A BIRD'S-EYE VIEW OF DEER HABITAT QUALITY

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Research shows that regional land-use trends influence deer antler size: Habitat management on your hunting land will produce more quality whitetails.

By Dr. Bronson Strickland, Dr. Steve Demarais, and Chad Dacus

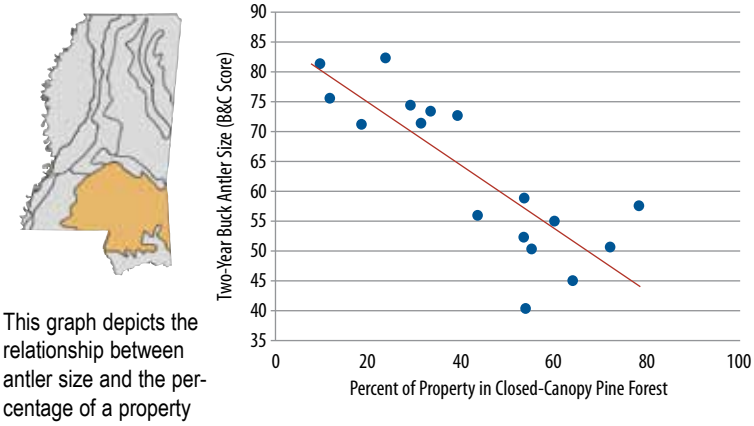
Most QDM'ers are aware of the variation in body and antler size of whitetails throughout their range in North America. On average, deer harvested in Wisconsin are larger than those harvested from Florida. This is largely due to genetics that code for larger bodies in the colder, northern environments, and smaller bodies that more efficiently thermoregulate in the warm environments of the South. This genetic predisposition coupled with differences in food quality and abundance generally explains why bigger deer are associated with certain regions of North America. With this in mind, it's no surprise that Iowa and Illinois consistently produce some of the largest bucks each year.

But have you ever wondered why there is so much variation in deer body and antler size within a geographic region? Like many states in the Southeast, Mississippi has areas that are known for relatively larger deer (for example the Delta region) and smaller deer (the Lower Coastal Plain), but within these regions there can be significant variation in the quality of deer produced. Why? Could subtle, local variations among habitats affect physical variation among deer? This information would be most helpful in making practical habitat management decisions.

Beginning in 2000, deer biologists with the Mississippi Department of Wildlife, Fisheries and Parks cooperated with the Deer Ecology and Management Lab at Mississippi State University to answer this question. We digitized the boundaries of more than 200 private properties and state wildlife management areas from across Mississippi into a Geographical Information System (GIS) and looked for underlying patterns in soil quality and habitat configuration. We compared these land characteristics to the average antler size of 2½-year old bucks harvested from each location. In addition, because deer harvested in one area likely used vegetation outside the property boundary, we added a 1/2 mile buffer around the property boundary and included those habitat characteristics in our analysis.

We calculated average antler size (Boone & Crockett Score) for bucks harvested on each property from 1991 to 1994 to coincide with satellite imagery from that time period, yielding 203 populations for analysis. We used 2½-year old bucks for our analysis because that age class provided the largest sample for each property (this time period was prior to widespread application of QDM buck harvest principles in Mississippi and the statewide

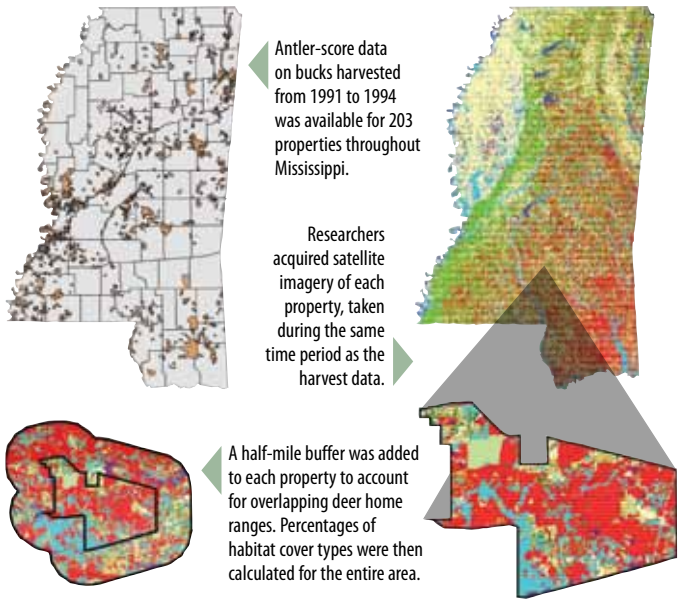
Antler Size in Relation to Closed-Canopy Pine Forest



This graph depicts the relationship between antler size and the percentage of a property in closed-canopy pine forest. Blue circles represent findings for individual properties that were analyzed, all located in Mississippi's Lower Coastal Plain region (indicated on the map). The red line is the average of all the properties together. The trend is clear: the greater the percentage of a property covered by closed-canopy pines, the lower the average gross antler score for 2½-year-old bucks. As seen in the adjacent photo, little or no forage is produced in this forest type.

antler restrictions). Next, for each property we gathered satellite imagery data that characterized variation in deer habitat quality. These habitat variables included percentage of the property in: agriculture, fields, bottomland hardwoods, upland hardwoods, high-density pine trees (i.e., pine plantations), low-density pine forest (like older long-leaf pine forests), and clearcuts. Also, we looked at overall habitat diversity. The resultant dataset contained the average antler size of 2½-year old bucks and the percentage of each vegetation class present on each property, yielding valuable information about land-use characteristics that are most related to antler size.

