Bigger Bucks Through Population Planning

Your harvest plan controls the number of older, bigger bucks on your hunting land. Here's how to use it to accomplish your goals as a whitetail manager.

by Gordon Whittington

The beauty of numbers is that they simply refuse to lie. Words can paint a certain picture of reality, but if the undeniable truth is what you seek, there's just no substitute for reducing something to figures on a page to show what's *really* going on.

Think about it. Could any business keep its doors open for long if the manager never looked at a balance sheet prior to making decisions? Could an engineer stay employed if he merely guessed at how strong a new bridge needed to be, instead of making careful calculations long before the first cement truck arrived? Of course not. Nor can you get a clear picture of what's going on with the deer herd on your land until you take a pencil or calculator in hand and start crunching the numbers.

Because we all understand that mathematics is at the heart of business and engineering, we never question the role it plays in such endeavors. Yet many hunters and landowners who recognize the need for numbers in many aspects of everyday life view deer management quite differently, thinking of it more as voodoo than as the simple math question it really is.

If you hope to build and then maintain a high-quality deer herd on your land, you must accept the fact that everything comes down to numbers on a page. Once that's been done, you must act on what those numbers tell you. No matter how well you know your property from years of observation, a population model will help you see where your herd is and where it's going.

As Dr. James C. Kroll, director of the Institute for White-tailed Deer Management and Research, noted in our last issue, there's nothing difficult about population modeling. For executing a basic management plan, the math skills you acquired in school will prove quite sufficient.



Want to increase the number and age of bucks on your land? A basic population model will show you how the right harvest strategy could make it happen. Photo by Tom Evans.

THE IDEA BEHIND A POPULATION MODEL

Remember "Terminator," the movie in which Arnold Schwarzenegger played a futuristic assassin who journeyed back through time in an attempt to rewrite history? The premise was that the cause of a crisis had been traced back to the actions of a person who'd lived many years earlier; thus, if that person could be eliminated before those events were set into motion, the crisis never would occur. Indeed, the future itself would be changed.

As a deer hunter, you need not wait years to see how your herd will turn out; a population model is your window into the future. By running the numbers, you can predict the results of a given management plan with surprising accuracy. Then, if you don't like what those numbers are telling you about the future, you can play Arnold yourself and take steps to change them now!

Last month, we introduced a basic population model to show how the addition (birth) and subtraction (death) of deer would cause an unhunted herd to change in number and composition over time. This month, we'll see what happens when a well-managed hunting program is introduced. This is the only way to illustrate how a manager's real-life decisions lead to changes in the herd.

In our December issue, we started with a population of 80 adult deer, consisting of 20 bucks and 60 does (a buck:doe ratio of 1:3). The annual fawn crop was 50 percent, meaning there were half as many fawns as does in the fall population. Then, we plugged in a 10 percent annual non-hunting mortality rate across the board. (Of course, natural mortality varies by both sex and age-class, but for purposes of illustration, a flat 10 percent loss is a workable average for the population as a whole.)

When we inserted these numbers into our model and calculated the results, we saw that in just three years the number of adult deer on

the tract would almost double, from 80 to 143. Also, because half of each year's fawns would be male, the sex ratio would become much tighter. Finally, regardless of how many "mature" bucks (age 3½ years or older) we had among our original 20 bucks, by the end of that third non-hunting year we'd have even more.

A perfect world? Looking at the herd that would exist at the end of that three-year period, you might think so — but let's be honest with ourselves. First, could our land's current nutritional supply support nearly twice as many deer in good health? And even if it could, how many of us would be willing to go several years without even trying to shoot a deer? Would our eventual return on this "investment" be worth such extreme sacrifice?

We at ***WHITETAIL*** doubt that it would be in the vast majority of situations. Only in the unusual case of a herd with *no* bucks over the age of 1½ years (yearlings) do we believe it's necessary to refrain from taking any male deer the first year. On virtually any piece of private land, you should be able to continue some level of buck hunting even as you're trying to get the herd back into balance.

JUST WHAT IS A HARVEST STRATEGY?

When hunters think of "strategy," what comes to mind is a calculated approach to hunting, in which as many variables as possible are weighed into the "game plan." Well, guess what? A *harvest* strategy is simply a calculated approach to managing the size and composition of your herd, factoring in as many variables as possible in deciding which deer to take out at which time.

