THE WHITETAIL RUT IN PENNSYLVANIA

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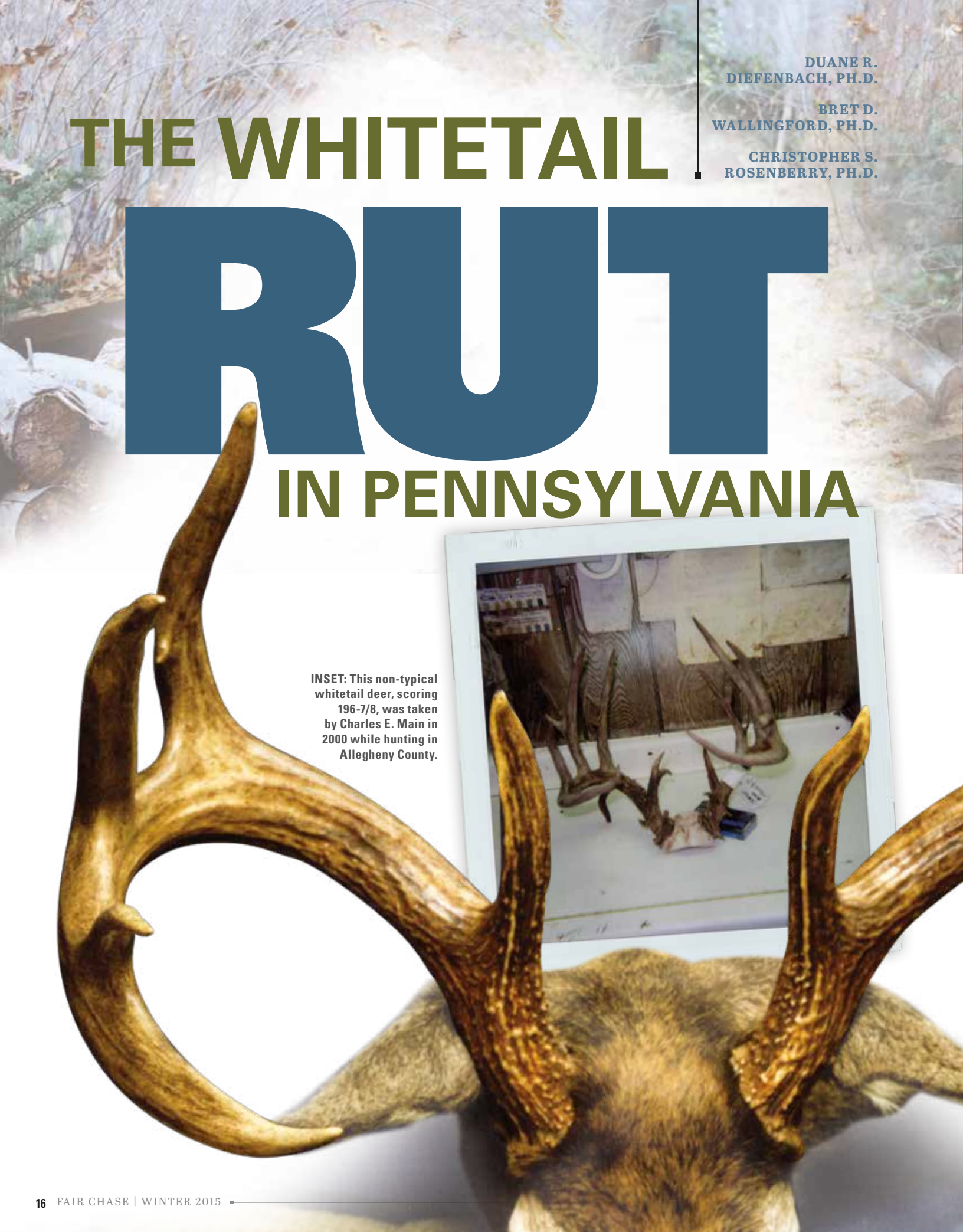


INSET: This non-typical whitetail deer, scoring 196-7/8, was taken by Charles E. Main in 2000 while hunting in Allegheny County.

In 2001 Craig Kirkman took this 163-1/8 typical whitetail deer in Bucks County, Pennsylvania. A legal antlered deer at that time had to have one antler longer than three inches, or had at least one antler with two or more points, and 80% of harvested antlered deer were only 1.5 years old. In 2002 the Pennsylvania Game Commission implemented new Antler Point Restrictions and since then the number of older bucks in the harvest has doubled.

If you are serious about hunting or managing whitetail deer, understanding when the rut occurs and how it may change from year to year is important.

