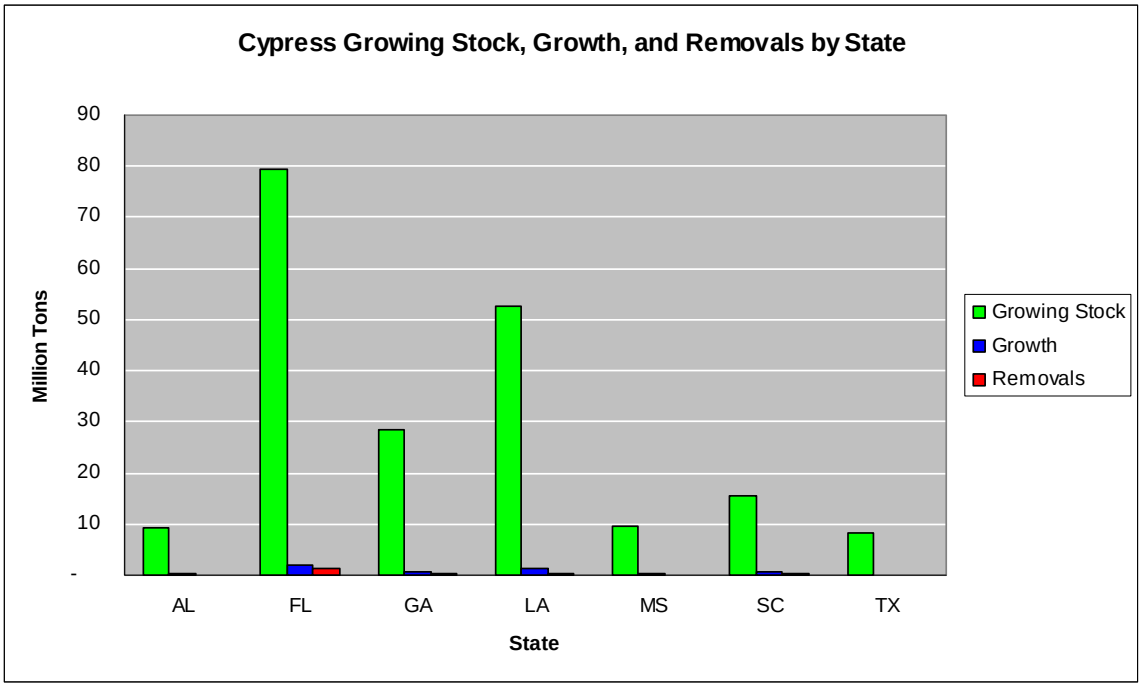
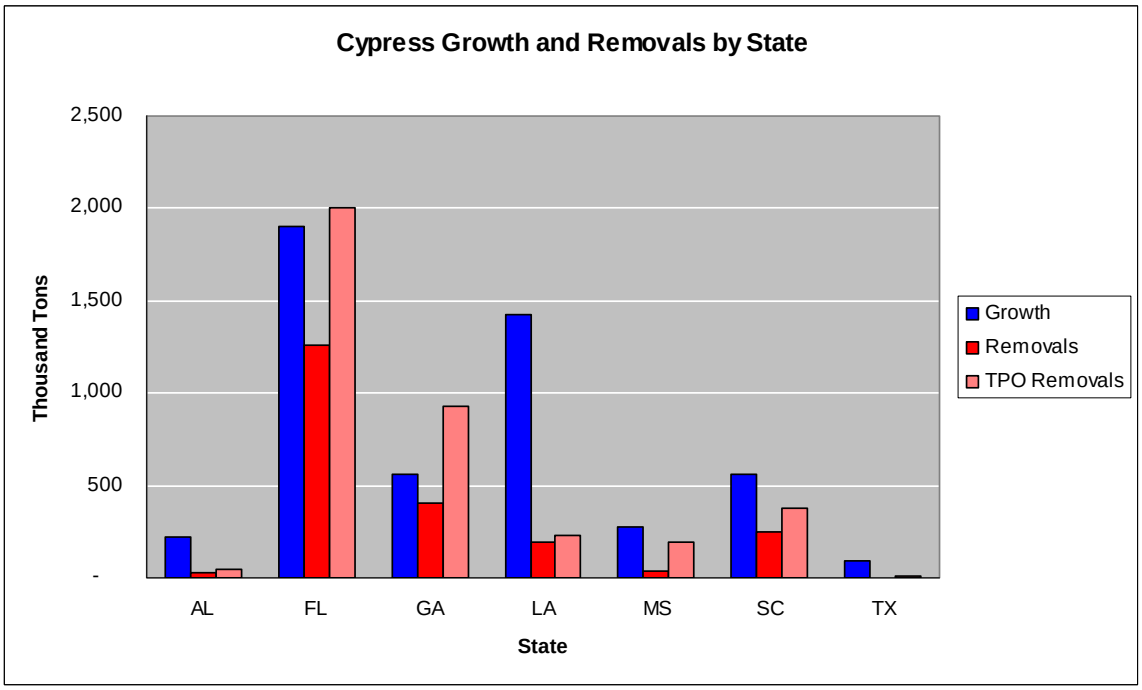


Figure 9. Relationship between cypress growth and FIA and TPO removals by state.
Note different scale than previous graph to better illustrate comparisons.



