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Longleaf Pine – An Ecological and Economic Opportunity

Longleaf pine produces high value timber and is associated with one of the most biologically diverse ecosystems in North America. Unfortunately, longleaf currently occupies an estimated three percent of its natural range. An organized effort underway to restore a portion of the ecosystem is described in our feature article, "The Longleaf Alliance." The Alliance, located at Auburn University, recognizes that longleaf restoration is ultimately dependent upon private landowner participation. The organization offers a wealth of information to landowners across the southeast who are interested in managing longleaf pine. An added incentive for growing longleaf pine is provided in "Managing for Pine Straw." This industry can pay big dividends for landowners with appropriate technical skills and a mind for business.

For a variety of reasons, we will likely never see the longleaf ecosystem completely restored. However, by educating landowners about management opportunities and matching their interests with effective management techniques, a sustainable level of management may be possible.

Larry Nelson and Bob Franklin, Co-Editors

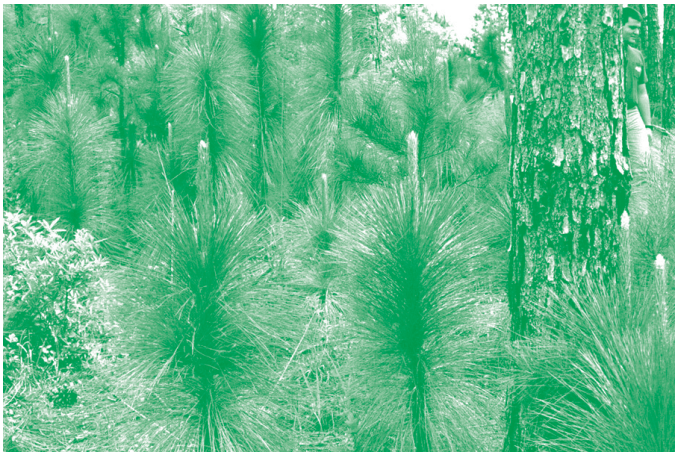
The Longleaf Alliance:

A Regional Effort Promoting the Ecological and Economic Values of Longleaf Ecosystems

*Dean Gjerstad, Rhett Johnson, and Mark Hainds**

For most of the past 5000 years longleaf pine was the dominant species on an estimated 90 million acres of uplands ranging from southeast Virginia down the Atlantic Coast and across the Gulf Coast to East Texas (Frost 1991). Today, less than 3 million acres is classified as longleaf forests (Landers et al l995). From a timber point of view, longleaf pine is superior to other southern pines in the production of high value wood products. Its growth form, with typically high form classes and straight boles, results in the production of a high percentage of poles, pilings and high quality logs. Longleaf is also resistant to many diseases, insects, and other damaging agents common to other southern pine. It is seldom damaged by fusiform rust, a serious pathogen in slash and loblolly pine; resists attack by southern pine beetles, and is very tolerant of fire throughout most of its life cycle. With so many attributes, why then has the longleaf forest been systematically harvested and then regenerated to loblolly or slash pine? The reasons for its precipitous decline are many and are rooted in the history of the South.

Landscape-scale fires that swept across most sites every 3-5 years maintained the prehistoric longleaf forests. European explorers described these forests as open, parklike stands with grassy ground cover containing little or no hardwood (Bartram 1791). As most early settlers were farmers, the forest required clearing to encourage settlement of the interior of the South. However, until the development of the steam engine in the mid-nineteenth century, only longleaf timber adjacent to waterways was accessible for harvesting. Large tracts of longleaf remained on the uplands out of reach of loggers. Longleaf timber harvesting peaked in the early 20th century when railroad logging reached the remaining large tracts (Croker 1987). By 1930 railroad loggers had moved across the longleaf region with little consideration for regenerating a new forest. When the longleaf timber was depleted, mills were



closed and most lumbermen moved to the Pacific Northwest to log its virgin stands. However, a few pioneering foresters remained in the South, believing that longleaf regeneration was possible – an indication that longleaf can be managed profitably over a long period of time.

Although longleaf pine is considered to be a pioneer species, it does not demonstrate the aggressive regeneration characteristics noted of most pioneer species (Landers et al 1995). In most years, mature longleaf trees produce few seed, making natural regeneration difficult, Thus, as the virgin longleaf forests were harvested, few seed were available to regenerate the next forest. In addition, planting longleaf is more difficult because the "grass stage" seedling essentially has no stem. In addition, longleaf seedlings are inferior competitors. Weedy competition can retard growth, resulting in seedlings remaining in the grass stage for several years. However through current technology, the problems related to artificial regeneration have been, for the most part, overcome and landowners are able to successfully establish longleaf plantations. In addition, those landowners with existing longleaf stands can, through wise management, naturally regenerate most stands following harvest.

