Intensively-Managed Pine Plantations

Barren Wastelands? or... Potential Deer Habitat?

Ongoing research at Mississippi State University.

By Scott Edwards, Steve Demarais, and Andy Ezell

If you are like many deer hunters in the Southeast, your primary hunting area is leased from forest products companies or timber investment management organizations (TIMOs). Most of the time, your hands are tied when it comes to improving habitat quality — prescribed burning is out of the question because you might damage the pine trees, and you are limited in the size and locations of food plots. So, the forest management practices used on the land where you hunt can have a strong influence on the quality of habitat available for deer.

Many hunters believe that a pine stand managed intensively for timber cannot produce quality deer habitat. This is not necessarily true, but certainly some stand development stages provide higher-quality habitat than others. For example, a recently-thinned pine stand with an open canopy is generally better deer habitat than a densely-stocked, seven-year-old stand. The difference is sunlight — most of the higher-quality plants that deer prefer, like forbs and legumes, require direct sunlight to grow, and there are certain management practices that forest products companies and TIMOs can use to improve overall habitat quality for deer (for more information on late-rotation management, see the article "Quality Vegetation Management," *Quality Whitetails*, August 2003).

One time period during a timber rotation that has generated concerns from hunters — and deer biologists — is the early years following planting. The years between planting and when pine limbs close together, usually around age eight, historically produced good deer habitat because of the abundance of food and cover that grows in direct sunlight. During the 1990s, however, more and more intensive practices developed, including the use of tank-mixed herbicides for site preparation and tree release. These management tools were used to control competing vegetation and give the pine trees a survival and growth advantage. Unfortunately, many of the plants that compete with pine trees

"All that is green is not deer food, and all

Strategy Descriptions

Low Intensity

1 MECHANICAL SITE PREPARATION
Banded herbicide (Year 1)

2 CHEMICAL SITE PREPARATION
Banded herbicide (Year 1)

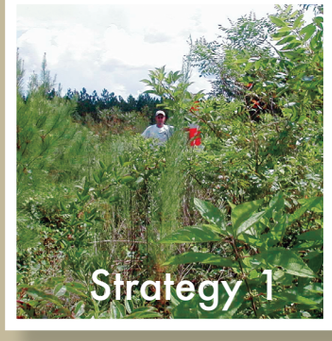
3 MECHANICAL + CHEMICAL SITE PREP
Banded herbicide (Year 1)

4 MECHANICAL + CHEMICAL SITE PREP
Broadcast herbicide (Year 1)

High Intensity

5 MECHANICAL + CHEMICAL SITE PREP
Broadcast herbicide (Years 1 and 2)

These photos helped document vegetation densities two years after various site-preparation regimes in pine plantations. To the eye, Strategy 1, the least chemically intensive, looks to be the best producer of deer food, but in terms of crude protein and digestibility, Strategy 3 actually produced the highest deer carrying capacity. Though it appears extremely lush, Strategy 1 actually produced the lowest carrying capacity.



Most of the strategies involved mechanical site preparation, including clearing, subsoiling and bedding (left, top) before planting. Herbicide treatments ranged from 50 percent coverage with banded spraying over rows to 100 percent coverage with broadcast spraying from a helicopter (left, bottom).

during those early years, like herbaceous forbs, legumes, and woody shrubs, are the very plants that deer need to eat!

GROUND ZERO

BACK IN THE mid-1990s, hunters and wildlife biologists throughout the Southeast began to be concerned that pine-plantation management intensity had reached a level that significantly limited forage production and wildlife habitat quality. Timber prices were high, timber sales from public lands were declining, and forest products companies were "pushing the envelope" to maximize timber productivity on their lands. Intensive site preparation and tree-release treatments sometimes created stands of mostly pine trees that some people described as a "barren wasteland" or "ecological desert."

Representatives from the National Council for Air and Stream Improvement, foresters and biologists from the forest products industry, professors from Mississippi State University and the University of Georgia, and biologists from the Mississippi Department of Wildlife, Fisheries, and Parks met together in early 2000 to discuss the effects of intensive timber management during stand establishment on wildlife habitat quality. We wanted to work together to design a research project evaluating how these management practices affected wildlife habitat quality, especially deer habitat, and identifying different ways that managers can produce rapid pine growth and high-quality deer habitat at the same time.

