

BUCK MOVEMENTS AND MORTALITY: LIMITATIONS IN QDM PROGRAMS

BY BRONSON STRICKLAND AND DR. STEPHEN DEMARAIS

Photo by Wyman P. Meinzer

Quality Deer Management (QDM) is an increasingly popular management strategy with today's landowners and hunters. QDM typically involves protection of young bucks coupled with an adequate harvest of antlerless deer to produce the desired herd size, age structure, and sex ratio. However, some landowners and hunters become frustrated with QDM after several seasons because they have not seen or harvested significantly older bucks than under previous management. In many cases, expectations exceed the ability of the management area to produce the desired number of older bucks. Additionally, many landowners and hunters do not understand how buck movements and mortality factors can limit the number of young bucks they are passing as yearlings from

reaching the older age classes. In this article we will review how buck mortality, dispersal, and home range size may impact the success of your QDM program.



Photo by Dr. Stephen Demarais

A relatively uncommon cause of non-hunting mortality occurs when two bucks lock antlers during sparring or aggressive confrontations. This situation, however, is more common under QDM where adult bucks are more numerous.

Mortality

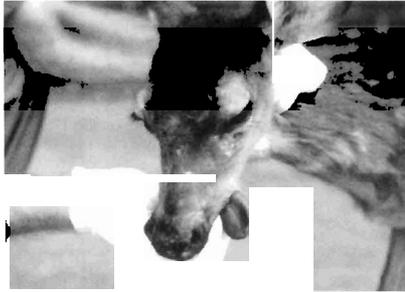
The annual mortality rate for a deer herd is simply the percentage of the population that dies in a given year. Mortality can be attributed to hunting, poaching, predators, weather, disease, malnutrition, vehicle collisions, etc. Mortality rates vary by sex and age of deer and by season and region of the United States (Table 1). Understanding the most common sources of mortality in your area and the percentage of bucks lost to these sources will help you refine your management strategies.

Table 1. Reported survival and mortality rates for male white-tailed deer throughout the United States and Canada.

Location	Annual Survival	Annual Mortality	Hunting Mortality	Natural/Nonhunting Mortality	Predatory-caused Mortality	Source
New Brunswick (> 2 years)	0.47	0.53	0.23	—	0.25	1
Northeast Minnesota	0.47	0.53	0.28	—	0.19	2
North Central Minnesota	0.46	0.54	0.41	—	0.06	3
North Michigan (> 2 years)	0.22	0.78	0.72	0.00	0.00	4
North Michigan (yearlings)	0.25	0.75	0.47	0.16	—	4
South Texas (> 2 years)	0.71	0.29	0.05–0.12	0.08–0.23	—	5
Southwest Washington	0.60	0.40	—	—	—	6
Coastal South Carolina	—	—	0.20–0.24	0.08–0.12	—	7
Mississippi (1.5 years)	0.82	0.18	0.16	0.02	—	8
Mississippi (2.5 years)	0.63	0.37	0.30	0.05	—	8
Mississippi (3.5 years)	0.53	0.47	0.40	0.06	—	8
Mississippi (4.5 years)	0.44	0.56	0.44	0.10	—	8
Mississippi (5.5+ years)	0.50	0.50	0.32	0.14	—	8
Maryland (1–18 months)	0.44	—	—	—	—	9

Legal harvest is a significant source of mortality in most areas, and is controlled with regulations and hunter selectivity. Illegal harvest, on the other hand, is not easily controlled and has not been quantified, but is assumed to be substantial. In most of the Southeast, legal and illegal harvest account for most of the annual buck mortality.

Populations near the northern and southern boundaries of the whitetail's range have the highest reported non-hunting mortality. In these regions, up to 25 percent of all bucks may be killed annually by predators. Coyotes, wolves, and black bears have been predators of whitetails in the North, whereas, coyotes and mountain lions are the prominent predators in the Southwest.



Hemorrhagic disease or "blue-tongue" is caused by one of several viruses transmitted by biting midges. This disease is one of the most common causes of non-hunting mortality in white-tailed deer, particularly in the south and central United States. Severely infected animals, particularly those found dead, often exhibit the typical blue tongue (top left). Deer that survive the disease often have sloughing hooves (top right). None of the viruses that produce this disease are infectious to humans. Photos by SCWDS.