The preceding chart (Figure 9) shows the growth and removals obtained from the FIA database. Also, reported in this chart are the removals from the Timber Product Output (TPO) database, which is also maintained by the FIA. For Florida and Georgia, the FIA and TPO removals reveal conflicting results when compared to the growth estimates. Using the FIA removals, all states show growth exceeding removals. However, when using TPO removals, Florida and Georgia show removals exceeding

growth. We do not wish to minimize the effects of the TPO removals, but for this analysis, we chose to use the FIA data for the following reasons:

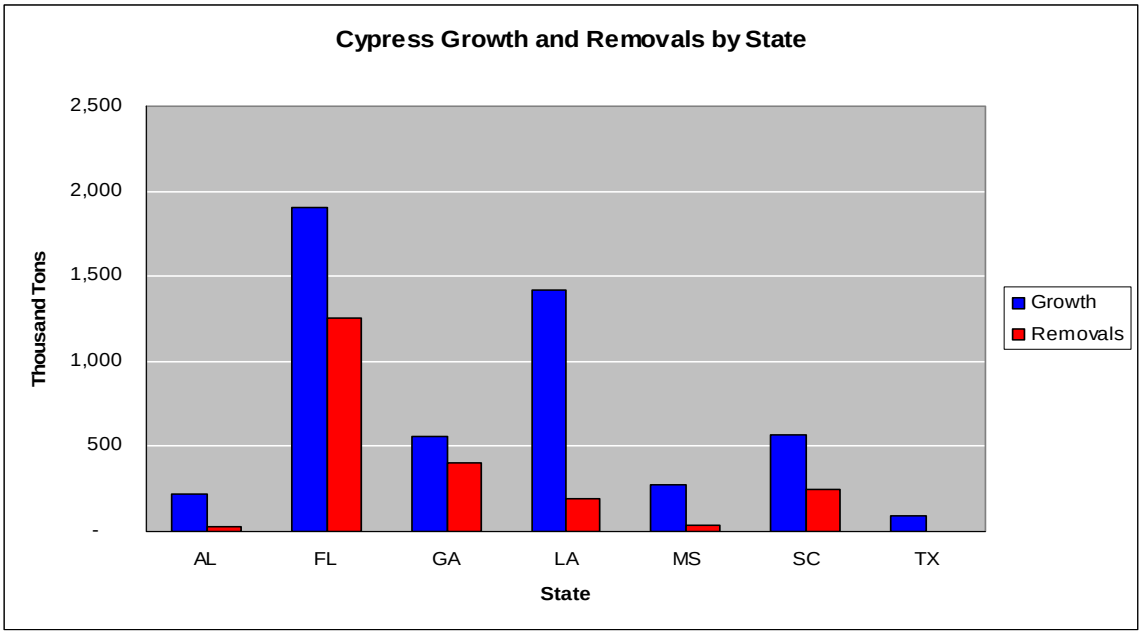
1) When conducting other analyses for other species, we generally have consumption estimates from another source (mill survey estimates). However, for this analysis, the mill survey estimates we received are not comprehensive enough to provide verification for either of the other estimates.

2) The FIA inventory and growth estimates are based on plot data as are the FIA removal estimates. The TPO removals are based on estimates reported by mills. Therefore, the FIA removal data is based on the same plot data that is used for inventory and growth estimates. Because stands containing cypress are a small percentage of the stands sampled in an FIA inventory, the volume estimates are subject to significant variability. In this case (of low sample intensity) it is probably more appropriate to match harvest estimates from the same source as the inventory estimates.[1]

3) Using the FIA removals allows for breakdown of the overall estimates into volume estimates by different land types as analyzed later.

Omitting the TPO removals from this analysis results in growth to removal comparisons as shown in Figure 10 and discussed below.

Figure 10. Relationship between cypress growth and FIA removals by state.
Note different scale than Figure 8 to better illustrate comparisons.



[1] The above analyses use data obtained from the FIA database. While we consider this data to be the best available for analyzing regional inventories and general trends, the data does have limitations. One important consideration is that the data is based on generally wide-spaced plots with corresponding large expansion or blow-up factors to convert plot data to population estimates, and the estimates of volume and growth are therefore subject to sampling error; i.e. every tree was not counted.

We have encountered considerable variation between the FIA estimate of the percentage of pine harvests coming from plantations and surveys of loggers in the same regions – therefore we believe it is sometimes appropriate to adjust FIA harvest estimates because they are based on a much lower sampling intensity than the overall pine inventory estimates, which are believed to be reliable. In this case, as stated above, the sampling intensity in cypress stands is much lower than in the pine stands in the same region, causing potential for greater variation in the standing inventory estimate, and therefore we think it is more appropriate to use a harvest estimate from the same methodology.

As can be seen, removals are a minor portion of the total growing stock inventories and removals do not exceed the total growth.