Given that forest products companies and TIMOs are going to manage their stands in some fashion during the establishment stage, we looked at five management strategies, ranging from low to high intensity, with different combinations of mechanical and chemical site preparation along with herbaceous weed control (see the strategy descriptions above). These strategies represented a range of operational intensities that were available to forest managers and allowed us to compare the resulting habitats from a deer management perspective.

PUTTING IT ON THE GROUND

WE BEGAN OUR research in 2001 with Molpus Timberlands, Plum Creek Timber Co., and Weyerhaeuser Co. providing four study areas and all of the costs associated with implementing these management strategies. Our research was in south Mississippi where intensive pine management is common and deer may already be nutritionally limited by lower-quality soils. The vegetation on these stands was typical of the Mississippi Lower Coastal Plain, a physiographic region with low fertility and acidic soils that is sometimes referred to as the "piney woods" due to the prevalence of longleaf, shortleaf and loblolly pine. Each of the five management strategies included a site preparation and tree-release treatment designed to decrease vegetative competition with pine trees, manage logging debris, improve soil conditions, and facilitate seedling planting. We applied each of the management strategies to every study area to eliminate any potential bias

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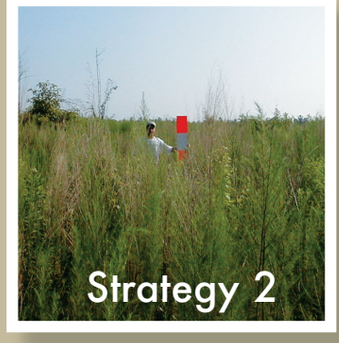

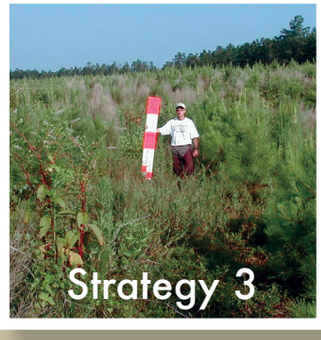

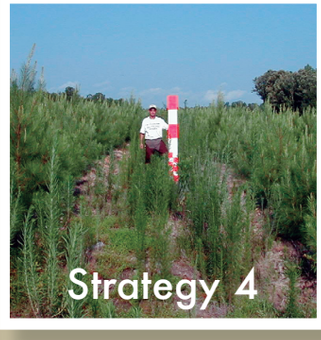

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from previous management or any site differences.

We applied the chemical site preparation during the summer of 2001 using a mixture of 32 ozs./acre Chopper® Emulsifiable Concentrate, 1.5 qt./acre Accord®, 1.5 qt./acre Garlon 4, and 1 percent volume-to-volume ratio of Timberland 90 surfactant in a total spray solution of 10 gallons/acre.

The mechanical site preparation was conducted during the fall of 2001 using a combination plow to subsoil, till and bed, pulled behind a tractor with a V-blade attached to the front to clear debris. We planted loblolly pines at a 10x7-foot spacing (628 trees per acre) and fertilized with 250 lbs./acre of DAP (diammonium phosphate or 18-46-0) during the spring of 2002. Depending on the treatment, banded or broadcast herbaceous weed controls were applied during the springs of 2002 and 2003 using 13 ozs./acre of Oustar® to control competing vegetation and promote tree growth. The banded application was centered on the row of pine trees and essentially covered 50 percent of the area. The broadcast application was applied by a helicopter and covered 100 percent of the area. We sampled each area during the summers of 2002 and 2003, years one and two post-planting.

During the first year following planting, the percentage of ground covered by plants, or understory cover, decreased as management intensity increased (see page 26). This made sense — the more intensive the site preparation, the less deer forage was available. Strategies 1, 2, and 3 were very similar during year one and ranged from 27 to 43 percent cover. This is interesting because we did not expect them to be so similar given that Strategy 1 was

Scott Edwards' graduate research at Mississippi State University focused on how forestry practices affect wildlife habitat quality, specifically deer forage production. Here, Scott is shown collecting plant samples from one of his test sites.

mechanical site prep only and Strategy 3 was a combination of mechanical and chemical. Strategies 4 and 5 reduced understory cover to lows of 6 percent because they involved broadcast herbaceous weed control.