Another deterrent to the longleaf forest was the fire prevention effort instituted during the first half of this century (Croker 1987). Fire was considered evil and most thought at that time that it should be prevented at all costs. However, the longleaf forest is a fire-dependent ecosystem and the tree is very tolerant of fire during most stages of its development. Fire is important in preparing a proper seedbed prior to seed fall and germination. Fire is also important in controlling hardwood competition that impacts the survival and growth of longleaf seedlings. Many plant and animal species associated with longleaf are dependent on fire maintaining a savanna-like ground cover (Mean 1996).

Forest management was initiated primarily in response to the pulp and paper industry that moved into the South during the 1950's and '60's. This industry created jobs and markets for timber, and played a vital role in the South's post-Depression economy. Unfortunately for the longleaf ecosystem, the emphasis of this industry was – and is – on wood fiber production. Although longleaf growth rates are competitive with those of other southern pine species on most sites over periods of 30 years or more, the best return on forest investment for companies whose product requires only fiber comes from highly productive short rotation plantations, a kind of silviculture for which longleaf is not well suited. Tens of thousands of acres of abandoned cropland and cutover woodland were either deliberately reforested by planting slash or loblolly pine or naturally reseeded with these and other aggressive tree species, like sweetgum and water oak. The plant community associated with the fire-maintained longleaf ecosystem could not be sustained under these conditions and gradually disappeared, much like the prairies and savannas of the Midwest. Interestingly, a significant portion of the remaining longleaf has been conserved out of consideration for another natural resource of the longleaf ecosystem – bobwhite quail. Large quail-hunting reserves across the South began to use fire to manage the forest for that species in the late 1930s and continue that use today. As a result, some of the best remaining examples of the longleaf community exist on quail plantations.

Although fast growing species like loblolly and slash pine are ideal for the pulp and paper industry, many nonindustrial private forest landowners prefer longleaf pine forests for their timber value and associated ecosystem that is aesthetically pleasing and conducive to a diverse plant end animal community. However many of these landowners have not been able to readily obtain information and advice on longleaf management.

A relatively new organization, The Longleaf Alliance, was established in 1996 with the express purpose of coordinating efforts to restore longleaf and its accompanying ecosystem on lands where they are compatible with the objectives of the landowner. The vast majority of forestland acreage in the Southeast is privately owned (e.g., nearly 95 percent in Alabama). Consequently, the Alliance directors felt that the greatest opportunity to significantly reestablish longleaf forests was on private lands. The restoration of a fully functioning longleaf ecosystem appeals to landowners in varying degrees. Recognizing that intact longleaf forest ecosystems are not likely to ever dominate the southeastern landscape again, the Alliance has adopted the philosophy that "better is better," i.e., longleaf in any form is better than a cotton field; that longleaf and wiregrass are better than longleaf alone, that longleaf, wiregrass, and gopher tortoises are better than longleaf and wiregrass alone, etc.

THE LONGLEAF ALLIANCE

This initiative resulted from the recognition that interest in the longleaf ecosystem and the tree itself was growing rapidly. Ecologists, foresters, wildlife biologists, landowners and land managers were searching for information or for an outlet to distribute what they had learned. A growing body of anecdotal information, personal experience, and scientific data were being passed on fitfully and many publics were not being reached. The Longleaf Alliance was formed in an attempt to catalog and coordinate all of the initiatives currently underway and to serve as a clearinghouse for information on longleaf and longleaf forests for the general public.

The Longleaf Alliance is based at Auburn University's Solon Dixon Forestry Education Center in southern Alabama in the heart of the largest longleaf concentration left in the country. It is a nonprofit collaborative effort incorporating a broad community of similar interests in the longleaf forest system. Its structure is simple, its goals direct – the establishment of a functional longleaf forest ecosystem to the extent feasible in today's southern forest environment.