The following graph (Figure 11) illustrates the cypress inventory by physiographic land class. The land classes are broad groupings based primarily on soil moisture and are defined as:

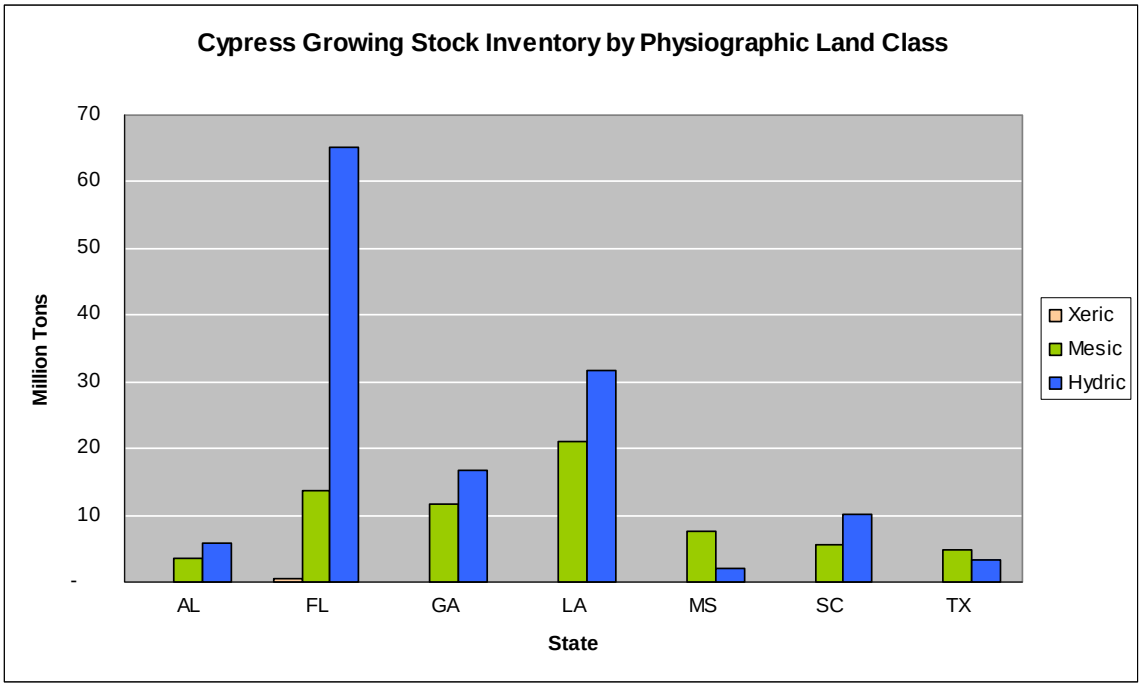
Xeric (Dry) – low or deficient in available moisture (dry uplands, dry slopes, deep sands);

Mesic (Moderate) – moderate but adequate available moisture (flatwoods, rolling uplands, moist slopes and coves, flood plains/bottomlands);

Hydric (Wet) – abundant or overabundant moisture all year (swamps/bogs, small drains, bays and pocosins, beaver ponds, cypress ponds).

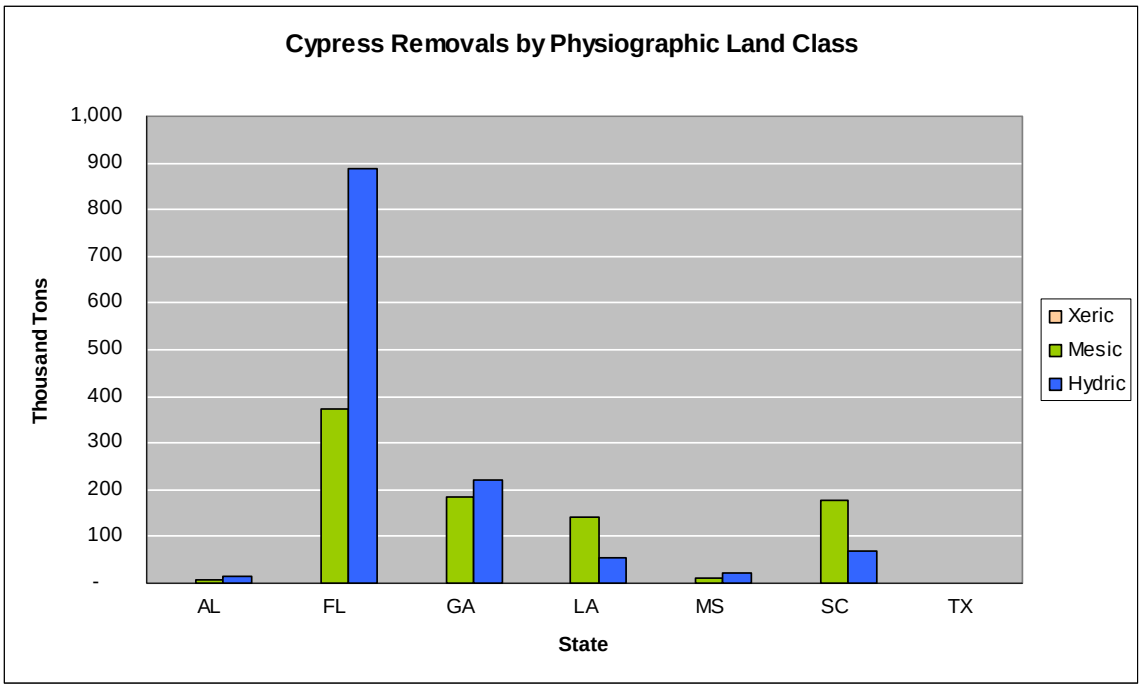
Primarily due to cypress' inability to tolerate fire, very little cypress occurs on the dry xeric sites, as evidenced in the graphs. As cypress is both tolerant of prolonged periods of inundation and is protected from fires on these sites, most of the cypress inventory occurs on the wet sites.

