The Deer Boom

Discussions on Population Growth and Range Expansion of the White-Tailed Deer

by Kurt VerCauteren

The white-tailed deer (Odocoileus virginianus) is the most common and sought-after North American big game animal. More whitetails are harvested each fall than all other deer species (elk, mule deer, moose, and caribou) combined. Whitetails are popular for two main reasons, 1) their broad distribution, and 2) their abundance. The vast majority of bowhunters live in whitetail range and whitetails have experienced a population boom over the last century. Both in terms of numbers and densities, whitetails are far more abundant now than at any time during our lifetime. That is the keypoint, "during our lifetime." If the range of white-tailed deer is examined on the extremely short time scale of what we have observed since the inception of modern wildlife management and modern bowhunting, about 1930 to present, whitetails do appear to have expanded their range.

In this chapter, I will discuss white-tailed deer populations, densities, and range expansion. I will cover what the current range is, and what the future may hold. Shifts in whitetail populations and impacts on other deer species are topics I often ponder and discuss with others interested in such phenomena; I've taken this opportunity to put many of those ideas on paper. Though easy to understand, range expansion is a complex issue involving and impacting a multitude of interacting environmental variables; hence, I will occasionally digress on interesting tangents. Tangents will include such topics as intra-species interactions (white-tailed deer versus white-tailed deer), inter-species competition (white-tailed deer versus mule deer), and the role modern deer management has played in range expansion.

Historical And Current Populations and Range

Origins of the white-tailed deer are obscure, but the fossil record shows their ancestors were present since the Pleistocene Epoch, 3 million years ago. Even before humans arrived on the continent deer populations fluctuated widely, due to natural, weather-related phenomena and predators. Archaeological records show that the ancestors of modern-day whitetails and humans have shared much of North America for thousands of years. Historically, whitetail populations were highest east of the Mississippi River. Populations across the continent went through several peaks and declines prior to 1500 and were impacted mainly by Native Americans. The carrying capacity of the land at this time was lower than it is today, primarily because mature forests dominated the landscape and whitetails prefer intermediate successional stages of forest and also because agricultural crops were not as prominent on the landscape. Deer select for transition areas between forest and grassy openings, prairie, or agriculture. Native Americans, perhaps the first wildlife managers, were aware of this and intentionally set fires to clear openings in the forests to benefit whitetails.

If we look at longer, more biologically significant timescales, we see that whitetail range has not really changed much in the last several centuries. The expansion of whitetail populations that we now perceive is just a small blip of prosperity when considering a large timescale. It is likely little more than recovery from a steep decline in populations resultant from the combination of intense market and subsistence hunting