Recognizing and emphasizing the importance of both the economic and ecological value of the longleaf forest broadens the appeal of the Alliance and gives it credibility with both the scientific and private communities. Members include researchers, outreach providers, landowners and managers, tree nurseries, state and federal natural resource agencies, forestry and wildlife consultants, forest industries, and forestry service providers. The effort and the organization are regional in scope, and the Alliance now has members from every state in the longleaf region. The Alliance maintains and constantly updates databases on current longleaf-related research, longleaf seedling nurseries, forestry and wildlife consultants with longleaf expertise, and pertinent research and demonstration sites. The Alliance's first regional meeting was held in Mo-

bile, Alabama in 1996 and was attended by over 250 longleaf enthusiasts from across the region, representing virtually every southeastern natural resource perspective. **A second regional meeting will be held in Charleston, South Carolina in November of 1998**. Publications produced by the Alliance to date have included proceedings from the first meeting, a landowner's guide to management of longleaf forests, several research notes, and newsletters.

The Longleaf Alliance is funded through donations, memberships, and grants. Further information is available by contacting The Longleaf Alliance at Route 7, Box 131, Andalusia, Alabama 36420; or you may call 334/222-7779, fax 334/222-7779. You may also email Rhett Johnson at johnson@forestry.auburn.edu, Dean Gjerstad at gjerstad@forestry.auburn.edu, or Mark Hainds at hainds@forestry.auburn.edu. There is also a Longleaf Alliance home page at http://www.forestry.auburn.edu/coops/la/la.html and a longleaf list server accessed by leaving a message to listproc@alaweb.com. Leave the subject line blank, and in the body of the message include the following line: subscribe longleaf *Your Name.* Interested readers are invited to participate in the Longleaf Alliance and share in the recovery of this once magnificent resource.

Longleaf has a place in the southern forest for many compelling reasons. However, due to the severe decline in longleaf acreage, it is important that we act now if we desire to insure its continued presence and reverse the decline of this important component of our southern forest.

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Managing for Pine Straw

George D. Kessler, Professor of Forest Resources, Clemson University

Managing for pine straw is an underdeveloped enterprise in many parts of the southeastern United States, while in some areas such as North Carolina and Florida it is large and well developed. Any state within the natural range of longleaf and slash pine has the resource base for a pine straw industry.

The pine straw industry uses mostly slash and longleaf pine needles. There are many reasons why slash and longleaf needles are preferred. One is related to the custom of baling the needles as hay is baled. Longleaf and slash needles are longer and easier to bale. Other reasons are the light brown color and brighter appearance of slash and longleaf needles and their longevity as a mulch.

Slash pine occurs naturally in the southeastern counties of Georgia and South Carolina. The primary area for the tree is south of a line stretching from Myrtle Beach, South Carolina to Macon and

Columbus, Georgia. Longleaf pine occurs naturally in parts of the lower Piedmont area and in all areas south and east of the Piedmont in both states. This area is south and east of a line extending from Lancaster, South Carolina to Macon, Georgia, then northwest to Cartersville and west through Rome and on to the Alabama line.

Under natural conditions slash pine is found in the flatwoods area and along the edges of wetter areas. With the control of fire on the landscape slash pine has spread to drier sites and has been planted far beyond its natural range.

Many people think of longleaf pine as a dry site species. While the tree will grow on harsh, dry sites its natural range includes many other sites. The Latin name of the tree means "of the marsh". The tree will grow and reproduce right to the edge of marshland when fire is part of the management cycle.

Management Practices

Managing for pine straw requires *intensive management*. Economics and environmental considerations will require landowners to carefully select stands they plan to manage for pine straw.

Landowners can manage existing stands of slash and longleaf pine for straw production. Intensive management cannot be justified on sites with low productivity. These include sites with deep sand because of drought or sites where competition cannot be economically controlled. One additional guideline is to only use intensive management on sites within a species natural range.

A first step in managing for pine straw is the development of a management plan. A management plan should consider landowner objectives, time requirements, equipment needs, and income potential. Use a forester who is experienced or at least interested in pine straw production to prepare your plan.

Pine straw management involves several negative and positive points that a landowner should consider.

Negative points include a reduction of nutrients on poor sites, a reduction in water-holding capacity by the litter layer, and an increased erosion potential on moderately sloping lands. Another possible negative is the need for a clean uncluttered understory consisting primarily of pine needles. Some people contend maintaining a clean understory makes a pine stand a biological desert. Another possible negative is the need for a time consuming multiple operation management plan.

Positive points are the economic opportunity provided by selling pine needles as a crop, and after harvesting timber, greatly reduced regeneration costs because of the lack of competition. Other benefits include better selling prices for timber products because of the ease of logging sites managed for pine needles and the parklike appearance of well-managed stands.

Vegetation Control

The most important management practice for straw production in an existing pine stand is the control of understory vegetation. Raking areas containing materials other than pine straw can be difficult, and debris greatly reduces the sale price for the straw. Examples of undesired materials include the presence of leaves, limbs, cones and twigs.