The Southeast no longer has viable populations of large predators such as wolves and mountain lions that are capable of killing adult deer. Coyotes and bobcats are about the only significant predators of whitetails in the Southeast, and they mostly take fawns and adults that are sick or injured.

Most health-related mortality in the Southeast can be attributed to two causes—hemorrhagic disease and malnutrition-parasitism syndrome. Hemorrhagic disease (also known as blue-tongue) viruses can kill up to 50 percent of a deer herd, although mortality rates are typically less than 15 percent. Deer populations in the South are confronted with these viruses much more frequently than their northern counterparts and have developed some immunity. Deer populations in northern latitudes may only encounter the disease every 5-10 years and suffer much higher mortality rates.



Severe malnutrition, which is generally associated with overpopulated deer herds, is another major cause of non-hunting mortality in white-tailed deer.

Malnutrition-parasitism syndrome is generally associated with high-density deer populations where the habitat has been chronically overbrowsed or where populations occur on very poor quality habitats. Nutritional stress makes deer much more vulnerable to both internal and external parasite infestations. Primary internal parasites include the large stomach worm and lungworm. Major external parasites include ticks and keds (deer lice). High deer densities can increase the transmission of these parasites to other deer. Actual

mortality rates vary by parasite species and age and health of deer.

Legal and illegal hunting are usually the most important mortality factors in the Southeast. In comparison, legal hunting, weather, and predation are probably the most important in the North and Southwest.

Dispersal

Dispersal is the process of an animal moving from its point of origin to where it reproduces. Most animals exhibit some form of dispersal to ensure exchange of individuals over time. Dispersal of bucks to and from your property can significantly impact the success of your management plan.

Reported dispersal rates vary from 40 percent in Virginia to

70 percent of bucks 8-18 months old in Maryland. Researchers in Maryland found that the number of yearling bucks dispersing *onto* their property was much lower than the number of yearling bucks dispersing *from* their property. This resulted in an annual net loss of yearling bucks. They suspected the reason for unequal

dispersal was the intense harvest pressure from neighboring properties.

Legal harvest is typically the most significant factor limiting the success of QDM programs. Research in Mississippi demonstrated that the most significant cause of buck mortality was legal harvest. Clearly, control of legal harvest is required for a successful QDM program. Properties less than several thousand acres also must rely on cooperation from neighboring hunters.

Home Range Size

Home range is simply the area that an animal travels during its normal activities and is estimated during specific time periods (e.g., breeding or annual home range). Whitetail home range size varies by sex, age, and habitat type. Home range sizes of bucks throughout the United States are listed in Table 2. The average annual home range size for females is around 300-600 acres. The average annual home range for bucks is probably 2-4 times larger (600-2,400 acres), and older bucks generally have larger home ranges than younger bucks.

Table 2. Reported home range sizes of male white-tailed deer throughout the United States.

Location	Sample Size	Acres	Square Miles	Hectares	Square Kilometers	Source
Mississippi	5	3734	5.8	1511	15.1	10
Florida (Everglades)	10	1730	2.7	700	7.0	11
Florida (Everglades)	23	717	1.1	290	2.9	11
Florida	5	1732	2.7	701	7.0	12
Washington	7	515	0.8	209	2.1	13
Michigan	—	351	0.5	142	1.4	14
New York (Summer)	34	576	0.9	233	2.3	15
New York (Winter)	12	371	0.6	150	1.5	15
Texas (Coastal Blend)	14	343	0.5	139	1.4	16

Figure 1. Effects of Natural Mortality, Legal Harvest, and Illegal Harvest on a Hypothetical Buck Population.