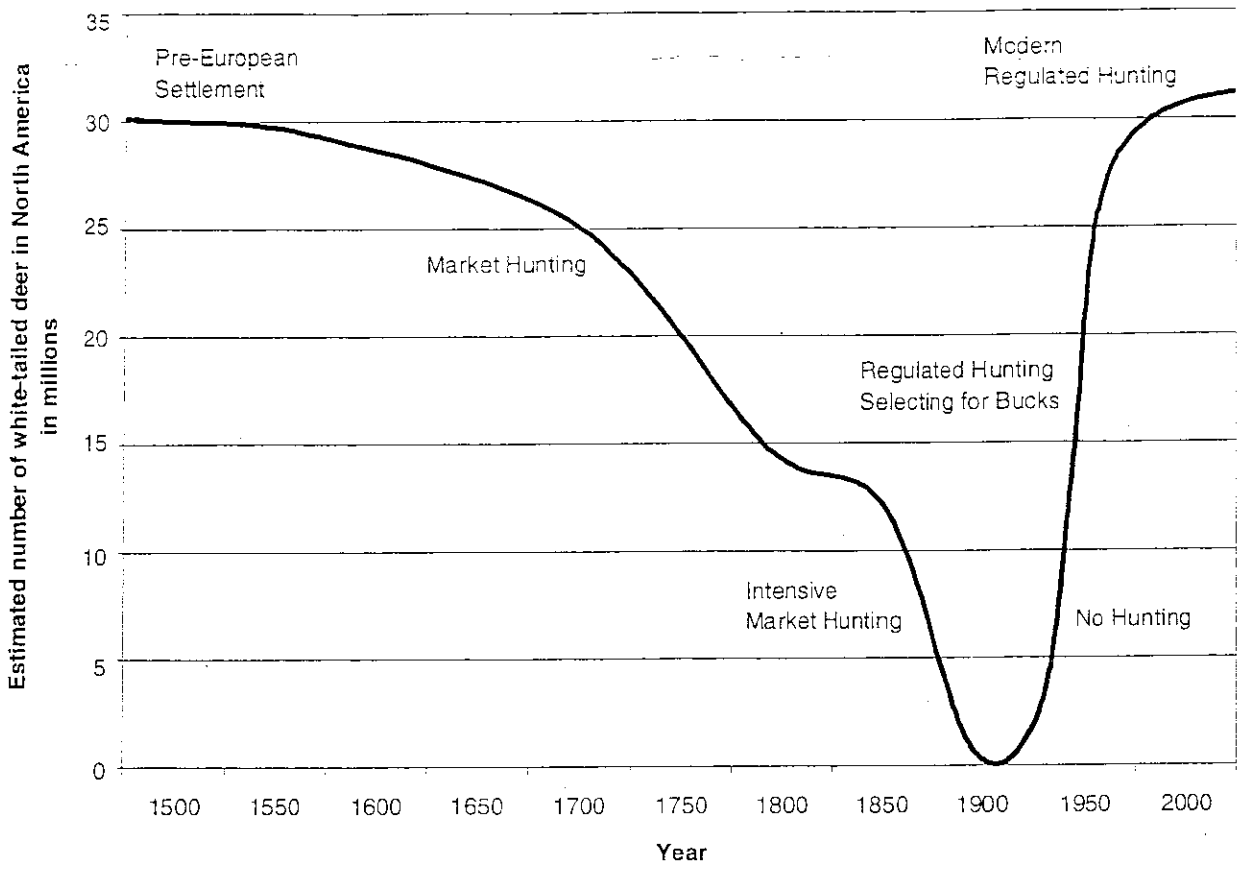


Figure 1. Graph of the estimated number of white-tailed deer in North America since European settlement and the major factor driving deer populations by period.

and logging that took place from colonial times until about 1900, when laws were enacted to protect the remaining deer. There was more hunting pressure on the country's whitetails and other wildlife (e.g., buffalo, passenger pigeon) during the late 1800s than during any other. Following this period, when hunting became regulated, forests began to regenerate, and some states reintroduced whitetails, populations began to flourish. Eastern states like New York and Pennsylvania were the first to experience the rebound, followed by Great Lakes states like Michigan and Wisconsin.

The populations and ranges of white-tailed deer, and other wildlife species, are dynamic on both short and long time scales, continually expanding and retreating. These phenomena are quite natural. What we are seeing with white-tailed deer is not so much range expansion, but population density increasing within the range. Human populations in North America are a good corollary to this. Humans are a species whose populations are higher than ever, on most any spatial or temporal scale you choose. Over the course of centuries, mankind has dispersed to increase their density in virtually every favorable, and even unfavorable, habitat on the continent. Though at least some humans have previously lived in virtually all habitat types, their densities are now higher throughout. On a shorter timescale and to hit closer to home, consider the shifting human densities related to the urban sprawl you see around any prospering metropolis as city and country folk move to suburbia. Rural inhabitants continue to be attracted to the city and city inhabitants yearn for the country, but need to be within commuting distance.

What we as hunters are most familiar with, from the inception of modern wildlife management and bowhunting to the present is truly just a blip on the screen of evolutionary time. White-tailed deer occupy a broad range from near timberline in southern Canada (60 degrees north latitude), south through the United States,

Mexico and Central America, into South America, where they can be found to 15 degrees south latitude. The widest ranging of big game species, the whitetail can be found across 78 degrees of latitude, from northern coniferous forests to tropical forests and nearly everywhere in between. Across their range, whitetails look essentially the same, though there are enough differences that some taxonomists divide the species into as many as 30 subspecies. Essentially, they grow largest in northern latitudes and in fertile agricultural regions while they tend to be smaller further south.