Herbicides, mechanical removal and prescribed burning can eliminate trees, shrubs and other vegetation. In most cases a combination of these treatments over two or three years is necessary to prepare a stand for pine straw management. Once understory plants are under control burning is not a recommended practice.

Let's look at a possible management plan to renovate a pine stand for straw production. The first step could be to control as many of the trees as possible with chemicals. Depending on the species present, possible chemicals include Garlon, Velpar, Arsenal, and Accord. After the trees have died, they are either piled and burned or piled and removed with a grapple skidder. Some owners grub out persistent

sprout clumps and smooth out the area with a landscape rake. Once the understory vegetation is under control maintaining a dense canopy and the periodic use of herbicides will keep sprouts and vines under control.

Vegetation control usually is not a problem in newly established plantations. While competing vegetation will exist during the early years, the amount on the site will be reduced as the pines become larger and shade out the competition. There may be a need for spot treatment of understory vegetation. Chemical or mechanical treatments are recommended; fire is not because it would remove the first needle crop.

The complete elimination of understory trees, shrubs and grasses results in stands with little wildlife benefit. This would be a problem if a large contiguous acreage were managed in this fashion. The intensive management of scattered small acreages would allow for diversity and eliminate this problem.

Stand Density

Before continuing we need to become familiar with a common forestry term, basal area. A 14-inch tree has a cross section area equal to a square foot. An acre with 100 trees 14 inches in diameter would have 100 square feet of tree cross sections. Foresters use the measurement of tree cross sections to measure stand density. They call the measured cross sections of trees on an acre basal area. An acre with 100 square feet of tree cross sections has a basal area of 100.

When needles are a desired crop, stand density rules are dramatically changed from those used for timber management or for wildlife management. For example, assume all the trees on an acre are 14 inches in diameter.

With wildlife management we might want 50 to 60 trees per acre or a basal area of 50 to 60. This low density would encourage understory plants and would increase the amount of food available for wildlife.

With timber management; we would want a basal area of 70 to 80 (with 14-inch trees, 70 to 80 trees per acre). This would be a heavier density but it would still give every tree room for its needle area or crown to grow. The amount of understory plants would be less than in the area being managed for wildlife.

When managing for needles the area would have a basal area of 90 or more. The increased density would result in more shade on the forest floor which would lead to fewer plants in the understory.

In plantation settings it is common to plant several hundred trees per acre. This forces the trees to compete with each other and other plants on the site. The large number of trees can effectively shade out other plants but can result in heavy competition among the pines and impede raking operations. Preparing existing plantations for needle production will often require removing some of the trees. Removing every sixth row and thinning other rows will provide access and allow equipment flow. Natural stands are more difficult to thin to improve equipment flow. In both cases, stand density is kept at 90 feet of basal area or higher to minimize hardwood invasion.

Landowners planting new longleaf or slash plantations should set the trees at a 6 x 12 foot spacing. The wider rows will allow mechanized raking. This spacing allows 605 seedlings on each acre. Longleaf survival is not as good as for some other pines. At least three hundred well-spaced trees per acre should be present at the end of the second year.

Increasing Yields

Straw production will increase with fertilization. Fertilization is beneficial on most fully stocked young to middle aged stands. However, in some cases there is an increase in the number of unwanted perennial plants that invade a site. Two commonly used programs in North Carolina use 200 pounds of diammonium phosphate or 100 pounds of ammonium nitrate and 100 pounds of triple super phosphate per acre. Applications are best made after the tree crowns are touching each other and every three years thereafter. Fertilizer treatment should occur before the growing season begins. A more accurate fertilizer recommendation can be provided by testing the soil and/or tree foliage for nutrient levels.

Harvesting the Straw

Raking quality straw requires an area that is clear of twigs, limbs and cones. One way to accomplish this is to move through a stand and pile these items at the base of some of the trees. This provides the least impact on the production system. The resulting increase in straw quality makes it a higher priced item.

Raking can be done by hand or machine. With hand raking, straw piles are made in more open areas. With machine raking a mechanical rake moves the straw into windrows. Machine raking systems have high production rates. A disadvantage is that machinery can damage the trees. This is less of a problem in plantations where the trees are well spaced for straw production or where operators use the smaller European rakes and balers.

Baling pine straw is done either in the woods or at a buying station. Buying stations bale straw that is hauled to them. They pay by the number of bales produced. Woods baling can be done by hauling a baler from pile to pile and hand loading the baler or pulling the baler along wind rows. Production rates when going from pile to pile average 300 bales per day. When baling windrowed needles production can be 1000 bales per day.