If you are a hunter, you want to know when the rut occurs for your specific hunting area—you don't want to miss all the action! And you would like to know how the timing of the rut might change from one year to the next, because you need to schedule time off from work!

If you are a deer manager, you need to know when the rut occurs for setting hunting seasons. In a big deer hunting state like Pennsylvania, a large proportion of the antlered population can be harvested each year, so it is important that the bulk of the harvest occurs after the rut. In addition, changes in hunting regulations, such as those designed to increase the number of males in older age classes, could affect breeding behavior.

THE PENNSYLVANIA EXPERIMENT

In 2002 the Pennsylvania Game Commission implemented new Antler Point Restrictions (APRs). Traditionally if a deer grew at least one antler longer than three inches, or had at least one antler with two or more points, it was defined as an antlered deer and legal for harvest. For decades, 80 percent of antlered deer harvested each year in Pennsylvania were 1.5 years old!

New APRs changed everything. Depending on the management unit, a legal antlered deer had to have at least three

or four points on one antler. We correctly predicted these new APRs would reduce harvest rates from 80 percent to below 50 percent for yearling males. Harvest rates of older antlered deer should have been around 80 percent, but in reality, harvest rates dropped to around 60 percent. We suspect lower harvest rates on older bucks occurred because hunters not only had to identify the deer as antlered but also had to ensure it had enough points to be legal. The additional time required to count points likely led to some bucks getting away resulting in lower harvest rates of older deer.

The effect of the new APRs was the median age of antlered deer was still 1.5 years old, but there were 30 percent more antlered deer in the population and almost 40 percent of the population was 2.5 years old or older. No longer was a 4.5-year-old or older buck a near impossible sighting in Pennsylvania (**Figure 1**). Finally, Pennsylvania hunters are experiencing harvest success rates similar to the 1980s and 1990s, but thanks to the new APRs, the number of older bucks in the harvest has doubled.

CAN OLDER BUCKS AFFECT THE RUT?

What effect did this change in the age structure have on the timing of breeding behavior? This is a question we posed before APRs were implemented.

Because the rut is about breeding, we can determine when the rut occurs by determining when fawns are born. The way we did this was to check road-killed does for embryos in late winter and early spring. If does were pregnant we measured the length of each fetus and estimated the date the doe was bred. Assuming a 200-day gestation period, and knowing the relationship between embryo body length and age, one can estimate the date of birth or (by subtracting 200 days) the date of conception. During 1999-2006, the Pennsylvania Game Commission checked 3,507 road-killed does with fetuses.

Our hypothesis was that having more, older bucks in the population would shorten the duration of the rut because more experienced males could improve breeding behaviors. That is, if our hypothesis was correct, we predicted less variation about the median date after APRs were implemented (2003-2006) than before (1999-2002).

The statistical analyses were quite complex, linear models with random effects, where we tested whether the variation about the mean date was smaller after APRs were implemented. But the figure of boxplots tells it all (**Figure 2**). We failed to detect any change in variation in breeding after APRs were implemented.

WHAT ABOUT THE MOON?

If APRs did not affect the breeding dates, what about other environmental factors? Does the moon phase affect breeding date? Specifically, how well did the rutting moon—the second full moon after the autumn equinox—predict the rut in Pennsylvania? We can use our data from 1999-2006 to answer this question as well. In the table below we list the date of the first full moon and the median

FIGURE 1 New definitions of a legal, antlered deer (APRs) in Pennsylvania increased the number of older antlered deer in the population.

