

Antler Regulations

PART 2 OF 3



NAVIGATING THE TANGLED THICKET

BY STEVE DEMARAIS AND BRONSON STRICKLAND

DEER HUNTERS across the country are getting ready for another deer season, and looking at and talking about antlers is part of our preparation. At hunting shows, we stare at and study impressive mounts. We sort through images from our infrared-triggered cameras, hoping to see bucks like these using our hunting lands. And hunters in some states, along with their state-agency biologists, are talking about mandatory antler regulations (ARs) – we talk about whether to use them, how to use them, or whether they are working.

In Part 1 of this three-part series, we described the benefits of an older buck age structure from the standpoint of deer biology and hunter satisfaction. We also described how ARs can increase the number of older bucks in a population and increase the average age of harvested bucks – in other words, the “good” aspects of ARs. Now we’ll discuss some of the potential biological problems associated with ARs that protect smaller-antlered bucks within an age class by describing the effects of Mississippi’s statewide 4-point-*total* AR on public management areas. We’ll also provide an update on the status of ARs in several other states.

10 YEARS OF STATEWIDE ARs IN MISSISSIPPI

The effectiveness of an AR designed to protect smaller-antlered young bucks within an age class is the source of potential problems. Are the protected bucks the ones you want growing older? The answer depends on your harvest goals. Remember that just about any sample of older bucks will have larger antlers, on average, than a similar sample of younger bucks. So if you are only interested in harvesting deer with larger antlers, then protecting younger bucks, even if they are of lower antler quality, can be effective. However, if your goal is to improve antler quality in older age classes, then an AR such as this is likely not the best long-term approach.

Protection of smaller-antlered bucks and harvest of larger-antlered bucks within an age class will reduce average antler size in older age classes – if antler development in younger bucks is predictive of future antler development. This concept is called “high grading” and is similar to removing better-quality timber and leaving lower-quality timber for later harvest. High-grading effects can be documented by measuring antler size of surviving

bucks at older ages. In contrast, population-level genetic effects would take longer to develop and are more difficult to document due to a lack of reliable markers to gauge antler genetics within a population. However, we know that antler size and shape are heritable, so it does matter which bucks are breeding. Quantifying the genetic effect at the population level, however, will remain a limitation for the foreseeable future.

Mississippi's statewide 4-point-total AR was established by legislative action in 1995. Although the Department of Wildlife, Fisheries and Parks had experimented with antler-point restrictions on some of its state wildlife management areas (WMAs), they did not recommend the creation of the statewide 4-point AR. The agency was championing liberalized harvest of females, with the goal of controlling population growth and reducing harvest pressure on bucks. They got their wish for expanded antlerless harvest opportunities, but the legislation also created the statewide 4-point AR on both public and private lands. A legal buck had to have a total of at least four points, with a "point" vaguely defined as "any antler protrusion that would hold any ring size."

Having a statewide AR allowed us to examine its effects across a broad range of environmental and management conditions. In cooperation with the Mississippi Department of Wildlife, Fisheries, and Parks and the U.S. Fish & Wildlife Service, we analyzed deer harvest data from 22 public hunting areas totaling



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On public hunting lands under antler regulations, hunters usually take the first legal buck that comes along. Over time, this removal of high-quality bucks while protecting young bucks with smaller antlers was seen to reduce antler quality in older bucks on Mississippi WMAs.

about 525,000 acres across a range of soil regions. We compared data pre-AR (1991 to 1994) to data post-AR (1996 to 2001) to answer several important management questions.

We compared the percentages of 1½-year-old, 2½-year-old, and 3½-year-old and older bucks in the harvest pre- and post-AR. The composition of the harvest shifted from predominantly 1½-year-old bucks pre-AR (59 percent) to predominantly older bucks (42 percent 2½-year-olds and 41 percent 3½ and older bucks) post-AR (see Figure 1-A). Based on these numbers, you might conclude that the AR was successful. And yes, it did change the age composition of the harvest. However, these percentages don't tell the full story.