Yields of Pine Straw

There are many factors that influence yield. One of these factors is tree age. In general, trees will not produce very much straw until they are 10 to 12 years old. Assuming a constant density over time, trees will be at their high in needle production from age 20 to 40.

The size of the tree crown is also a factor. A stand should have at least 25 percent of tree height as live crown. Smaller crowns are acceptable if the stand is dense enough to discourage understory growth.

Basal area also influences straw yield. Basal area levels should be at 80 square feet and above for young stands and increase as stand age increases.

Tree vigor is a factor that reflects the quality of the site. While longleaf pine will grow on deep, droughty sands, the yield will be low. However, even poor sites will produce some straw.

Other factors influencing yield are raking efficiency, the time interval between raking, and the size of the bale.

There are very few standards in the pine straw business. This is especially true with the weight of a bale of straw. The weight varies because of differences in packing density as well as the size of the bale. For this article a pine straw bale will be 40 pounds.

Increasing the time interval between raking up to three years increases the yield for each raking. Yield decreases at intervals of more than 3 years as needles are lost to decay. On good sites raking pine straw every other year will provide 120 to 160 bales per acre at each raking. This is an average annual yield of 60 to 80 bales per year. Raking on poorer sites needs to be done with less frequency. If raked every four years, the average annual yield will be 20 to 40 bales per acre per year. Raking highly managed quality sites once every two years can yield 100 bales per acre per year.

Selling Pine Straw

People sell pine straw in many ways. Some sell by the bale. Others sell by the tract. Others rake their own straw and sell direct to the public. The seller should consider all of these methods. A seller should use marketing techniques like competitive bids, well-defined sale areas and marketing contracts to protect themselves and to get the best price. Prices at baling stations ranges from $1.50 to $2.50 per bale. Prices by the boundary can be as high as $250 per acre for a first raking. A more typical price for a good site would be $150 per acre for areas raked every two years.

Needle fall is from late summer to early winter. Most pine straw raking is done during the cool winter season, but straw can be raked any time during the year.

Summary

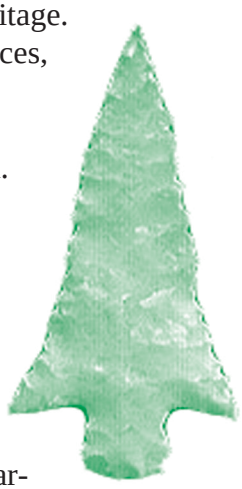
Pine straw will on many sites account for more income for the landowner than the timber itself. Disadvantages can be minimized or eliminated with good management on most sites. Pine straw management is similar to many agricultural operations

where crop removal is quite frequent. It requires a higher level of management and a higher level of inputs than timber management. Any landowner with longleaf or slash pine trees should consider pine straw as a crop.

Preserving Native American Heritage

Bob Franklin, Clemson University Cooperative Extension Service & Chris Judge, South Carolina Heritage Trust Program

University of South Carolina college instructor Chris Judge is often asked many interesting questions by his students about South Carolina, the South, and its archaeological heritage.



The South is rich in many resources, and one of the most unique and endangered is our historic and prehistoric archaeological record. This record is reflected in the locations where activities of the past took place. As states like South Carolina seek and find opportunities for development, our record of the past has come under increased danger. Archaeological sites are disappearing rapidly and everyone needs to do his part in conserving the remaining sites for the future. Here are some of the most often asked questions about our archaeological heritage.

What is an archaeological site?

An archaeological site can be any area (including buildings) that is more than 50 years old. Sites fall into two broad categories: historic and prehistoric. Historic sites are ones that appear after written history–a Civil War battlefield or old home place could qualify. Prehistoric sites, on the other hand, are sites that occur before written history. In North America these are the locations where native Americans were active. Both types of sites are found in South Carolina and both are endangered.

How do I know if I have a site on my property?

Sites come in all shapes and sizes and are often difficult to locate. For prehistoric sites, broken shells, small pieces of pottery, stone flakes or "arrowheads" may indicate the presence of a site. Old foundations, broken glass, pieces of metal, collapsed walls and chimneys often show the location of a possible historic site. If you have anything on your property that falls into one of those categories, or if you find an object that is "out of place" with its surroundings, you need to have it examined by a professional archaeologist.

Why should we want to conserve our state sites?