Figure 11. Relationship of cypress growing stock between land types by state.



While most of the cypress is located in the wet areas[2], a good portion of removals comes from the moderate sites, as shown in Figure 12 below. This occurs because logging of the moderate sites is easier, and the sites are more accessible for a greater portion of the year than are the wet sites.

Figure 12. Relationship between cypress removals between land types by state.



Figures 13 and 14 below illustrate the relationships between the growth and removals by land type and state. Generally, removals are less than growth indicating that harvesting is sustainable. An exception is the harvest on moderate (mesic) sites in Florida, where removals exceed growth by about 70%.

[2] The FIA inventory does not provide any estimate of operability; i.e. whether or not a particular plot falls into an area that can't be harvested. We know that there are economic and regulatory restrictions on some of these sites that will either restrict harvest or limit harvest to very dry times. To the extent that these volumes are contained in the FIA inventory, standing inventory and growth could be somewhat overstated. However, the relationship of growth to harvest by state is such that we don't believe that any adjustments due to harvest restriction or regulation would cause the harvest estimate to exceed growth.

Figure 13. Relationship (actual) between cypress growth and removals by land type and state.

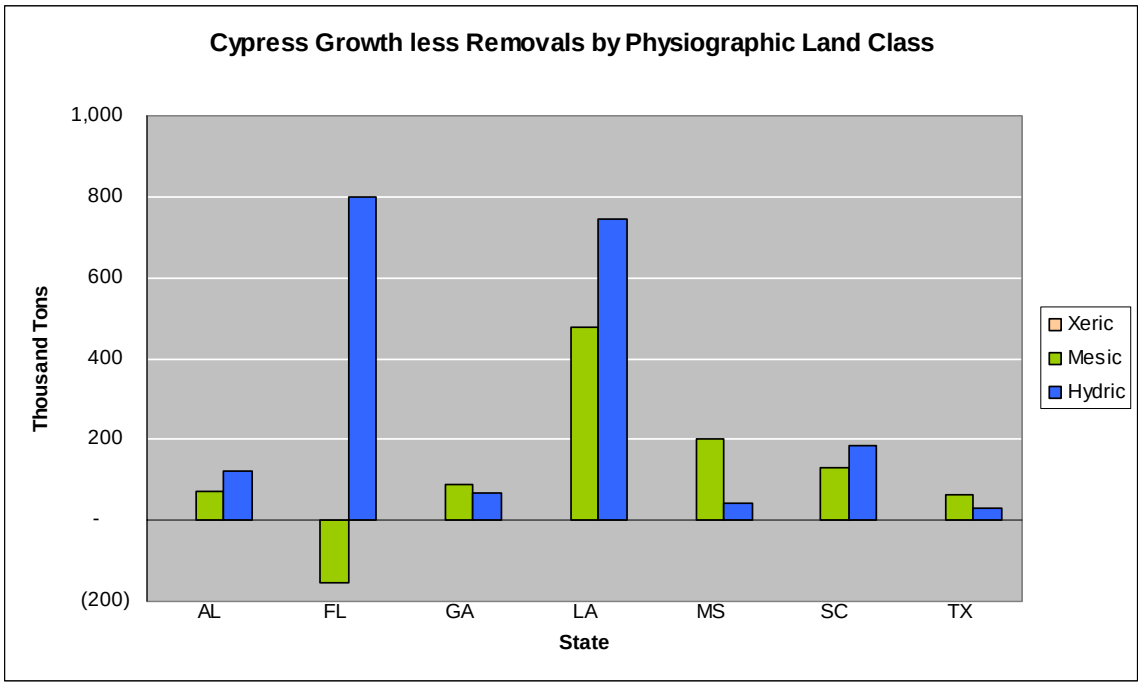
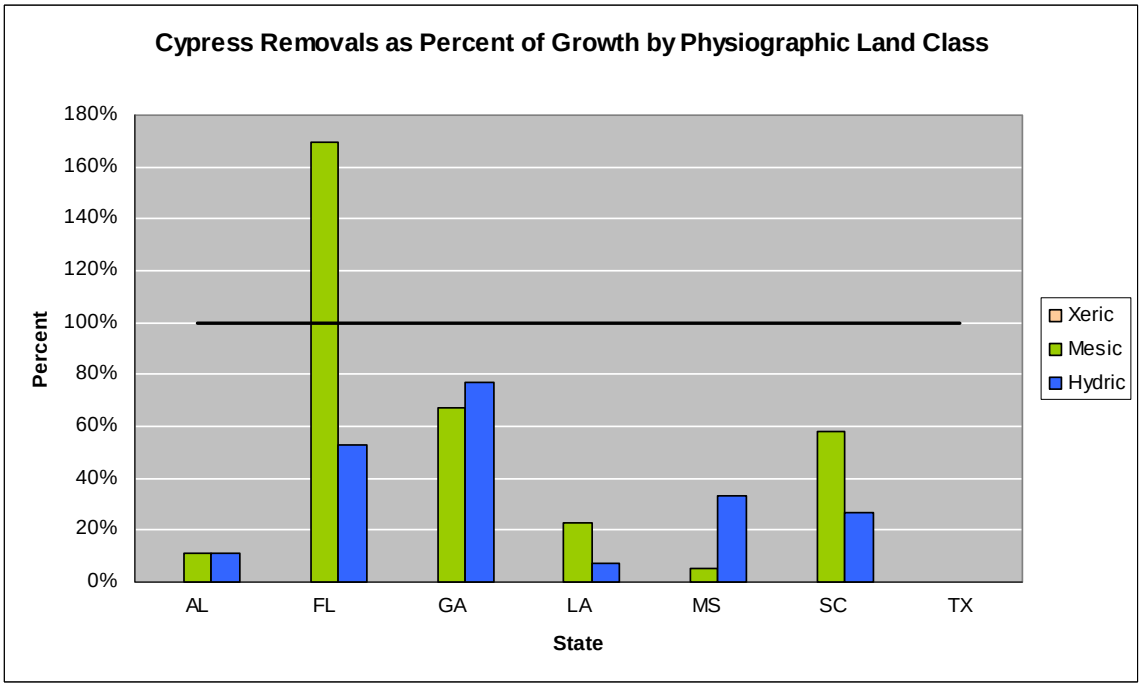