Vegetation re-colonized during the second year, and the amount of understory cover increased dramatically within most strategies (see page 26). Strategy 1 produced a high of 116 percent understory cover (understory cover can be greater than 100 percent because the canopies of some plants overlap). Strategies 2, 3, and 4 were very similar and ranged from 82 to 96 percent. Strategy 5 had the lowest understory cover at 27 percent, which is typical of very intense management involving combination site preparation and two years of complete herbaceous weed control.

Previous research tells us that the effects of site preparation on plant communities are relatively short-term, generally reducing growth in these communities for only two to three growing

seasons. Our research supports this, because we saw increases in understory cover in all major forage classes during the second growing season. Of particular interest were the increases in forbs and legumes in Strategies 3 and 4, which more than doubled during the second growing season. These plant species are the higher-quality forages preferred by deer — needless to say, we were glad to see these increases. Strategy 4 had the greatest overall increase in understory cover during the second growing season. This is important because it tells us that an intensive management regime such as Strategy 4 could still provide similar amounts of vegetative cover to that of a lesser intensive management regime within two growing seasons.

QUANTITY VS. QUALITY

KNOWING THE AMOUNT of forage available to deer is important but it does not tell us anything about the quality of the forages — how nutritious they are. Thus, we decided to look at deer habitat quality in terms of nutritional carrying capacity. We estimated the number of deer that could be supported under each of the management strategies assuming an average diet level of 12 percent crude protein. A diet averaging 12 percent crude protein is below the optimum level of 16 percent protein, but it allows direct comparison of nutritional habitat quality among the management strategies.

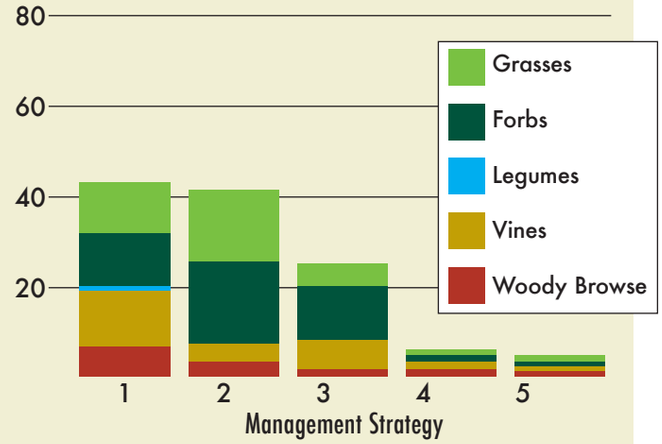
We collected leaf samples from the predominant plants within each strategy and analyzed them for their percent crude protein and digestibility. We used this quality information along with plant biomass within each treatment to give us an estimate of the growing-season nutritional carrying capacity.

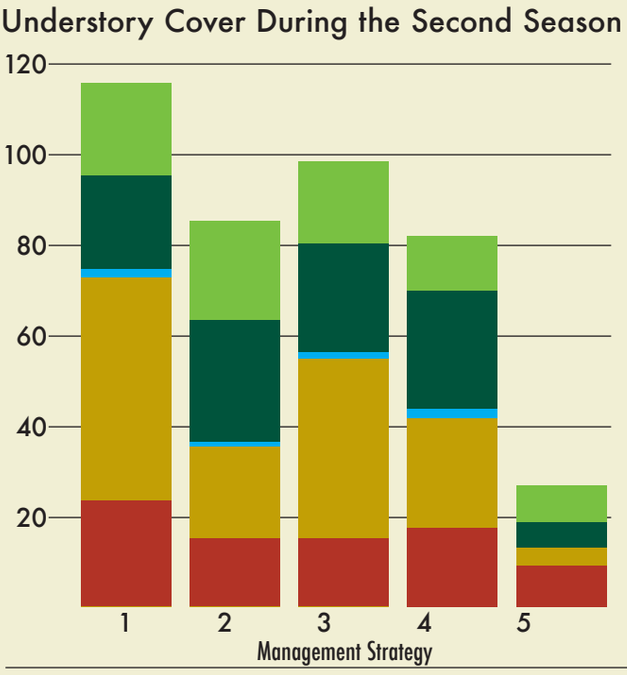
During the first growing season, all of the strategies provided similar but low nutrition carrying capacities of zero to five deer-days of foraging per acre. In other words, given the amount and quality of the forage available during the growing season, between zero and five deer could eat a diet averaging 12 percent protein for one day on one acre.