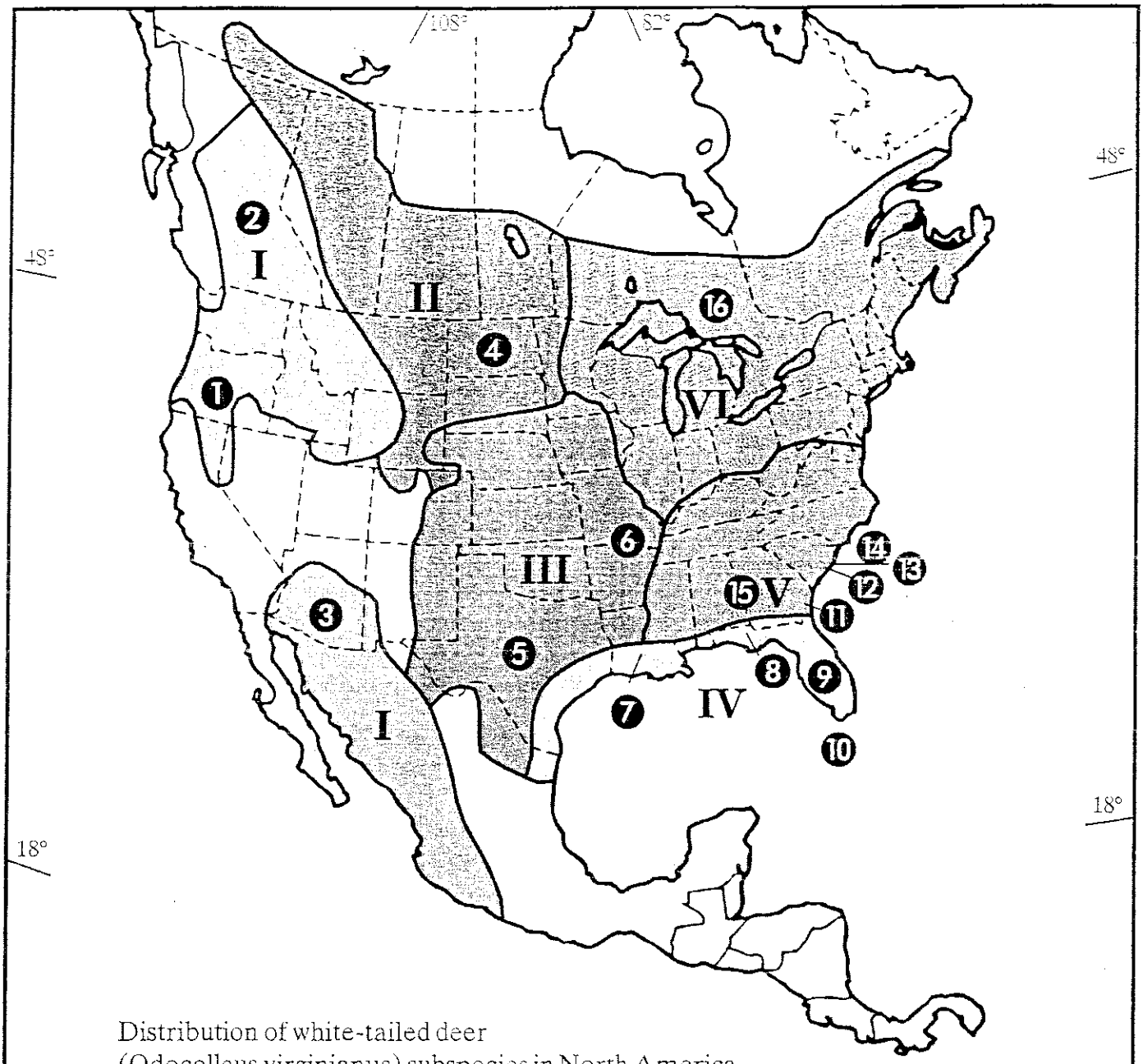
Within this range, today we enjoy the presence of whitetails in areas where Saxton Pope and Art Young could not have hunted them. One hundred years ago the range of white-tailed deer was more geographically restricted than today. Pope and Young, in the early 1900s, nor Fred Bear, in the mid 1900s, never had the opportunity to chase whitetails along the rivers of eastern Colorado and Wyoming, because whitetails, for the most part, were not there. Today bucks from these areas grace the pages of the Pope and Young Record Book. It is likely that these deer are descendants of Old Mossy Horns, harvested by Del Austin in 1962 near Grand Island, Nebraska along the Platte River, at what was essentially the western extent of whitetail range in the Great Plains at that time. In the lifetime of the last two or three generations of hunters, whitetails have expanded their range and increased in density across the western United States and the prairie of southern Canada, in most cases moving up vegetated river drainages that provided them cover.