This isn't how most private lands have been managed over the years. Yes, on some hunting properties there long have been vague "rules" about which deer can and can't be taken, but how often is this based on an honest, accurate look at *that* herd on *that* land at *that* time? How many landowners or hunters have ever even tried to figure out the number of bucks and does on their land, and of what ages those deer are?

The most common and yet far-reaching management decision being made across North America is whether or not to shoot when a given deer comes within range. The results of such decisions impact herd size and composition far more directly

HOW A HARVEST PLAN WORKS

The harvest strategy you employ has a major impact on both the size and makeup of the deer herd on your land. Your goals as a manager determine your harvest strategy, and that harvest strategy then determines your exact harvest plan.

To see how a harvest plan can be used to improve the hunting on a piece of land, let's look at a basic population model for a sample herd. We'll start with 80 adult deer — 20 bucks and 60 does (a 1:3 buck:doe ratio) — and a 50 percent fawn crop (half as many fawns as does). We'll assume an annual natural mortality rate of 10 percent for both sexes and all age-classes.

Our overall management goal is to improve the buck:doe ratio and buck age structure as rapidly as possible without totally eliminating buck harvest or exceeding the property's carrying capacity of 80 adult deer. We won't harvest any bucks younger than age 2½ years, and we won't harvest more than half of either our 2½s or 3½-pluses in any single year. Our hunting club has eight members, and either-sex hunting is allowed (within the limitations of our overall harvest strategy).

	Bucks By Age-Class						
	Fawns	1½	2½	3½+	Total Bucks	Does	Total
Fall 1998 adult deer		**14**	**4**	**2**	**20**	**60**	**80**
Fawns added	15				15	15	30
Natural mortality	-2	-2			-4	-7	-11
1998 hunter harvest			-2	-1	-3	-16	-19
Fall 1999 adult deer		**13**	**12**	**3**	**28**	**52**	**80**
Fawns added	13				13	13	26
Natural mortality	-1	-1	-1	-1	-4	-7	-11
1999 hunter harvest			-5	-1	-6	-9	-15
Fall 2000 adult deer		**12**	**12**	**7**	**31**	**49**	**80**
Fawns added	13				13	12	25
Natural mortality	-1	-1	-1	-1	-4	-6	-10
2000 hunter harvest			-5	-3	-8	-7	-15
Fall 2001 adult deer		**12**	**11**	**9**	**32**	**48**	**80**

This shows that by restricting buck harvest and taking an adequate number of does each season, in just three years our property's buck:doe ratio will improve from 1:3 to 1:1.5 (two bucks for every three does), and more than a third of our bucks will be at least 3½ years old.

Of course, management goals vary, so these numbers might be very different on your land. But the principles of coming up with a harvest strategy and harvest plan are the same everywhere.

than any biologist can. Good choices lead to a good herd; poor choices lead to a poor herd. Simple enough.

But how do we tell "good" choices from "bad" ones? That depends on what the manager's trying to accomplish. A "good" choice is one that helps him realize his goals; a "bad" choice is one that doesn't. And management goals themselves can be drastically different from one piece of land to the next.

FORMULATING A HARVEST STRATEGY

Because not all managers have identical goals, neither will all harvest strategies be the same. On top of this, there clearly can be a great difference in environmental factors from one tract to the next, and these must be considered as a harvest strategy is being devised.

Let's say our eight-member hunting club has a tract we want to begin managing for a better herd. Our three-year goal is to keep the herd's size within the limitations of the habitat, tighten the sex ratio and move as many bucks as we can into the older age-classes. But we don't want to shut off all buck hunting as we do.

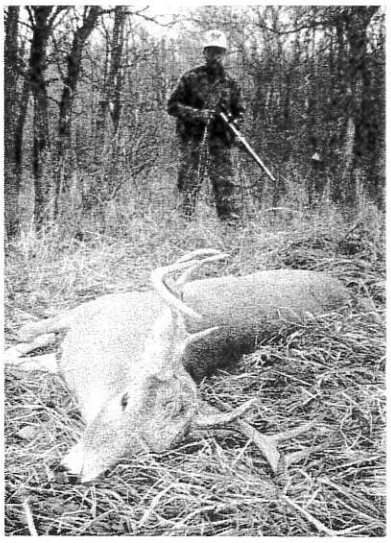
Where do we start? First, we have to know the maximum number of healthy deer our property will support (its "carrying capacity"). Then, we must come up with reasonably accurate estimates of how many deer we now have. And we'll need to estimate the following: the number of deer being added each year (fawns); the number of deer being removed each year (hunting and non-hunting mortality); the buck:doe ratio; and buck age structure.