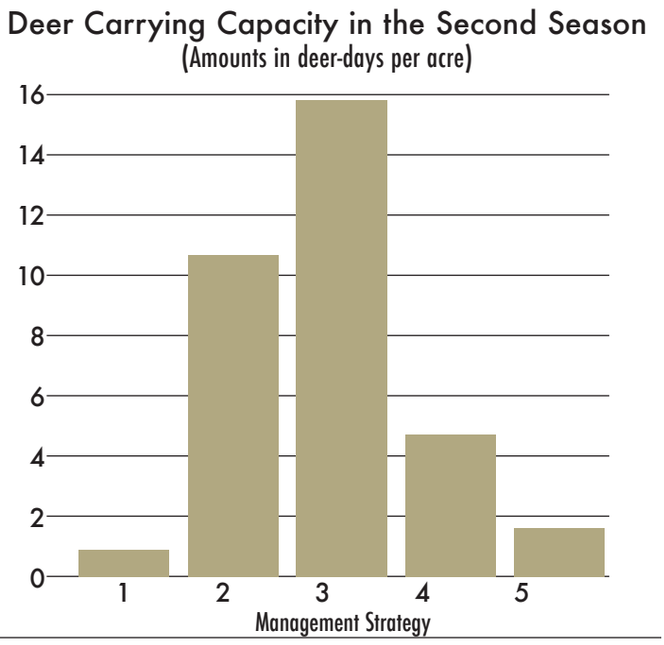
We already knew that areas receiving less-intensive management provided the most deer habitat because the remaining vegetation was available as forage. Thus, we predicted that these strategies would also provide the best deer habitat during the second growing season. Boy, were we surprised.

Interestingly, Strategy 1, which received the least-intensive management, did not provide the best deer habitat from a nutritional standpoint (see chart below). By the end of the second growing season, Strategy 1 was dominated by large amounts of potential deer browse — but of very low quality. In fact, Strategy 1's nutritional carrying capacity was equal to that of Strategy 5, which received the most intensive management. Having an abundance of vegetation does not necessarily mean that the available forage is nutritious. A good point to remember: all that is green is not deer food, and all that is deer food is not quality deer food.

The best deer habitat during the second growing season was provided by the moderately intensive Strategy 3 at 16 deer-days/acre. Strategy 3 included mechanical and chemical site preparation and one year of a banded herbaceous weed control.







We believe the mechanical disturbance promoted plant growth much like a tilled strip used in quail management. The chemical site preparation greatly reduced the prevalence of the woody browse plants normally considered important for deer. But, their removal made sunlight, water and nutrients available for higher-quality forbs and legumes. Deer are known to select areas with large amounts of high-quality forages, so it is possible that stands receiving management similar to Strategy 3 may accommodate more deer use during the second growing season.

THE BIG PICTURE

FOREST PRODUCTS COMPANIES and TIMOs own millions of acres of forestland in the Southeast, much of which is managed intensively and also leased for hunting. Although primarily concerned with establishing a crop of trees that maximizes economic return, these landowners also care a great deal about how their management affects wildlife habitat. Programs such as the Sustainable Forestry Initiative® (SFI) ensure that forest managers give proper attention to the environmental effects of their management. Because of this research, we now know more about the relationship between intensive pine plantation management and deer habitat quality during the first two years following planting. Mississippi State University is continuing this study to provide more information as these pine stands grow toward canopy closure.

The reality is that there are times during a rotation when pine plantations will not provide all of the resources necessary for deer to thrive. Habitat quality varies in each stage of stand development in the rotation, thereby providing different wildlife management challenges and opportunities. It's the job of resource managers to use different techniques as plantations develop and to manage stands across the landscape to ensure that habitat quality remains at an acceptable level for a deer population. This research gives us great insight into how we can manage the earliest stage in a pine plantation's life to maximize deer habitat and ensure that we do not produce a "barren wasteland."

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