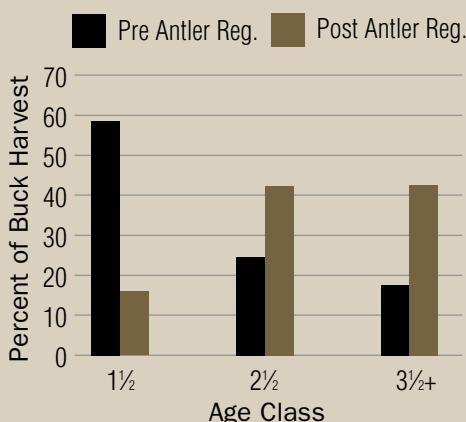
To determine if bucks protected at 1½ showed up later in the harvest as older bucks, we compared the number harvested per 1,000 acres on the public lands studied. The number of 1½-year-old bucks harvested declined from 1.9 to

0.3 per 1,000 acres – which was the intent of the AR. However, the harvest of 2½- and 3½-year-old bucks increased only slightly while total buck harvest decreased from 3.1 to 1.8 bucks per 1,000 acres (see Figure 1-B).

From these results we can draw two conclusions. First, the change in percentage composition of the harvest can be explained almost entirely by the removal of 1½-year-old bucks from the harvest. Therefore, judging the success of an AR based solely on

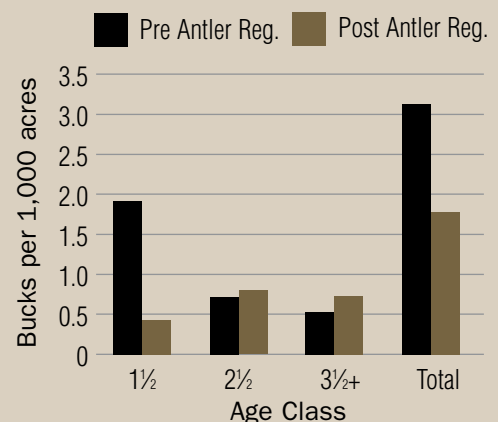
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1-A. Change in Percent Harvest of Antlered Bucks

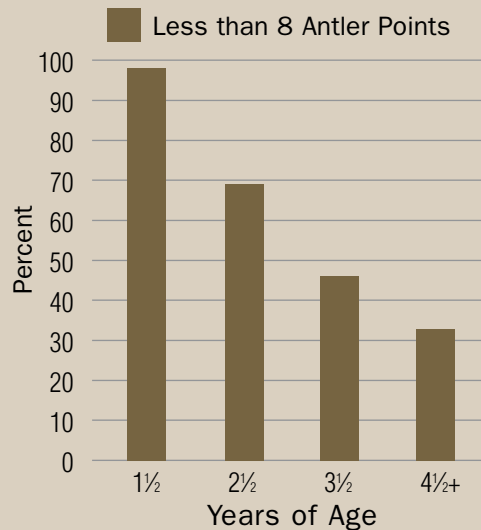


These charts depict alternative interpretations of buck harvest data following the implementation of a 4-point-total AR in Mississippi. On the left, the percentage of harvested yearling bucks declined steeply and the percentage of 2½- and 3½-year-old bucks increased following the AR. Now examine the harvest rates (bucks/1,000 acres) in chart B. The same steep decline occurred in the yearling age class, but the harvest rate of older bucks is not that different from before the AR. In this case, protection of yearling bucks did not guarantee their harvest in subsequent years.

1-B. Change in Harvest Rate of Antlered Bucks



2. Some Older Bucks May Never Be Eligible for Harvest with Some ARs



This chart shows the percentage of bucks in each age class with less than eight total points from a region with moderate soil quality in Mississippi. Using an 8-total-point AR in this area would protect almost all yearling bucks, but it would also perpetually protect over 30 percent of bucks 4½ years and older.

a shift in percentage of age classes in the harvest can lead to incorrect conclusions. Second, the regulation reduced overall buck harvest by approximately one third. While this reduction was restricted to the yearling age class, the protected yearlings were not taken in significant numbers in subsequent years on these public hunting areas.