Figure 14. Relationship (%) between cypress growth and removals by land type and state. The black line at 100% indicates the level at which removals equal growth, above this level removals exceed the growth, and growth exceeds removals below this level.



Conclusions

Alabama, Mississippi, and Texas have relatively minor inventories of cypress. The overall relationship of growth to removals in these states is positive, indicating that current harvest levels are likely sustainable.

Of the other four states, Florida and Louisiana have the largest volumes of cypress growing stock and growth, followed by Georgia and South Carolina, respectively. Florida has the largest volume of cypress removals. However, more removals are coming from Georgia and South Carolina than from Louisiana.

Overall, Louisiana by far has the greatest differential between growth and removals. Florida, on the wet sites, has a large difference between growth and removals; however, the removals from the moderate sites significantly exceed the growth. Georgia's growth and removals are more equal than the other states. Table 2 below lists these four states and the relationship of growth to removals.

Table 2. Volumes of growth exceeding removals

State	Tons
Louisiana	1,224,454
Florida	646,342
South Carolina	316,434
Georgia	154,275

BMP CONSIDERATIONS

BMPs – general and specific to cypress harvests

While the quality and frequency of oversight varies significantly from one state to another, all states within the study area have active Silvicultural Best Management Practices (BMP) promotion and monitoring programs. The basic practices comprising State BMPs for protection of water quality are similar across all states with emphasis on protection of streamside management zones, stream crossings, road construction and maintenance. Through the SFI® Program[3] the State Forestry Agencies and State Forestry Associations actively work to promote BMPs and provide BMP and Logger Training Programs designed to improve implementation.

All state BMP manuals place additional emphasis on wetlands and include specific practices for forested wetlands. However, little distinction is made between wetlands containing cypress and those dominated by bottomland hardwoods or other wetland species. All states stress that Federal and State laws govern practices in forested wetlands and that many, if not all, of the BMPs are considered mandatory on these sites.

F&W Forestry Services, Inc. manages a private database tracking BMP performance and the user of trained loggers across most of the eastern and southern United States. The information is gathered from professional foresters who are responsible for administering timber harvest operations and for monitoring and enforcing contract provisions on behalf of landowner clients. These data closely track the results found in periodic public surveys conducted by State Forestry Agencies. Results of the Agency and F&W programs are shown in Table 3 below.

A May 27, 2008 Savannah Federal District Court ruling regarding the interpretation of ongoing forestry and eligibility of a cypress harvesting operation to the exemption from the Federal Clean Water Act permit process certainly bears noting. In this ruling the Judge sided with the plaintiffs in ruling the Corps of Engineers (COE) improperly granted an exemption for harvest of cypress on a specific tract as there was no evidence the site had been harvested before or that it would grow back. This ruling is not expected to have a significant impact on the regulation of normal ongoing forest harvest operations as these activities are generally exempt from the COE permit process. If challenged, the burden of proof would fall to the landowner to demonstrate the tract has a history of forest management and will be regenerated as part of an ongoing forestry operation.