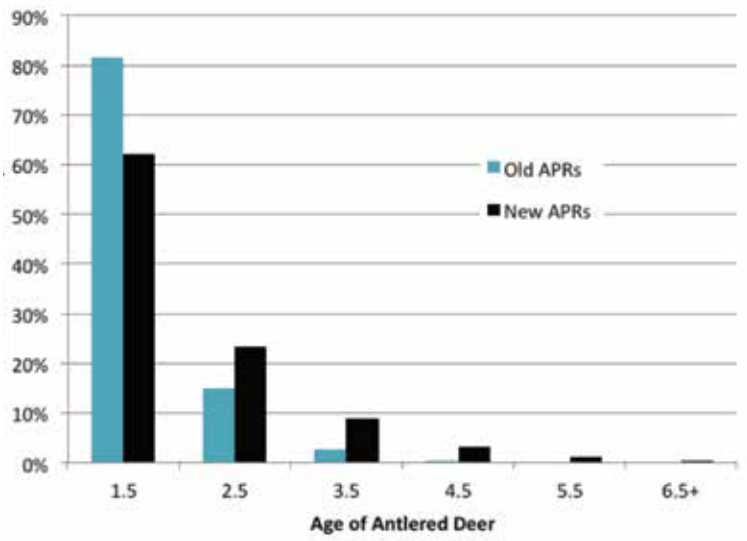
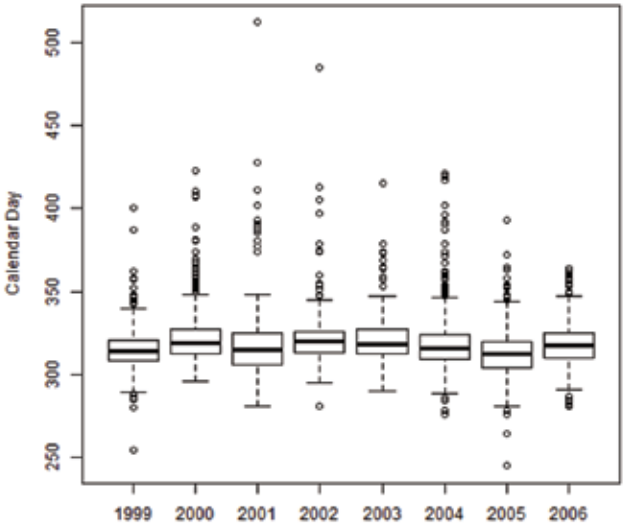


FIGURE 2 Boxplots of the breeding dates for adult female whitetail deer in Pennsylvania. Thick horizontal lines are the median date; boxes include the middle 50 percent of dates; and the open circles beyond the whiskers are the most extreme dates.



date of breeding for adult and fawn females.

The median date of the rutting moon was November 15, during 1999-2006. The variation about the first full moon averaged +/- 9 days, which is substantial enough to make changes in timing of the rut detectable. (**Figure 3**).

Across all years, the median date of conception for adult does was November 13, similar to the median date of the full moon, November 15, (based on 190-436 does checked/year). For fawns, the median date was November 25, but sample sizes were smaller (17-87 fawn does checked/year).

Is there a connection between the full moon and the rut? To find out we correlated the date of the full moon with the median date of conception. (**Figure 4**).

It turns out no matter the date of the full moon the median date of the rut simply bounced around November 13, for adults and November 25, for fawns. There is no relationship between the rut and the moon so you can plan your hunting vacation around the rut months ahead of time!

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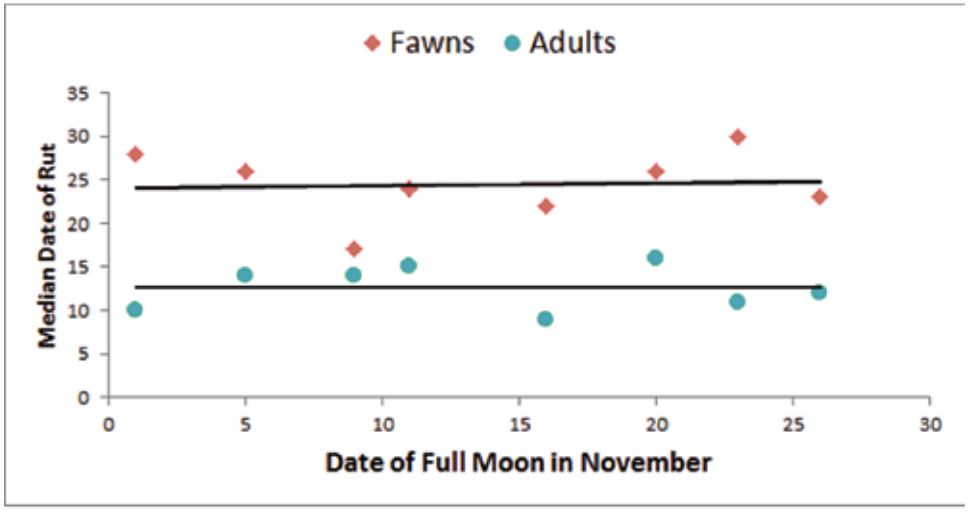
FIGURE 3 The variation about the first full moon averaged +/- 9 days, which is substantial enough to make changes in timing of the rut detectable.

	Median Breeding Date		
Year	Full Moon	Adults	Fawns
1999	24 Oct	11 Nov	30 Nov
2000	11 Nov	15 Nov	24 Nov
2001	01 Nov	10 Nov	28 Nov
2002	20 Nov	16 Nov	26 Nov
2003	09 Nov	14 Nov	17 Nov
2004	27 Oct	12 Nov	23 Nov
2005	16 Nov	09 Nov	22 Nov
2006	05 Nov	14 Nov	26 Nov

OPPOSITE PAGE: Lower harvest rates on older bucks occurred because hunters not only had to identify the deer as antlered but also had to ensure it had enough points to be legal. Matthew T. Staggert didn't have any trouble identifying this typical whitetail deer, scoring 166-7/8 points, while hunting in Lycoming County, in 2014.