Places that have no whitetails are essentially areas where the species cannot exist because their needs cannot be met. Examples of inhospitable habitats include the barren deserts of Nevada and northern latitudes beyond where agricultural crops can be grown. Within the broad geographic range of the whitetail are regions without notable numbers of individuals. Such areas include forested mountain ranges and extensive tracts of homogeneous, vast coniferous forest.

Impacts of Habitat Succession and Manipulation

Deer are irregularly distributed throughout their range, with favorable habitat being the key determinant of their distribution. Quantity and quality of cover are the major limiting factors. As habitat becomes favorable, deer colonize it. As a whole, habitat changes caused by humans in recent history have widely benefited the adaptable white-tailed deer. Large scale conversion of undeveloped land to agricultural purposes, in tandem with related activities such as well-managed cattle grazing and allowing riparian habitat to mature, combined to create a mosaic of complex, diverse vegetation that whitetails capitalize on, often to the detriment of the more habitat-specific mule deer. As whitetails expand their range into the Great Plains (primarily westward) they do so by following riparian zones along river and stream corridors. The permanent cover along waterways is often excellent deer habitat and borders agricultural food sources. Prior to the damming of rivers and diverting flows for human use, the course of rivers changed frequently enough that permanent vegetation could not become established because of the scouring effects of intense spring runoffs. Deer populations, then, fill in between riparian areas if the habitat is suitable; in the Great Plains, this is often influenced by irrigated agriculture.

Another example of creating habitat favorable to deer occurred from the mid 1800s to the early 1900s when pioneering agricultural attempts and logging in the northern portions of Great Lakes states turned marginal deer habitat into excellent deer habitat. This occurred because farming and logging opened up the forest canopy, resulting in a range of successional stages from grassy meadows to regenerating aspen and hardwoods to old-growth timber. As a result, northern Wisconsin and Michigan were traditionally (since the inception of modern hunting) the most popular regions in those states to hunt. Today, due primarily to forest succession, the region is again becoming less attractive deer habitat. Its ability to support high populations of deer is decreasing as succession has resulted in large expanses of mature forest. Concurrently, the intensification of agriculture in the southern portions of these states has led to a shift in deer populations. Traditionally, the greatest numbers and largest deer in these states were in the north; now, the highest densities and many of the largest bucks are in the southern, agricultural regions of these states.



Distribution of white-tailed deer
(Odocolleus virginianus) subspecies in North America

REGION I

1.) O.v. leucurus
2.) O.v. ochrourus
3.) O.v. couesi

REGION II

4.) O.v. dacotensis

REGION III

5.) O.v. texanus
6.) O.v. macrourus

REGION IV

7.) O.v. mcilhennyi
8.) O.v. osceola
9.) O.v. seminolus
10.) O.v. clavium

REGION V

11.) O.v. nigribarbis
12.) O.v. hiltonensis
13.) O.v. venatorius
14.) O.v. taurinsulae
15.) O.v. virginianus

REGION VI

16.) O.v. borealis

Figure 2. Map of white-tailed deer range and subspecies in North America (map provided by Whitetails Unlimited, Inc.).