---

[3] The Sustainable Forestry Initiative (SFI®) Program is a leading forest management environmental certification program in the United States where forestlands of SFI® Participants are third-party certified to an independent environmental management standard. The Program also sponsors logger training and education, and landowner outreach programs.

Table 3. BMP Performance & Percent of Tracts Harvested by Trained Loggers*

State	State Agency Performance (Year / Average Score)	F&W Database Performance** (# Tracts / Average Score)	F&W Database Percent of Sites Harvested by SFI® Trained Loggers
Texas	2005 / 91.7%	646 / 90.7%	90.3%
Louisiana	2003 / 96.0%	203 / 92.2%	98.3%
Mississippi	2007 / 93.0%	418 / 94.5%	96.9%
Alabama	2007 / 98.1%	594 / 94.0%	70.9%
Florida	2007 / 98.6%	336 / 96.4%	84.5%
Georgia	2007 / 91.8%	1,730 / 93.7%	92.1%
South Carolina	2003 / 94.0%	1,988 / 94.5%	97.3%

* Estimate of Percent of Sites harvested by SFI® Trained Loggers reflects knowledge of consultants providing data and is believed to significantly understate the actual percentages of sites where SFI® trained loggers were used. It is our professional opinion that over 95% of the wood moved in the Southeastern States is harvested by SFI® Trained Loggers with the general exceptions limited to those loggers contracted to smaller privately owned mills.

** F&W scores are averages from tracts harvested from 2003-2008

Other Special Sites and Considerations

Section 404, Federal Clean Water Act. Exempts normal ongoing forestry activities including timber harvest, road construction and reforestation from the permit process. Regulations and guidance documents establish mandatory BMPs for road construction and reforestation in some wetland forest types. Mechanical site preparation in and conversion of cypress dominated forests to other forest types is regulated and generally prohibited under these guidelines.

Section 10, Rivers and Harbors Act of 1899. While regulations exempt normal ongoing agriculture and forestry activities including harvests from the permit process, in some instances the Corps of Engineers have attempted to use this law to restrict the types of timber harvest activities allowed below the ordinary high water mark.

State Scenic or other designated and protected River Corridors. BMPs are generally mandatory and harvest levels restricted.

Conclusion

The data indicate Forestry BMP and Trained Logger Programs are in place and effective across all states within the study area. Almost all sites are harvested by SFI® Program Trained Loggers; State Agency and private data confirm BMP compliance rates are good to excellent across all landowner types.

CYPRESS PRICE INFORMATION

Timber Prices

The pricing of cypress follows closely that of the pine pulpwood and sawtimber market. Price is influenced by distance to the mill and transportation costs which is a high cost issue now with current fuel costs. The mulch market, which follows the real estate market, is in a down cycle so the prices listed below are ranges that are currently paid based on need and transportation.

Table 4. Pricing of cypress products.

Product	Top Diameter	Stumpage Price ($/ton)	Delivered Price ($/ton)
Cypress Pulpwood	3”	$8-$13	$28-$32
Cypress Chip-n-saw	6”	$29-$34	$47-$53
Cypress Sawtimber	10”	$38-$42	$57-$61

SUMMARY AND CONCLUSIONS

The Forest Service data indicate that the overall growth of cypress is greater than the removals. In addition, cypress growth exceeds harvest in every state in our study. Louisiana and Florida have the greatest differential between cypress growth and harvests, although in Florida it appears that harvests exceed growth on the mesic or moderate sites. If this situation persists, it could lead to a shortage of available cypress on these sites; however as mentioned above, in the state as a whole growth substantially exceeds harvests.

As exhibited by the second and third growth cypress stands all over the South, cypress will regenerate following a harvest from seed and by sprouting from stumps. Seed regeneration is dependent on getting the seed to moist bare ground. Maintaining flooded conditions after seed fall severely limits germination and survival of cypress seed. Cypress harvesting and regeneration should be managed by a knowledgeable professional.

It appears the greatest challenges to cypress management and sustainability are:

1) Habitat loss through
    a. draining and changing land uses,
    b. flood control projects preventing or reducing regular, periodic flooding, which subsequently prevents sediment replacement,
    c. subsidence of the land, and
    d. salinity increases of coastal forested lands;

and

2) Mimicking natural flooding conditions upon which cypress depends. This entails having the site flooded at around the time of seed fall to enhance soil moisture and to distribute the seeds. The flooding must then be allowed to dissipate soon thereafter and remain free from extensive re-flooding for several months to a year to allow the seeds to germinate and grow tall enough to avoid overtopping by successive floods.

Maintaining and continuing development of a market and, therefore, an economic base for cypress is important for its management and sustainability. Through economic importance, research about this resource and its management will likely increase and emphasis may be placed upon individuals and government agencies to manage flooding for cypress' benefit.

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Qualifications of Primary Collaborators

William F. Miller

EDUCATION

Received an Associates degree from Abraham Baldwin Agricultural College in 1968. Graduated with a Bachelor of Science degree in Forestry from the University of Georgia in 1970.

EMPLOYMENT

1972-1974–Land Management Forester, Union Camp Corporation, Brunswick, Georgia.