Sites are fragile and are easily destroyed by the natural weathering process and by activities of modern development. Once a site has been altered or destroyed it is gone forever and cannot be renewed. Each site (historic and prehistoric) has its own unique story to tell; the archaeologist is just the interpreter of the story. But to tell the story truthfully, the archaeologist must study what was left behind. These left-behind items are artifacts and the archaeologist wants to know when, how and why the artifacts were used. If the artifacts get moved around on the surface of the ground, destroyed, or looted, then the story becomes incomplete, inaccurate, or at worst, impossible to tell. Since there are a fixed number of sites (almost 20,000 in South Carolina), each time a site is altered in some fashion the story of South Carolina's past becomes more difficult to tell.

Do the archaeologists get to keep the artifacts for themselves?

No. The artifacts found on a site are studied, photographed, cleaned and reconstructed for display or storage in a state museum or state repository. In some cases the artifacts are returned for reburial. Many times the archaeologist only excavates that part of the site which is endangered.

If I locate or suspect a site on my property, what should I do?

There are several organizations ready to assist landowners in just about any state. Teresa Paglione, cultural resources specialist with the Natural Resources Conservation Service in Alabama says, "The NRCS has a Conservation Reserve Program that promotes good stewardship for the land. Through this program landowners are awarded points to qualify, so there is an advantage to having a site on your property." If a landowner is receiving technical advice from NRCS or is enrolled in a

cost-share program, NRCS helps administer (like CRP), then the landowner may call on the agency to look at a site that may have archeological significance.

At the state level the South Carolina Institute of Archaeology and Anthropology at the University of South Carolina stresses the need to conserve the sites.

Another voice that is urging conservation is South Carolina's Department of Natural Resources Heritage Trust Archaeologist, Chris Judge, "Take part is South Carolina Archaeology Month activities held each year in September, report sites to the State Archaeologist and never disturb archaeological sites or remains."

What if I find or suspect that I have human remains on my property?

Anytime you accidentally find human remains on your property you need to call your local sheriff's department immediately. Unfortunately, in today's world, many times the remains turn out to be of recent origin and may be involved with criminal activity. Both the police and the archaeologist need to have the remains left in place if they are to tell the complete story. If it is determined that the remains are historic or prehistoric, then the archaeologist will be consulted. Also remember that disturbing human remains is not only improper, but unlawful.

How can I learn more about South Carolina archaeology?

You can learn more about general archaeology from your local library. The Archaeological Society of South Carolina sponsors Archaeology Month in September. You can also enroll in archaeology courses at the College of Charleston, the University of South Carolina-Columbia, the University of South Carolina-Lancaster, and Midlands Technical College. Both the College of Charleston and the University of South Carolina-Columbia offer summer field schools in archaeology where students can learn scientific field investigation techniques.

If you wish to see artifacts and learn more about South Carolina's history, you may visit the Charleston Museum in Charleston, the State Museum in Columbia, and Keowee State Park in Pickens County, or any of the state's parks that highlight our heritage.

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Adapted from an article by Dr. Bruce Bizzoco, Shelton State Community College, Birmingham, Alabama, that appeared in the Winter 1998 issue of Alabama's Treasured Forests.

South Carolina's Forestry BMPs: Implementation Monitoring Results

Darryl Jones, South Carolina Forestry Commission

Timber harvesting, site preparation, and regeneration occur regularly on private lands in South Carolina. Since 1991, the South Carolina Forestry Commission has been conducting monitoring surveys to determine if forestry Best Management Practices (BMPs) are being implemented when forestry activities occur. Simply put, forestry BMPs are forestry practices designed to minimize and prevent non-point pollution resulting from forestry activities. In contrast with point-source pollution, where the source is usually easily identified, it is

often difficult to determine the cause of non-point source pollution. The most common type of non-point source pollution resulting from forestry is sediment that moves from the site, into streams and rivers, and degrades water quality. The South Carolina Forestry Commission published *South Carolina's Best Management Practices for Forestry* in 1994 to provide landowners, foresters, and other land managers with a set of guidelines to follow in order to reduce and prevent non-point source pollution.

Implementation monitoring begins by locating recently harvested areas from the air. The landowner of each monitoring site is contacted to acquire permission to evaluate the harvesting operation. A landowner questionnaire is completed, and the site visit is conducted, where each applicable area of the BMP manual is evaluated. These areas include streamside management zones (SMZ), stream crossings, forest road construction, and timber harvesting. In the 1991 survey, overall BMP compliance was 84.5 percent, and the major problems noted during the survey were the harvesting of SMZs and deep rutting. In 1993, compliance rose slightly to 84.7 percent and the major problems were a lack of protection for perennial streams, and logging during wet soil conditions. The 1994 survey showed a rise in compliance to 89.5 percent, and the major problems noted were that the SMZ was cut, skid trail stream crossings were improperly designed, and logging occurred under wet conditions.