From a nationwide perspective, think about some of the trends we have seen during our hunting lifetime: From going "up north" or to the big woods to hunt, to seeing population size and individual quality of whitetails increase in agricultural regions and states (i.e., Illinois, Iowa), and now transitioning to states dominated by agricultural and prairie habitats (i.e., Kansas, Nebraska). Further, consider how deer can prosper in proximity to human development. Deer habituate to humans in urban areas where humans do not represent predators because there is no or little hunting. In these areas humans actually make good neighbors for deer, they often supplementally feed the deer and there are few predators in urban areas – unless, of course, you consider vehicles to be predators.

Range Expansion

Range expansions likely begin seasonally. For example, at northern latitudes deer historically yard during the winter. They may spend their summers in regions dominated by agriculture and hardwood forest, but winter snows makes retreating to thick coniferous forests a necessity. After a series of mild winters, a proportion of the population may begin to winter in habitat that formerly could only sustain them in the summer. Without a return of heavy snows this pattern can, and in some local areas has, effectively led to range expansions.

Another example occurs in the agricultural Midwest and Great Plains, where a proportion of some deer populations undergo seasonal migrations. These deer winter in large, forested tracts and summer in agricultural regions where the only permanent cover may be that found along waterways and shelterbelts. Deer in these regions are forced into the large woods in the fall, when crop harvest and leaf drop leave them exposed and vulnerable if they remain in their summer haunts. If, through succession, places in summering areas are permitted to develop into more favorable habitat, they can eventually develop into areas that could support deer year round. When this occurs, some deer may cease their annual migrations and establish themselves permanently, in the process increasing the range of the species.

Role of Modern Deer Management in High Densities and Range Expansion

From the first modern-day deer hunting seasons until the last 10 to 20 years, state agencies managed deer herds for hunter opportunity, concentrating hunting on bucks and tightly regulating harvest of does. By managing for does, populations may expand to fully occupy available habitats. When this occurs, densities may approach biological carrying capacity. At this point, it is in the best interest of a portion of the population to leave the area; this phenomenon may not only be the best strategy for dispersing individuals to maximize their quality of life (by finding more abundant resources), but it takes some pressure off of remaining individuals, thereby increasing their quality of life. Biologically speaking, it can increase the fitness of the disperser and those left behind, and it also increases the genetic fitness of the entire population. This basic biological concept is explained by a variety of ecological theories (e.g., the source-sink hypothesis, perculation theory, rose petal hypothesis, dispersion theory). The premise is that animal populations expand to fill suitable vacant space. Simply put, for the most part, human manipulations of North America's landscape have made more space suitable and available to whitetails – for the time being. Of course, some activities negatively impact deer by reducing available habitat. By being adaptable and having a flexible diet, when burgeoning deer populations in rural areas motivate some individuals to disperse they find favorable conditions in suburbia and flourish.

Competition with Mule Deer

Mule deer and white-tailed deer ranges overlap across a large area of western North America. Competition between the two species has been proposed as a major factor influencing segregation, although actual competition leading to improved survival of either mule deer or whitetails has not been documented. Factors such as differences in behavior, morphology, and physiology which may contribute to subtle differences in habitat and diet selection are probably more important determinants of segregation. In general, the two species effectively segregate themselves spatially even where their ranges

overlap; in such areas, they tend to occupy different niches. As a general rule, mule deer have specialized at the more arid, open range end of the habitat spectrum while whitetails have dominated the forested, mesic end. Whitetails are at a disadvantage in the quest for food and water in arid habitats where mule deer dominate, at least partly because white-tailed deer are smaller in body size and occupy more restricted home ranges.

Hybridization between whitetails and muleys is often of interest to hunters, and many have seen hybrids, though not many exist. A stotting mule deer buck has little hope of catching up with a white-tailed doe in estrous. The whitetail ritual of "playing hard to get" by dashing through, over and under vegetation virtually assures that muley bucks do not breed whitetail does. Conversely, a driven whitetail buck has only a slightly better chance of overtaking a muley doe as she effortlessly stots across the prairie, leaving the exhausted whitetail buck behind. When it does occur, whitetail bucks are more likely to breed muley does than visa versa; this could negatively impact mule deer populations because if a muley doe is bred by a whitetail buck she is effectively prevented from adding muley fawns to the population that year. Any hybrids that may be born are essentially "dead ends." They often have low survival rates because of their confused reactions to predators and hunters (a mix of whitetail and muley characteristics). These individuals are also likely to be infertile.