We evaluated several potential social and biological reasons why many protected bucks did not show up in the harvest in later years. There was no change in overall hunting pressure following initiation of the AR. The harvest rate of does remained steady, so there was no shift in harvest emphasis away from bucks. Based on pre-AR harvest data, 18 percent of 2½- and 3½-year-old bucks and 4 percent of 4½-year-old and older bucks normally carried less than four antler points and would have remained ineligible for harvest. Additionally, non-harvest mortality could explain some of the reduced harvest at older age classes. Unbalanced yearling-buck dispersal may have been another contributing factor. Finally, behavioral changes may occur in older bucks that decreased their susceptibility to harvest. The bottom line is that protection of 1½-year-old bucks with a 4-point-total AR on public hunting areas did not substantially increase the harvest of older-aged bucks in subsequent years on these areas.

Wildlife biologist Kent Kammermeyer reported success and failure of a 4-points-on-a-side AR on two large Georgia WMAs. On one area the harvest rate of 2½ and older bucks more than doubled from 0.8 to 1.9 per 1,000 acres, due partially to an older buck age structure and partially to increased hunter density. Despite higher hunter density on the second area, the harvest rate of 2½ and older bucks did not increase due to overharvest of does, forage competition with an increasing wild hog population, and habitat decline due to pine canopy closure.

The protection of bucks with perpetually small antlers is a potential problem with any AR, but it is especially problematic when using more restrictive ARs designed to extend protection to 2½-year-old bucks. For example, if an 8-point AR was applied to moderate quality habitats in Mississippi, it would protect almost all 1½-year-old bucks and 70 percent of 2½-year-olds. However, it would also protect 34 percent of bucks 4½ and older (see Figure 2). In other words, it would create a class of perpetually protected, inferior-antlered mature bucks that would consume valuable forage and breed while better-quality bucks were being harvested.

Remember the simulation model we outlined in Part One of this series? This simulation demonstrates how problematic the perpetual protection of inferior-antlered mature bucks can be without the proper AR. In our model we started with 500 yearling bucks and followed them to 4½ years of age with an 8-point total AR to approximate its potential effects on buck age structure. We used antler-growth patterns from a high-quality soil region

in Mississippi, applied a 50 percent harvest rate and added a 10 percent non-harvest mortality rate each year. To determine how many of these “perpetually protected” older bucks could result under these conditions we boosted the non-harvest mortality rate to 15 percent for mature bucks and calculated the number of 4½ and older bucks with less than eight total points still alive after five years. Under these conditions about 70 of these bucks could be roaming the woods after five years! Again, these bucks would never be eligible for harvest but would be eating and breeding – a management problem that should be addressed.

To evaluate the effect of the 4-point-total AR on antler size of older bucks, we compared antler sizes from six WMAs where we had adequate sample sizes from 3½-year-old bucks. Antler size within age classes generally declined during the post-AR period (see Figure 3). This

decline was evident in at least one of the two age classes evaluated across the range of soil regions in Mississippi. On these public management areas, gross Boone & Crockett scores decreased 5 to 9 inches for 2½-year-old bucks and 10 to 17 inches for 3½-year-old bucks.

On one management area in a moderate-quality soil region, the availability of sub-4-point (“any buck”) tags to all hunters during the 2003 season allowed the first valid sampling of all antler sizes since initiation of the AR in 1995. For this property, distribution of antler points changed for 3½-year-old bucks between the pre-AR period and the 2003 hunting season (see Figure 4). All three antler-point categories that would be considered indicative of “inferior” antler production at 3½ years (i.e., two to three, four to five, and six to seven points) increased in prevalence. Bucks that were 3½ years old with two to three points had not been recorded during the pre-regulation period but made up 6 percent of the harvest in 2003. Bucks with four to five and six to seven points increased in prevalence from 4 to 17 percent and 15 to 31 percent, respectively. Concurrently, bucks with eight or more points decreased from 81 to 47 percent. The significant shift in prevalence of antler points within the 3½-year-old age class on this public property provides evidence of the mechanism by which the 4-point-total AR can decrease average antler size. Protection of 2- and 3-point yearling bucks would result in smaller-antlered 3½-year-old bucks only if there is a link between antler size at 1½ and 3½ years.