In the summer of 1997, another round of implementation monitoring was begun. In this survey, 200 recently harvested sites around the State were evaluated for BMP compliance. Landowners were grouped into four categories–small private landowners (<1,000 acres), large private landowners (>1,000 acres), industrial landowners, and public landowners. After the evaluation, each site was given an overall rating of excellent,

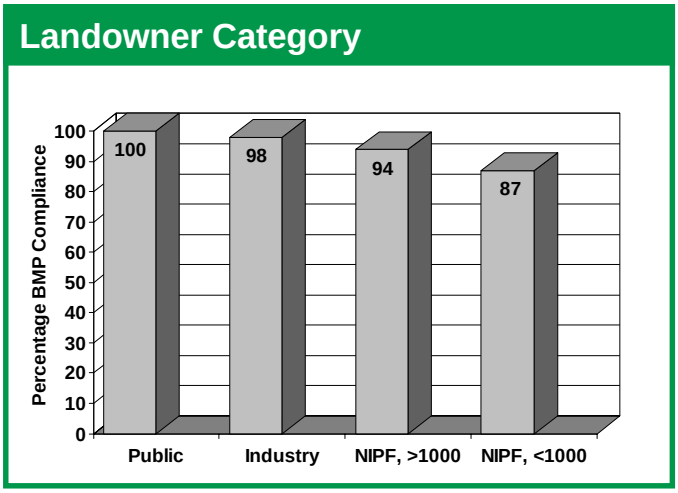

Figure 1. BMP Compliance by landowner category in the 1997 monitoring survey.

adequate, or inadequate. In this survey, the overall compliance was 91.5 percent, and the major problems noted were the harvesting of the SMZ, excessive woody debris left in the stream channels, and poorly designed skid trail stream crossings. The graph in figure 1 illustrates BMP compliance by landowner category.

When a written sales contract was used during the timber harvest, BMP compliance was 94% percent, compared to 65 percent compliance when there was not a contract. When a professional forester was used in the sale of timber, BMP compliance was 94 percent. In contrast, when there was no forester involved, the BMP compliance was 79 percent. In

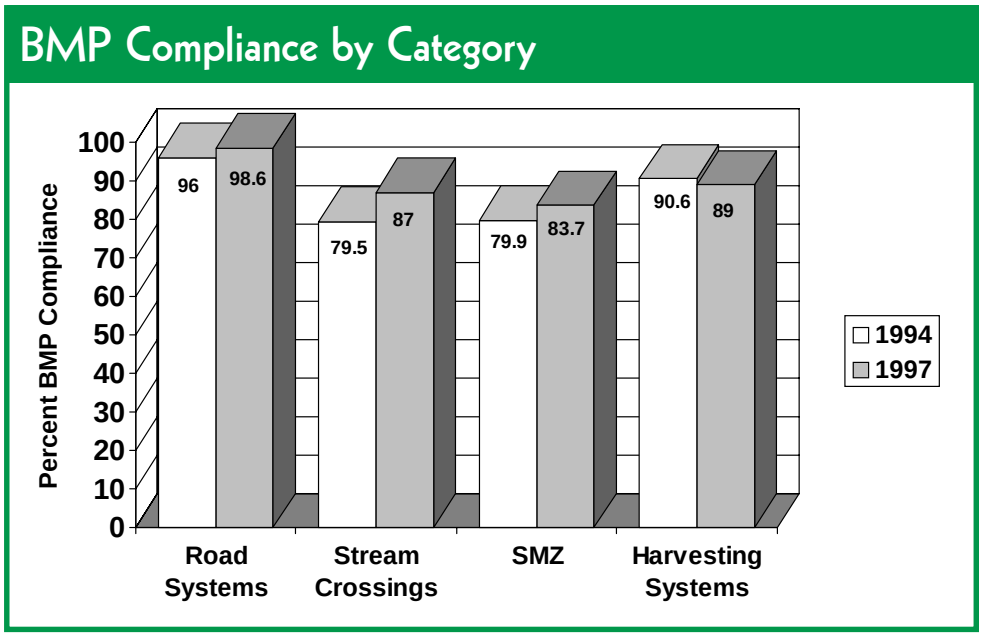

Figure 2. BMP Compliance by category, 1994 and 1997 monitoring surveys.