1974-1976–Timber Buyer, Union Camp Corporation, Waycross, Georgia.

1976-1978–District Supervisor, Wood Procurement, Union Camp Corporation, Ridgeland, South Carolina.

1978-1980–Assistant to the Wood Procurement Manager, Union Camp Corporation, Savannah, Georgia.

1980-1983–Area Superintendent, Union Camp Corporation, Savannah, Georgia.

1983-1989–Wood Procurement Manager, Union Camp Corporation, Savannah, Georgia.

1989-1992–Region Manager, Alabama Region, Union Camp Corporation, Prattville, Alabama.

1992-1995–Region Manager, Eastover Region, Union Camp Corporation, Colombia, South Carolina.

1995-1999–Wood Fiber Manager, Union Camp Corporation, Savannah, Georgia.

1999-2000–Southeast Region Manager, International Paper, Savannah, Georgia.

2000-2002–Director, Sustainable Forestry Technologies, International Paper, Savannah, Georgia.

2003–Wood Fiber Manager, Atlantic Region, International Paper, Georgetown, South Carolina.

2004-2005–Manager, Supplier Services Forest Resources Division, International Paper, Savannah, Georgia.

2005-2006–Consultant, Miller Timber and Land Properties, LLC, Savannah, Georgia.

2006-Present–Fiber Logistics Development and Support, F&W Forestry Services, Inc., Albany, Georgia.

REGISTRATIONS/CERTIFICATIONS

Georgia Registered Forester #1008

AFFILIATIONS

Board Member of Georgia Forestry Association and past President and Chairman of the Board; Board Member and past Executive Board Member of the Forest Resources Association; Society of American Foresters; Georgia, Florida, and South Carolina Forestry Associations; and Forest Landowners Association. Member of the University of Georgia's Warnell School of Forestry and Natural Resources Advisory Committee and past Alumni President.

Keith B. Ward

EDUCATION

Attended Louisiana State University from 1979-1983 and graduated with a B.S. Degree in Forestry in December 1983.
Attended Louisiana State University from 1984-1986 and completed course work toward M.S. Degree in Forestry.

Successfully completed the following Appraisal Institute courses:

1A/8-1	- Real Estate Appraisal Principles
1A2	- Basic Valuation Procedures
310	- Basic Income Capitalization
320	- General Applications
410/420/430	- Standards of Professional Practice, Parts A, B, and C
510	- Advanced Income Capitalization
520	- Highest and Best Use and Market Analysis
530	- Advanced Sales Comparison and Cost Approaches
540	- Report Writing and Valuation Analysis
550	- Advanced Applications
Seminars	- Appraisal Review-General

Successfully completed the following American Society of Farm Managers and Rural Appraisers courses:

A-20	- Principles of Rural Appraisal
A-30	- Advanced Rural Appraisal
Seminars	- Valuation of Fractional Interests; Timber and Timberland Valuation; Appraising Agricultural Chattel

In addition to the above, completed numerous Uniform Standards of Professional Appraisal Practice (USPAP) courses in fulfillment of state and federal requirements to maintain appraisal licenses.

EMPLOYMENT

August 2000 to Present as Manager and Regional Appraiser for F&W Forestry Services, Inc, Jackson, Mississippi. Responsibilities: Manage forestry activities in the Mississippi area. Appraise properties in the west gulf region. Establish appraisal requirements and review appraisals for a major timberland investment management organization.

July 1992 to August 2000 as Appraiser for F&W Forestry Services, Inc, Phenix City, Alabama. Responsibilities: Appraised properties and continued development of the company’s information system.

April 1990 to July 1992 as Inventory Forester for F & W Forestry Services, Inc, Albany, Georgia. Responsibilities: Designed and managed the development and implementation of the company's information system including timber inventory and appraisal, timber sale information, and time & expense.

March 1988 to April 1990 as Computer Specialist for Institute of Quantitative Studies, USDA Forest Service, New Orleans, Louisiana. Responsibilities: Managed the unit's computer systems, which involved evaluating, purchasing, installing, and maintaining the hardware and software.

December 1986 to June 1988 as Computer Programmer for Computer Services and Systems, USDA Forest Service, New Orleans, Louisiana. Responsibilities: Wrote and amended computer programs, trained users on how to use computers and related software, and maintained the computer hardware and software.

May 1986 to August 1986 as Research Forester for Economics Unit, USDA Forest Service, New Orleans, Louisiana. Responsibilities: Developed computer program for determining the optimal bucking lengths and volumes of trees.

August 1986 to November 1986, and January 1984 to May 1986 as Graduate Research Assistant, Department of Forestry, Wildlife, and Fisheries, Louisiana State University, Baton Rouge, Louisiana. Responsibilities: Developed computer programs for analyzing management alternatives of uneven-aged southern pine stands.