To show how a harvest strategy might be formulated, we've come up with estimates of these numbers for our sample population model on page 35. As was the case last month, we're starting with 20 adult bucks and 60 does (a 1:3 sex ratio), plus 30 fawns (a 50 percent fawn crop).

With a population model, the more accurate your assumptions are, the more accurate your conclusions will be. Once you have numbers that reflect the true size and makeup of your herd, the model can help you come up with a harvest strategy for achieving your management goals. In future issues, we'll be telling you how to fine-tune your estimates of herd size and makeup, but for now, let's assume the figures we're starting with are close enough.

Let's also say, purely for purposes of illustration, that we won't be upgrading our habitat, but instead will work with the deer food we have. (We'll look closely at habitat improvement next month.) How many deer can our property support in good health?

Our wildlife agency tells us that this type and amount of land will carry no more than 80 healthy adult deer, plus the annual fawn crop. So, we're already at what's normally called "carrying capacity." If we aren't going to improve nutrition, our challenge lies in filling those 80 slots with the best balance of bucks and does of the right ages.



By using a sound harvest strategy on your land, it's almost always possible to take some bucks and still improve the herd's age structure and buck:doe ratio. Photo by Bill Vaznis.

To keep track of bucks as they develop, we now must separate them into age-classes. (An age-class is nothing more than that group of deer born during a single fawning season; for example, in the fall of '98, our yearling age-class of bucks will consist of all surviving males born in '97.) Each age-class dwindles over time, as natural mortality removes deer from it, and hunting almost always takes some as well. Keeping track of the number of bucks in each age-class thus shows how much progress we're making and tells us how many of which age we can harvest at which times.

Let's assume our sample herd has been fairly heavily hunted up to this point, so we'll estimate that our starting crop of 20 antlered bucks is made up of 14 yearlings, four 2½-year-olds and two of age 3½ or more. (We're lumping all "3½-plus" bucks into one group because, from this club's perspective, there's no need to distinguish the 3½-year-olds from the 5½-year-olds; any buck of age 3½ or more would be a trophy to our members.)

Estimating that 70 percent of our antlered bucks are in the yearling age-class is realistic in many areas today. Where there's moderate to heavy pressure, most bucks are taken at age 1½, with relatively few slipping through the cracks to reach age 2½ or more.

Year 1 (1998)

What's available to shoot during the 1998 season, our first under this management plan? We won't know that until we've made several calculations, the first of which is to subtract 10 percent of the deer from each column's top number. This will be our assumed natural mortality over a 12-month period, and what's left will be the population we can manipulate through the use of selective hunting pressure.

We're beginning with 20 adult bucks and are adding 15 buck fawns, for a total of 35 male deer on the tract. A 10 percent mortality rate would be 3.5 bucks, which we'll round up to four. That leaves us with 31 male deer from which our buck harvest can come — and only 18 of these are old enough to have racks.

We obviously won't shoot any buck fawns ("button" bucks), but neither will we take any yearling bucks, because they, too, are our trophies of the future. That leaves us with just six bucks to hunt in '98 (four 2½s and two 3½-pluses).

But we shouldn't take all of these, either, even if we're skilled enough to do so. To improve the buck age structure rapidly, we're setting this club's '98 season buck limit at half of the total number of bucks that are at least 2½ years old. And we'd prefer not to take more than half of the bucks from either of the huntable age-classes, making our buck quota two 2½s and one 3½-plus.

This leaves us with a dilemma right off the bat: We have more hunters (eight) than bucks to harvest (three). If we reach this quota before

the season ends, we'll just have to make bucks off-limits for the rest of the year, like it or not. Our members must understand that the club's first priority is to reach the long-term herd goals we've established.

On the doe side, there's *plenty* of opportunity to hunt; in fact, it's essential that we harvest some of them. But exactly how many?

We're starting with 60 does and we're adding 15 doe fawns, for 75 females total. Then, we subtract 10 percent natural mortality, which comes to 7.5. But rather than round this up to eight, as we did with buck mortality, we're rounding it down to seven. Why's that? Because bucks have higher natural mortality than does. We'll always be liberal in estimating natural buck mortality and conservative in estimating natural doe mortality, as it's better to err to the side of underharvesting bucks and overharvesting does than the other way around.