FIGURE 4 It turns out no matter the date of the full moon the median date of the rut simply bounced around November 13, for adults and November 25, for fawns.



Why are fawns impregnated two weeks later? Primarily because they need to reach a minimum body size to become reproductively mature their first year of life, which few fawns attain and if they do it's later in the year. In northern Pennsylvania, almost no fawns get pregnant. During 1999-2006 Pennsylvania Game Commission personnel checked over 3,500 road-killed females and a total of 50 pregnant fawns were discovered north of Interstate-80.

If we pool our 1999-2006 data to look at when breeding occurs we can see that it really picks up the last week in October and that most deer are bred by the end of November. But fawns are different. Their breeding doesn't really begin until mid-November and by mid-December there are more fawns bred than adults. (**Figure 5**)

CONCLUSION

Should we be surprised that timing of the rut was not influenced by changes in the age structure of the population or moon phase? We probably shouldn't be surprised and for a couple of reasons.

First and most importantly, for deer in more northern latitudes, birth date of fawns is timed to maximize ideal rearing conditions. The earlier in the year a fawn is born the larger it will be going into its first winter. However, if born too early, fawns have to contend with harsh weather and mothers may struggle to find sufficient food resources for lactation. That means the most reliable cue for breeding would be photoperiod. The whitetail deer has had eons to find the associated date (day length) for breeding in autumn that maximizes survival of offspring the following year.

Second, recent genetic research has found that older, dominant males do not necessarily dominate the breeding. Yes, they may account for slightly more of the breeding in proportion to their abundance in the population, but breeding in whitetail deer is what scientists call a "scramble competition." And during that scramble, even 1.5-year-old males are quite successful.

At the beginning of this article we identified some characteristics of the rut that hunters and managers would like to understand. Our findings indicate that timing of the rut varies little due to environmental or biological factors. It is driven by photoperiod, and that makes some management and personal hunting decisions a lot easier. We wish the answers to more deer questions were so simple! ■

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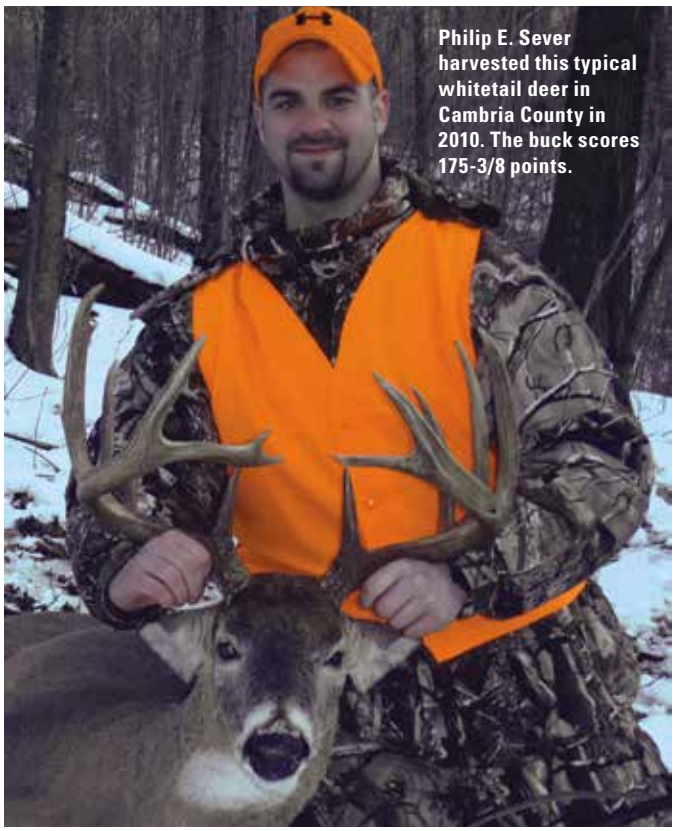
Finally, Pennsylvania hunters are experiencing harvest success rates similar to the 1980s and 1990s, but thanks to the new APRs, the number of older bucks in the harvest has doubled.



Philip E. Sever harvested this typical whitetail deer in Cambria County in 2010. The buck scores 175-3/8 points.

FIGURE 5 **If we pool our 1999-2006 data to look at when breeding occurs we can see that it really picks up the last week in October and that most deer are bred by the end of November.**