In better-quality Mississippi habitats, antler size in 1½-year-old bucks is, on average, a good predictor of antler size in older age classes. In contrast, in areas of inadequate nutrition and/or late fawning, there may be a one- or two-year delay in expression of antler potential, a phenomenon we see in the Lower Coastal Plain of southeastern Mississippi. In this region, average antler size of bucks at 2½ or 3½ years is a more accurate predictor of

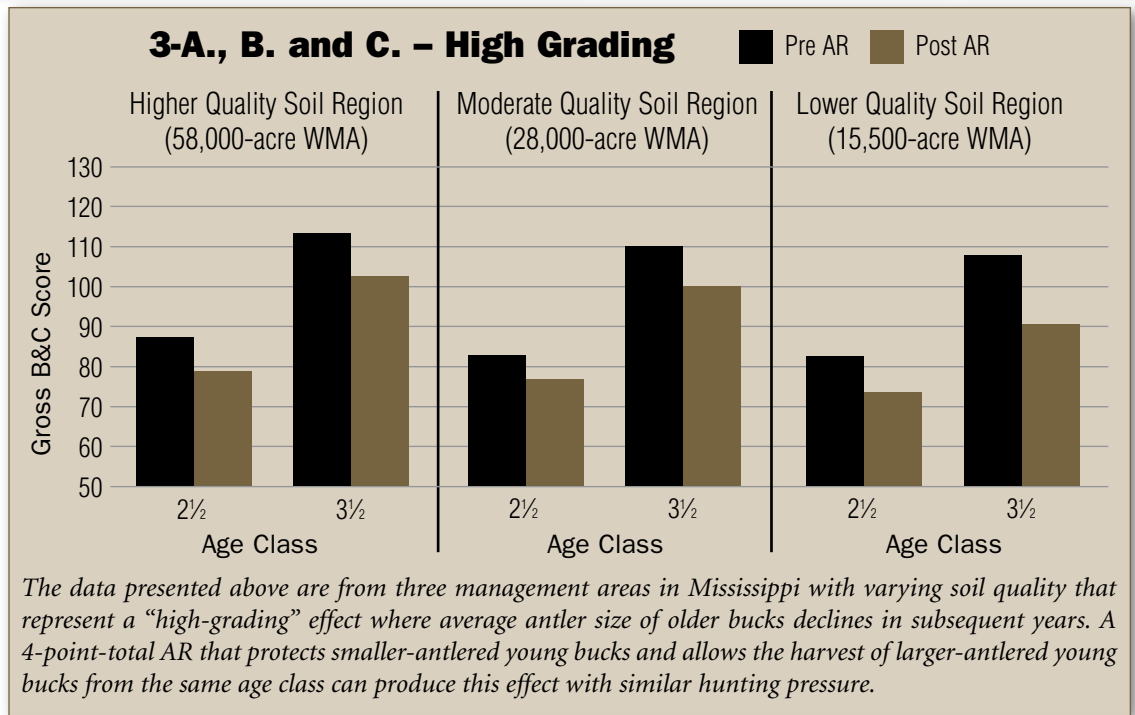
future antler size.

Did the 4-point-total AR cause the decline in antler size within age classes? We can't prove a definitive cause-and-effect relationship because this study did not include scientific controls. However, we can eliminate several other potential causes. The most obvious alternative explanation is that antler size decreased due to declines in habitat quality and thus nutrition. If antler size decreased in response to lowered nutrition, then we would expect other condition indicators to reflect similar decreases. However, kidney-fat measurements and fetal rates of adult females on the study areas remained stable between pre-AR and post-AR periods. Therefore, it appears unlikely that a nutritional decline contributed to the reduction in average antler size of older bucks.

We conclude the 4-point-total AR has reduced average antler size of older bucks on numerous public hunting areas in Mississippi. We emphasize that these results were from public hunting areas, and that's the type of area where the conclusions are most applicable. However, these problems could develop on private lands under similar management conditions.