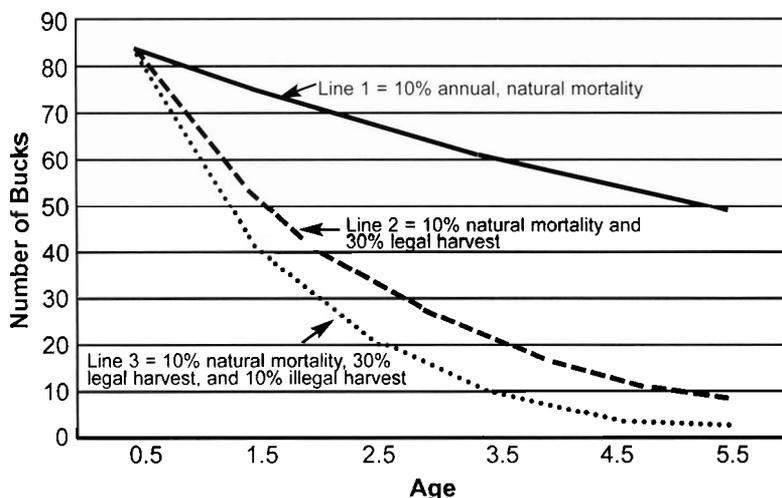


Photo by Stephen Demaris

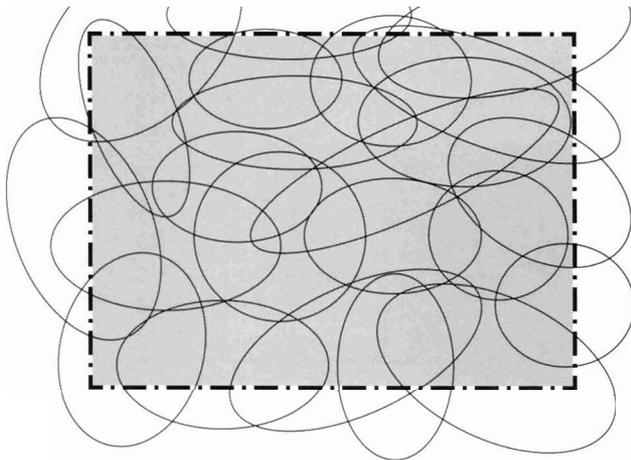
The above South Texas buck was killed by coyotes during the late summer. While predation is not generally considered a major source of non-hunting mortality, high predator populations, especially larger predators such as coyotes, wolves, and bears can affect management success.

Management Implications

We will use some hypothetical examples to illustrate how movement and mortality factors can affect the number of bucks on your property and, thus, the success of your QDM program. Suppose you are managing a 5,000-acre property with a deer density of 1 deer per 16 acres. If the adult buck to adult doe ratio is 1:2 and the annual fawn survival is 80 percent, you should have around 83 buck fawns alive at the beginning of the hunting season. Now we will evaluate the effects of natural mortality and harvest on these 83 buck fawns, and calculate how many would survive to maturity (Figure 1).

Line 1 represents the effect that a 10 percent annual natural mortality rate would have on this group, with only 73 percent (61 of 83) surviving to 3.5 years old and 60 percent (50 of 83) surviving to 5.5 years old. Line 2 represents the effect of a 10 percent annual natural mortality rate and a 30 percent annual legal harvest. Only 25 percent (21 of 83) would survive to 3.5 years old and only 10 percent (8 of 83) would survive to 5.5 years of age with this combination. Line 3 represents the effect of a 10 percent annual natural mortality rate, a 30 percent annual legal harvest, and a 10 percent annual illegal harvest. Only 13 percent (10 of 83) would survive to 3.5 years while only 4 percent (3 of 83) survive to 5.5 with this scenario. Now imagine how these figures would change if you included unequal dispersal rates off and onto your property.

Now let us use the information on home range size to see how it could impact harvest levels on your property. If you have a 100-acre tract of land, no deer will be totally protected given the average home range size of over 600 acres. Let us look at another example, with a 5,000-acre tract (Figure 2). The box represents a property boundary and the circles represent the home ranges of deer. You can see that most of the deer could be vulnerable to harvest on surrounding properties. As the size of the management unit increases, the number of bucks that can be protected within the management unit also increases. Property size and harvest intensity on peripheral properties can have a big impact on the success of your management plan.



Another source of frustration for hunters can come from differences in the susceptibility of bucks to harvest. The absence of older aged bucks in the harvest can lead hunters to believe that these animals are not present in the herd. Often older bucks do not expose themselves to hunters during daylight hours with about the only harvest opportunities occurring during the rut. Therefore, it is possible these older aged bucks are present but are not being harvested.

Conclusions

We hope the information provided in this article will assist you in understanding some of the factors that can affect the success of your QDM program. Local harvest rates, natural mortality rates, dispersal rates, and home range size all can play an important role in the success or failure of a plan. Landowners and hunters must have goals and expectations that are reasonable given these limitations. The degree to which a QDM program works is dependent on these and many other factors. Consultation with a biologist from your specific region about these considerations can help you fine-tune your management program and increase your chances of success. 🦌

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