Future

Given the adaptability of the whitetail and the increasing scale of conflicts with humans in agricultural (crop damage) and suburban environments (deer-vehicle collisions, damage to ornamental vegetation, disease threats), it could be said that we have been too successful in restoring the white-tailed deer. Until recently, deer harvest strategies, which were designed to optimize hunter opportunity at the expense of the male component of the population, resulted in skewed age structures (fewer older adult bucks) and sex ratios. Hence, deer population growth continued essentially unchecked despite the fact that buck harvests were excessive. A paradigm shift in deer management, that will help to alleviate these problems, is occurring. State agencies and hunters who manage private lands are beginning to manage for lower densities and healthier populations. The goal is to keep populations in check with habitat capacity and comprised of "natural" sex and age ratios. A bonus of this concept for hunters is that it results in populations with more adult bucks.

The ranging of whitetails into urban areas, where some forms of hunting may not be safe or socially acceptable, requires the consideration of other management strategies. Research, though, has shown that bowhunting can be an effective and safe method of managing urban whitetails. Non-lethal management techniques include fencing, repellents, frightening devices, and deer-resistant plants, all of which may have some application. Immunocontraception is often brought up as a potential means of managing deer in urban areas, but its practical application is profoundly problematic.

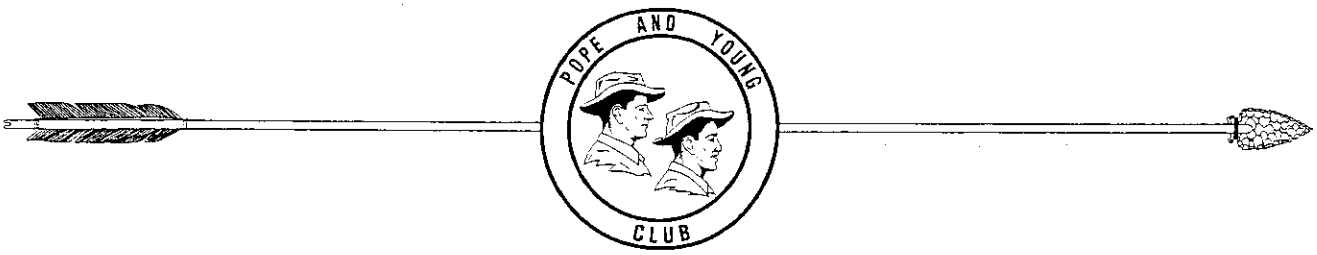
Special consideration must be given to endangered subspecies of white-tailed deer (such as the Florida Key and Columbian whitetail, which occur at edges of whitetail range). To attempt to coherently discuss range expansion and recession of the differing subspecies would be futile. Suffice it to say that neighboring subspecies do interact and interbreed, therefore, differences near the borders of differing subspecies' ranges are less prominent than in the middle of a given subspecies' range. Further, through reintroductions, and transfer of deer from region to another by humans for other reasons, the subspecies picture becomes increasingly muddled.

For the most part, I believe that white-tailed deer range will not expand much beyond where it presently is, pending landscape changes imposed by humans that make the habitat in regions more or less suitable. Densities within the range of whitetails, however, will continue to increase and decrease over time on regional and smaller scales. These population responses will depend on both natural and human-induced habitat changes.

Kurt VerCauteren, United States Department of Agriculture/Animal Plant and Health Inspection Service/Wildlife Services/National Wildlife Research Center, 4101 LaPorte Ave., Fort Collins, CO 80521

BOWHUNTING
RECORDS of NORTH AMERICAN WHITETAIL DEER

SECOND EDITION



EDITED BY
GLENN HISEY
KEVIN HISEY

DESIGN BY
STEVE ASHLEY

1993

The deer boom: discussions on population growth and range expansion of the white-tailed deer. (2003. Pages 15-20 in G. Hisey and K. Hisey, editors. Bowhunting records of North American whitetail deer. Pope and Young Club, Chatfield, MN, USA)