Studying The Effect of Habitat Quality on Antler Quality



Land-Use and Antler Size

Our results clearly demonstrated that in landscapes dominated by dense forests, land-use types that promote the growth of forbs (broadleaf plants browsed by deer) and associated groundcover plant communities should positively influence deer habitat quality and antler size (and likely body size and reproduction as well).

The percentage of a property in agriculture, or agriculture and field, positively influenced antler size in some regions; conversely, the percentage of a property in pine forest negatively influenced antler size in some regions. The results varied somewhat by region, but in all regions studied, properties with a greater percentage of medium- and high-density pine forests tended to have smaller antler size. The Lower Coastal Plain region in southern Mississippi displayed some of the most striking relationships, with a half-inch decline in population antler size with each 1 percent increase in high-density pine forest. So, for example, a property in that region with 20 percent more closed-canopy, high-density pine forest than surrounding properties would have a 10-inch smaller average antler size. Properties that are dominated by closed-canopy pine forests simply do not provide enough quality forage for deer.

So what about hardwoods? Believe it or not, the effect of high-density, closed canopy hardwoods had an effect similar to that of pine forests. That is, if the forest is so dense that light can't reach the forest floor, it doesn't matter what type of trees are in the forest. Having an open-canopy forest that promotes the growth of knee-high vegetation for deer food and cover is what is imperative! Sure, acorn production is very important and provides an energy boost during the fall and winter, but what are these hardwood forests producing for deer the other nine months of the year? An article in the February/March 2011 issue of *Quality Whitetails* by wildlife biologist Dave Edwards, titled "Moving Mountains," makes the point well. After surveying a predominately hardwood forest in Virginia, Dave concluded "the mature hardwoods were wide open and park-like," and "the primary limiting factors of the property were adequate, high-quality food and cover for deer."

As you might expect, we found the opposite effect with agriculture. As the percentage of the area in agriculture increased, so did deer population antler size. There are three points to consider

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here. First, row-crop agriculture provides an abundant source of high-quality forage for deer (albeit much to the aggravation of farmers), which can be replicated on a much smaller scale with food plots. Second, there's a synergistic effect in that areas with row-crop agriculture are also areas of higher soil quality and fertility. This greater soil quality also produces natural vegetation of greater nutrient content.

So deer in these agriculture-rich regions get the direct benefit of forage from agriculture production and also higher-quality, naturally occurring forage. Third, there are limitations to the extent of agriculture that is beneficial. In areas dominated by agriculture, the lack of cover needed for refuge can keep deer population numbers down, so the addition of cover on these properties can actually boost habitat quality and deer numbers.

Research References

The findings discussed in this article come from peer-reviewed, published research:

Strickland, B. K, and S. Demarais. 2008. Influence of landscape composition and structure on antler size of white-tailed deer. Journal of Wildlife Management 72:1101-1108.

Jones, P. D., B. K. Strickland, S. Demarais, and S. E. Edwards. 2008. Soil region effects on white-tailed deer forage protein content. Southeastern Naturalist 7:595-606.

Conclusions of the Study

On a statewide scale, our results demonstrated a mechanism for the spatial variation observed in deer population antler size. Within regions of similar soil nutrient quality, variation in antler size was explained by land-use types that either promote or suppress the growth of quality deer forages. For example, agriculture is a land-use type that promotes quality forage, and high-density pine or hardwood forest is not.

Please keep in mind that our results do not condemn pine and hardwood forests altogether but emphasize the importance of thinning, burning, and other practices that open forest canopies and stimulate the production of deer forages.

Managing a forest for timber production and for wildlife can be a tradeoff. If forest land makes up a small percentage of your property, then maximizing timber value of the forest may not be detrimental to deer habitat quality. However, if your property is composed primarily of forest, then how the forest is managed will have a significant impact on the deer forage production and overall deer habitat quality.

A caveat we think worth mentioning is that suitable habitats will encourage greater deer densities, which may negatively affect antler size through increased competition for food. The relationships we found between deer antler size and habitat type among the 203 properties we studied do not account for deer density relative to carrying capacity. Instead, the results we found were apparent in spite of differences in deer density among the properties. If we could have accounted for differences in deer density we believe the relationships between habitat type and deer antler size would have been even stronger.

What Does It All Mean?

Our results from a large-scale, state-

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Deer living in lower-quality habitat, like these two Florida bucks, do not achieve the body or antler size of deer living in regions with better soils, more agriculture, and colder climates. However, within a given region, body size and antler quality can vary from property to property based on habitat management choices.

wide analysis provide validation for what most deer biologists and experienced QDM'ers already knew – habitats that provide abundant food will yield higher-quality deer. Our findings show that land-use types which promote and maintain forb-rich plant communities should positively influence deer body and antler growth. Conversely, large expanses of closed-canopy forest (pine or hardwood) will limit the production of high-quality forages and may cause deer population antler size to decline. The replacement of row-crop agriculture with Conservation Reserve Program pines is also likely to reduce habitat quality. Managers of deer populations associated with closed-canopy forests should increase the production of annual and perennial forbs by thinning and use of prescribed burning. In pine plantations, the use of selective herbicides to remove mid-story hardwoods in combination with prescribed burning can also increase the production of high-quality deer forages and improve deer habitat quality. Furthermore, supplemental food plantings are an option for hunting clubs that lease property and do not have the ability to manage the forests they hunt. A system that produces abundant year-round, high-quality food plantings should improve diet quality for deer populations in dense forests.

However, once ideal deer habitat is created, the gain can be quickly lost if deer populations are not kept well below the habitat's carrying capacity. Deer managers must maintain adequate doe harvest and population levels so the habitat management will continue to yield quality whitetails.

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