At this point, you may be wondering about the impacts of the 4-point-total AR on *private* lands in Mississippi. Harvest data from about 2 million acres enrolled in Mississippi's Deer Management Assistance Program (DMAP) allows a similar comparison of antler development before and after establishment of the statewide 4-point AR. On these private properties, average antler size of bucks in all age classes remained constant or improved slightly following the 4-point AR.

How can we reconcile the differences in results between public and private lands? We believe the differences between public and private lands are partially due to selection factors. First, the greater harvest rate of higher-quality young bucks on public areas is more likely to result in high-grading. Second,



there are differing levels of hunter selectivity between property types. On public areas, most hunters shoot the first available legal buck and the resultant harvest sample is therefore more representative of available legal bucks. On private areas, hunters are

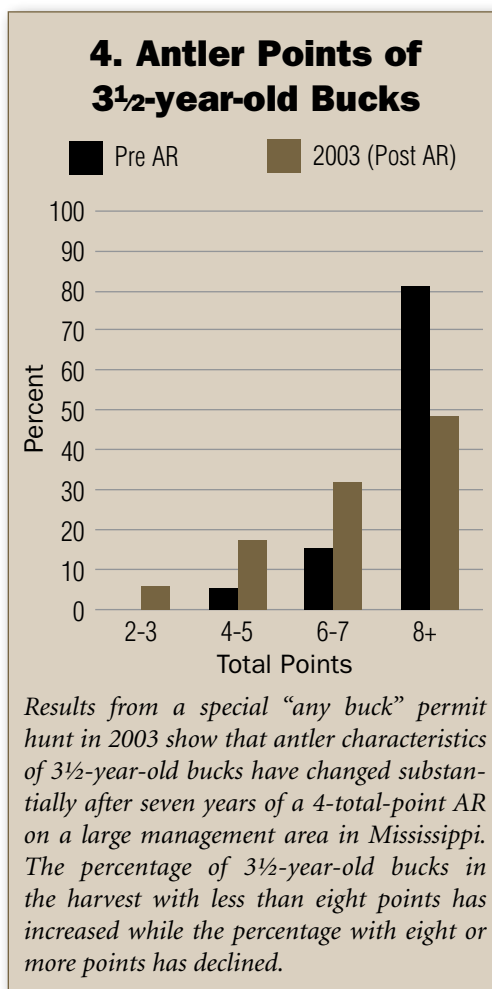
generally more selective and often pass legal but smaller-antlered bucks. As a result, the "high-graded bucks" are not as likely to be harvested, making the harvest sample less representative of the 2½- and 3½-year-old bucks in the population. A 2004 survey by Kevin Hunt at Mississippi State University showed that 94 percent of DMAP cooperators have hunters that chose not to harvest a legal buck.

A final difference between public and private hunting areas in Mississippi deals with the type of AR. Most managed private properties have ARs or other harvest criteria that are more restrictive than the statewide 4-point-total AR. A more restrictive AR applies the potential high-grading effect at an older age class, which makes antler degradation harder to document.

ARs in Other States

We've discussed the potential "ugly" side of ARs based on evidence from public hunting areas in Mississippi, but what about other states that have implemented more restrictive types of ARs, such as a minimum of three or four points on one side? We spoke with white-tailed deer project

Continued.



Regulations, goals and expectations of some state agencies that have implemented Antler Regulations.