Upcoming Events

Meetings

September 16	South Carolina Forestry Association's Board of Directors Meeting, Columbia, South Carolina.
September 29, 30	Uneven-Age Forest Management Workshop. Sept. 29 for Foresters, Sept. 30 for Landowners. Old School, Blackstock, SC. Contact Phil Epps at 803/276-1091.
October 1	SC Tree Farm '98 Awards Ceremony & Field Tour. C. Randell Ewing's Tree Farm, Society Hill, SC.
October 18-21	National Symposium on Horse Trails in Forest Ecosystems, Clemson University. Contact Gene Wood at 864/656-0319.
November 4-6	South Carolina Forestry Association's Annual Meeting, Hyatt Regency, Savannah, Georgia.
November 12-15	National Tree Farm Convention, Hyatt Regency Hotel, Savannah, Georgia. "Growing Greener Horizons." Contact American Forest Foundation at 770/451-7106. Pre-Convention Tree Farm Tours: November 10 - ReBluff Plantation in Jasper County, November 11 - Cypress Bay Plantation in Hampton County. Contact above number.
November 17-19	Second Biennial Longleaf Alliance Conference, *Longleaf Pine: A Forward Look*. Charleston Sheraton, Charleston, SC. Contact the Longleaf Alliance at 334/222-7779.
November (TBA)	Jasper County Forestry and Wildlife Management Association Fall Plantation Tour. Contact Bob Franklin at 843/549-2595.

Landowner Association Meetings

October 5	McCormick County Landowner Association Meeting. Urban Forestry. Edmond & Callie's on Main Street.
October 6	Fairfield Forestry Association Meeting. Fish Pond Construction & Management. Winnsboro County Extension Office. Call 803/635-4722.
October 15	Hampton County Forest Landowners Association Meeting. Forum on Legislative Issues Related to Forestry with Senator Bob Inglis. Contact Norris Lafitte at 803/943-3334.
October 19	Kershaw County Forest Landowners Association Meeting. Sustainable Forestry. Call 803/432-9071.
October 26	Union County Woodlands Association Meeting. Timber Harvest Value/Forest Economics. Union County Extension Office. Call 864/427-6259.
November 3	Chester County Forestry Association Meeting. World Forestry Economics/ Imports/Exports. Pundt's Restaurant. Call 803/385-6181.
November 9	Laurens County Forestry Association Meeting. CRP Pine Management. Laurens County Extension Office. Call 864/984-2514.
November 10	Newberry County Forestry Association Meeting. Timber Harvesting Equipment. Back Porch Restaurant, Prosperity. Call 803/276-1091.
November 10	Greenwood County Forestry Association Meeting. Timber Taxes. Call 864/229-6681.
November 16	Abbeville County Landowners Association Meeting. Urban Forestry. Abbeville Agricultural Building.
November 17	Chesterfield County Forestry Association Meeting. Fish Pond Management. Chesterfield High School Cafeteria. Call 803/623-2134.

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the 1997 survey, BMP compliance rose in each of the broad categories examined except for harvesting systems. This broad category addresses the timing of the harvest (during wet conditions, etc.), matching the equipment used to the site (single-tired skidders vs. high flotation equipment), and skid trail design and placement. The graph in Figure 2 compares BMP compliance in each category in the 1994 and 1997 monitoring surveys.

BMP compliance has continued to rise in each successive monitoring survey. This rise is due to educational efforts aimed at loggers, foresters, and landowners throughout the state, and because of the strong commitment of forest industry to reducing the environmental impacts of their activities. Upon request, the South Carolina Forestry Commission will conduct a courtesy BMP exam to landowners that are considering a timber sale on their property, and recommendations specific to their property will be given.

Questions about this newsletter, submissions and requests for subscriptions should be directed to: Editor, *Forest Steward* Newsletter, Clemson University Cooperative Extension Service, Department of Forest Resources, 272 Lehotsky Hall, Box 341003, Clemson, SC 29634-1003. Phone: 864/656-2479.

The Forest Steward

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The South Carolina Forest Steward Newsletter is sponsored by the Forest Stewardship Program in South Carolina. For more information on the Forest Stewardship Program, contact Ron Ferguson at the South Carolina Forestry Commission, 803/896-8846. *The South Carolina Forest Steward* is compiled and edited by Larry Nelson, Extension Forester at Clemson University, and Bob Franklin, Area Forestry & Wildlife Agent, Walterboro, South Carolina.

SOUTH CAROLINA FORESTRY COMMISSION