Shooting 16 of the 68 remaining does is how we're going to keep total herd size under control. We won't be trying to harvest does of any specific age, but we'll do what we can to make sure no "button" bucks are mistaken for does.

As a result of combined hunter harvest and non-hunting mortality, by the start of the '99 season we'll still have 80 adult deer (28 bucks and 52 does), but we'll already be seeing a big change in the herd's sex ratio and age structure. There now will be eight more bucks and eight fewer does than a year earlier, and among those bucks will be 12 2½s and three 3½-pluses.

Our recruitment of fawns now is lower than in '98, as we have fewer does to produce them. But with fawns being born at a 1:1 sex ratio, we still should recruit 13 bucks and 13 does into the fall '99 population.

Year 2 (1999)

How does our '99 season look? Much better, thank you, in terms of bucks available for harvest. After subtracting our 10 percent annual natural mortality, we see we now can take as many as six bucks without shooting more than half of our bucks that are age 2½ or older. This still doesn't provide a buck for each of the club's eight members, but we're rapidly moving in that direction. (On our model, we've shown this harvest as five 2½s and one 3½-plus.)

Also included in our '99 harvest will be nine of the 58 does we'll have left after accounting for natural mortality. This harvest will keep our total adult deer count at 80 as we enter the 2000 season. But while the herd's size has stabilized, its makeup has continued to improve. The sex ratio now is even tighter, with three more bucks and three fewer does than a year earlier.

Year 3 (2000)

Our herd is quickly taking shape. Even after we calculate our 10 percent loss due to natural mortality, more bucks than ever will roam our property, and 17 will be potential "shooters": 11 2½s and six 3½-pluses. We can take up to eight of these bucks without cutting too deeply into our supply. (We've shown a harvest of five 2½s and three 3½-pluses in our example.)

As a deer hunter, you need not wait years to see how your herd will turn out; a population model is your window into the future.

And we can reduce doe harvest. After subtracting natural mortality, we'll need to take out only seven of our 55 females in order to keep the total adult deer count at 80. For the first time since we began, we'll have a well-balanced harvest of bucks and does (eight and seven, respectively).

Year 4 (2001)

Looking at the bottom of our chart, we see that the herd we'll have "built" by the 2001 season will be far different from the one we began with just three years earlier. And every change will have been a good one.

Of our 80 adult deer, 32 now will be bucks and 48 will be does, for a sex ratio of 1:1.5 (two bucks for every three does). That's essentially what you'd see in an unhunted herd, so we know it's healthy for the social structure of the population. And so is our buck age structure.

And of the 32 adult bucks, there now would be great distribution throughout the age-classes we're tracking: 12 yearlings, 11 2½s and nine 3½-pluses. So more than a fourth of our bucks now would be "mature," big enough and old enough for our members to view them as trophies.

Mission Accomplished?

Our three-year goal was to tighten the buck:doe ratio, have far more bucks in the older age-classes and keep the total herd size in line with its food supply. We've accomplished all three in less time than you might have guessed. By the start of our fourth year, we're already pretty much out of the "construction" phase of our management plan and are shifting into "maintenance."

So is the work all done? Not necessarily. Maybe by now we've decided we want to harvest bucks only from that oldest age-class; we no longer have any interest in taking 2½s. Plus, we'd like to start bringing spouses, kids, friends, etc., to the property to hunt bucks, now that we've had to cut back somewhat on buck hunting for several years. Our new goal is to be able to take up to a dozen 3½-plus bucks per season, on a sustainable basis, from this piece of land. Can we do it?

The population model says no. If our estimates of herd size and composition are close, we can't produce enough bucks to allow such a heavy harvest of older bucks. The land simply won't carry that many deer in good health, and healthy deer are among our main responsibilities as hunters and managers.

Ah, but wait — maybe we can do something about the land itself! Maybe we can increase its carrying capacity, providing more good deer food per acre. That, in turn, would let us hold more deer, which ultimately would allow for a higher buck harvest without sacrificing size or age. If we somehow could boost nutrition dramatically, in theory we could have more deer *and* bigger deer!

Well, this idea is no longer just a theory — through many years of management research at Fort Perry Plantation in Georgia, ***WHITETAIL*** has *proved* it's a valid concept. You really can have more deer and bigger deer than you ever thought possible, simply by mixing the right harvest strategy with what we've come to call "food-source management."

Next month, David Morris will begin sharing with you the inner workings of this bold new concept, showing how to start tearing down the old barriers between you and more big bucks. Stay tuned!