Arkansas	Mississippi	Georgia	Michigan	Pennsylvania
<p>Statewide Antler Regulation: 3+ Points on a Side</p> <ul style="list-style-type: none"> • Protect more yearling bucks • Increase buck age structure • Balance sex ratios <p>These goals are being accomplished.</p>	<p>Statewide Antler Regulation: 4+ Total Antler Points</p> <p>Some Regional ARs Include:</p> <ul style="list-style-type: none"> • 4+ points and 10-inch spread or 13-inch beam • 4+ points and 15-inch spread • 4+ points and 12-inch spread <p>Goals Included:</p> <ul style="list-style-type: none"> • Protect yearling bucks • Increase buck age structure <p>These goals are being accomplished.</p>	<p>Statewide Buck Regulation: At Least One of Two Bucks Must Have 4+ Points on a Side</p> <p>Additionally, nine counties have more stringent ARs (seven have 4+ points on a side and two have minimum spread ARs)</p> <p>Goals Included:</p> <ul style="list-style-type: none"> • Hunter Satisfaction <p>These goals are being accomplished.</p>	<p>Statewide Regulation: At Least One of Two Bucks Must Have 4+ Points on a Side</p> <p>Countywide ARs Include:</p> <ul style="list-style-type: none"> • 1 antler branched with 1+ inch point(s) • 1 antler with 3+ points and all 1+ inches long. <p>Goals Included:</p> <ul style="list-style-type: none"> • Protect yearling bucks • Hunter satisfaction <p>Statewide, these goals are being accomplished. The goals of the countywide ARs are being accomplished in some but not all deer management units.</p>	<p>Western third of the state: 4+ points on a side Remainder of the state: 3+ points on a side</p> <p>Goals Included:</p> <ul style="list-style-type: none"> • Protect yearling bucks • Increase doe harvest • Improve breeding ecology • Increase buck age structure <p>All of these goals are being accomplished except improving breeding ecology, which is uncertain so far.</p>

coordinators in other states to get their agency’s perspective on the effectiveness of mandatory ARs (See the table above). There are many similarities from state to state. Some agencies incorporated ARs to reduce yearling-buck harvest and increase antlerless harvest while others did so in response to hunter requests for an improved hunting experience. Chris Rosenberry said that in Pennsylvania they also wanted to improve the breeding ecology of their deer herd.

Are these agencies accomplishing their goals with ARs? For the most part, yes! All have experienced reductions in yearling-buck harvest and most have seen increases in antlerless harvest. Most have observed increases in 2½- and 3½-year-old bucks in the harvest, indicating that some portion of yearling bucks protected by the AR are surviving to an older age.

However, not all expectations were met in every state. In Michigan, Rod Clute stated that hunter satisfaction is not universal across deer management units due to inconsistent buck age structure results. In Mississippi, Chad Dacus said that high-grading of bucks and the protection of smaller-antlered, older-aged bucks are big concerns of Mississippi biologists. Cory Gray expressed similar concerns in Arkansas. Jim Simmons reported that hunter participation in some Georgia counties may have declined following implementation because both younger and older hunters were generally less supportive of the AR.

So why is Mississippi the only state that has documented a high-grading effect? There are several potential explanations.

- The Mississippi 4-point-total AR produces a potential high-grading effect as soon as 2½ years. More restrictive ARs that protect most or all 1½-year-old bucks, such as 4-points-on-a-side or a 15-inch spread, have the potential for high-grading 2½-year-old and older bucks, though the effects may be slower to occur and more difficult to detect.

- The data from some other states represent both private and public lands. It is possible that high-grading effects are masked by differing levels of habitat quality, management regimes and/or hunter selectivity in these data sets.

- The mandatory check stations on large public hunting areas in Mississippi allow collection of an adequate sample size, some-

thing lacking in some states.

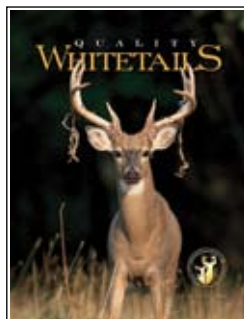
- The AR may not have been in effect long enough to detect effects. It takes several years to accumulate enough data to adequately test for high-grading effects.

In summary, remember that Quality Deer Management involves much more than simply protecting young bucks – it’s a holistic approach that promotes stewardship by managing both the male and female segments of the deer herd as well as their habitat. Antler regulations can effectively reduce the harvest of yearling bucks. However, they are not a panacea for all age-structure and sex-ratio problems in deer herds.

One of the basic principles of Quality Deer Management is that the hunter is the manager, and so the harvest decision each hunter makes has significant implications on their deer population. The importance of hunter selectivity will be emphasized in Part 3 of this series. We’ll also present some AR approaches that can improve buck age structure while minimizing potential negative biological effects. Finally, we’ll provide some alternatives to ARs that can be used to accomplish your deer management goals.



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