PROFESSIONAL LICENSES / REGISTRATIONS

Registered Forester: Alabama #1649; Georgia #002171; Mississippi #1964

Certified General Real Property Appraiser: Alabama #G00438; Georgia #003235; Maryland #10805; Mississippi #GA-578; North Carolina #A4037; South Carolina #CG3446; Texas #TX-1327591-G

AFFILIATIONS

Society of American Foresters:
- Member (1986-present)

Mississippi Forestry Association:
- Member (2000-present)
- Board of Directors (2004-present)
- Youth Forestry Committee:
  - Member (2001-present)
  - Chairman (2004-2006)

Mississippi State 4-H Advisory Council:
- Member (2006-present)

Appraisal Institute:
- Associate Member (1993-present)

North Jackson, Mississippi Kiwanis Club:
- Member (2001-06)
- Treasurer (2002-06)
- Vice-President / Treasurer (2001-02)
- Secretary (2001)

Phenix City, Alabama Kiwanis Club:
- Member (1998-2000)
- Vice-President / President-elect (1999-2000)

Southeast Louisiana Chapter of Society of American Foresters:
- Member (1986-1990)
- Secretary-Treasurer (1988)

Past Treasurer, LSU Student Chapter of Society of American Foresters (1982-83)

Xi Sigma Pi Forestry Honor Society

PUBLICATIONS

Busby, R. L. and K. B. Ward. 1989. MERCHOP: A dynamic programming model for estimating the harvest value of unthinned loblolly and slash pine plantations. Res. Pap. SO-254. New Orleans, LA: USDA Forest Service, Southern Forest Experiment Station. 19p.

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Hotvedt, J. E. and K. B. Ward. 1990. A dynamic programming optimization model for uneven-aged loblolly-shortleaf pine stands in the Mid-South. In proceedings of the Southern Forest Economics Workshop on Evaluating Even and All-aged Timber Management Options for Southern Forest Lands. Gen. Tech. Rep. SO-79. New Orleans, LA: USDA Forest Service, Southern Forest Experiment Station. p. 35-43.

John F. Godbee, Jr.

EDUCATION

Graduated with a Bachelor of Science degree in Forest Entomology from the University of Georgia in 1972. He received his Master of Science degree in Forestry Entomology from the University of Georgia in 1974.

EMPLOYMENT

1975-1979–Pest Management Specialists, Forest Management, Georgia Forestry Commission, Macon, Georgia.

1979-1991–Project, Group Leader; Woodlands Research; Union Camp Corporation, Rincon, Georgia.

1991-1997–Manager Environmental Compliance, Woodlands Division; Union Camp Corporation, Savannah, Georgia.

1997-1999–Manager Environmental Affairs, Forest Resources Group, Union Camp Corporation, Savannah, Georgia.

1999-2001–Manager Environmental, Health & Safety and ISO, Forest Resources Group, International Paper, Savannah, Georgia.

2001-Present–Forest Certification and Environmental Compliance Programs Manager, F&W Forestry Services, Inc., Statesboro, Georgia.

REGISTRATIONS/CERTICATIONS

Georgia Registered Forester #RF002663. ANSI-RAB ISO 14001 Environmental Auditor # EO52699. Completed USACOE Wetlands Delineation Training

AFFILIATIONS

Association of Consulting Foresters of America, Inc.; Society of American Foresters; Georgia Forestry Association, Past Chairman Environmental Committee, Co-chaired 1999 BMP Task Force; American Forest and Paper Association, Past Chair CWA Silvicultural Exemption Committee, Past Chair Southern Forest Assessment Task Force. Leadership Georgia Foundation; AGON, University of GA Agricultural Honor Society, Rotary International.

Marshall D. Thomas

EDUCATION

Graduated with a Bachelor of Science degree in Forestry from the University of Florida in 1978. Received his M.B.A. from Georgia Southern University, Statesboro, Georgia, in 1988.

EMPLOYMENT

1978-1980–Field Forester, F & W Forestry Services, Inc., Albany, Georgia.

1980-1982–Technical Forester, F & W Forestry Services, Inc., Albany, Georgia.

1982-1985–Manager, Savannah Branch, F & W Forestry Services, Inc., Savannah, Georgia.

1985-1988–Manager, Statesboro Branch, F & W Forestry Services, Inc., Statesboro, Georgia.

1988-Present–President, F & W Forestry Services, Inc., Albany, Georgia.

REGISTRATIONS/CERTIFICATIONS

Georgia Registered Forester #1544; South Carolina Registered Forester #869; North Carolina Registered Forester #749; Arkansas Registered Forester #436; Alabama Registered Forester #1439; Mississippi Registered Forester #1404R; Georgia Certified Real Estate Appraiser #000938; and Georgia Real Estate Salesperson License #S163192.

AFFILIATIONS

Society of American Foresters; Georgia Forestry Association, Board of Directors and 1998-99 President; Association of Consulting Foresters of America, Inc.; Practicing Foresters Institute Trust; Past Chairman 1994-1999, Georgia Chapter ACF; Florida Forestry Association; Forest Landowners Association; Member, Forest Resources Association, Inc.; Member, Realtors Land Institute; Member, Wilderness Society, Chairman, University of Georgia, Warnell School of Forest Resources Center for Forestry Business Advisory Council; Albany Rotary Club; and Albany Boys' and Girls' Club, Past-President.