Wounding Rates of White-tailed Deer with Traditional Archery Equipment

Article · December 2007

CITATIONS
2

READS
834

7 authors, including:

Stephen S. Ditchkoff
Auburn University
80 PUBLICATIONS **1,181** CITATIONS
SEE PROFILE

Ronald E. Masters
University of Wisconsin …
75 PUBLICATIONS **1,648** CITATIONS
SEE PROFILE

Wounding Rates of White-tailed Deer with Traditional Archery Equipment

Stephen S. Ditchkoff, *Department of Zoology and Oklahoma Cooperative Fish and Wildlife Research Unit, Oklahoma State University, Stillwater, OK 74078*

Edgar R. Welch, Jr., *Department of Zoology and Oklahoma Cooperative Fish and Wildlife Research Unit, Oklahoma State University, Stillwater, OK 74078*

Robert L. Lochmiller, *Department of Zoology, Oklahoma State University, Stillwater, OK 74078*

Ronald E. Masters, *Department of Forestry, Oklahoma State University, Stillwater, OK 74078*

William R. Starry, *McAlester Army Ammunition Plant, McAlester, OK 74501*

William C. Dinkines, *Oklahoma Department of Wildlife Conservation, 1801 N. Lincoln, Oklahoma City, OK 73105*

Abstract: We captured and affixed radio collars to 80 male white-tailed deer (*Odocoileus virginianus*) during 1995–1997 to ascertain the wounding rate and proportion of deer that die from hunter-inflicted wounds. Our study population was hunted only with traditional archery equipment (recurve and longbows). Of the 22 deer shot by archers, 11 were recovered by the hunter, resulting in a 50% wounding rate (deer shot but not recovered). Only 3 (14%) of the 22 deer shot by hunters died and were not recovered. Based upon demographic and harvest statistics, these estimates indicate that approximately 4% of adult males in the population die from archery related wounds annually and are never recovered.

Proc. Annu. Conf. Southeast. Assoc. Fish and Wildl. Agencies 52:244–248

It has been speculated that wounds acquired during the hunting season are a major source of mortality for white-tailed deer (*Odocoileus virginianus*), yet existing information often is conflicting or based upon conjecture rather than science. In addi-

tion, data designed to determine the fate of wounded deer is difficult to obtain and is virtually nonexistent in the literature. Because intensive management practices rely upon accurate estimates of mortality, it is essential to have accurate estimates of wounding rates when modeling population dynamics. Our goal was to quantify wounding rates (proportion of deer shot by hunters but never recovered) of white-tailed deer with traditional archery equipment and to determine the proportion of wounded deer that actually die from their wounds.

Funding and support were provided by the U.S. Army and the Oklahoma Cooperative Fish and Wildlife Research Unit (Okla. Dep. Wildl. Conserv., Okla. State Univ., Wildl. Manage. Inst., U.S. Geol. Surv. Biol. Resour. Div., cooperating). B. J. Farrar, D. E. Townsend II, and S. Grubbs provided assistance in the field.

Methods

The study was conducted at the McAlester Army Ammunition Plant in southeastern Oklahoma during 1995–1997. The McAlester Army Ammunition Plant is an ammunition production and storage facility of the U.S. Department of Defense with 18,212 ha under a quality deer management program. Access onto the base is strictly controlled and hunting is limited to traditional archery equipment. Six 3-day hunts are conducted during October and November and an average of approximately 1,300 hunters participate annually (Ditchkoff et al. 1996). All deer harvested on the base must be reported at the deer check station of the McAlester Army Ammunition Plant.

The vegetation of the area is tallgrass prairie (60%) interspersed with post oak (*Qeurcus stellata*) and blackjack oak (*Q. marilandica*) forest (40%) (Duck and Fletcher 1943). Water oak (*Q. nigra*) and red oak (*Q. shumardii*) drainages and brushy draws bisect the area. Ditchkoff et al. (1996, 1997) provided a more complete description of the vegetation and management on the McAlester Army Ammunition Plant.

We captured 80 adult male deer during January 1995–1997 using drop nets (Ramsey 1968) on sites prebaited with corn and persimmons (*Diospyros virginiana*). We fitted each captured deer with a radio collar (Adv. Telemetry Sys., Isanti, Minn. 55040) equipped with a 4-hour mortality sensor. Total radio-collared deer alive at the beginning of each hunting season ranged from 37 to 47. We monitored deer daily during archery hunts using a 3-element Yagi antenna and portable receiver. Prior to each hunt, all hunters were instructed to inform the hunt coordinator when they shot a radio-collared deer. Each report of a wounded deer was verified by the presence of blood or a visual confirmation by the hunter that the arrow had struck the deer. We monitored wounded deer every 4–8 hours for $\geq$ 5 days to enable timely necropsies of deer found dead. When we received a mortality signal, we waited until hunters had left the area (sunset) to locate the deer and ascertain cause of death. We left all wounded deer in the field and did not confer with hunters regarding the fate or location of wounded deer so as not to influence recovery rates.

Results and Discussion

During the study, 22 of the 80 bucks with radio collars were shot by archers, and 11 (50%) of those deer were recovered (Table 1). Of the 11 deer that were wounded but not recovered, 3 died from their wounds, resulting in a wounding loss of 14%. At the time of necropsy, we found wounds in the abdominal area and determined that integrity of the alimentary tract had been compromised. Two of the deer died within 24 hours of being shot, but the third deer survived 5–7 days before succumbing to his wounds. Of the 8 deer shot by archers that survived, we determined (e.g., visual sighting, necropsied at a later date, hunter information) that arrow entry was near the dorsal cavity (trapezius or lumbo-dorsal fascis muscles) or in the shoulder and had resulted in only a flesh wound.

Because a high proportion of wounded deer survive at the McAlester Army Ammunition Plant, population models are adjusted accordingly. Based on demographic calculations and annual census data (sex ratio, population density, etc.), approximately 15% of the adult males at the McAlester Army Ammunition Plant are harvested each year. This suggests another 15% of the males are wounded (50% wounding rate) by hunters but never recovered. After extrapolating wounding loss estimates to these values, we estimated approximately 4% of adult male deer at the McAlester Army Ammunition Plant die from archery related wounds annually and are never recovered by hunters. These estimates indicate that wounding losses due to archery hunting at the McAlester Army Ammunition Plant are negligible relative to other forms of mortality (e.g. hunter harvest, rut-related mortality, predation) (E. R. Welch, Jr. unpubl. data). However, in management strategies with higher archer densities, heavy pressure on the male portion of the herd, and elevated sex ratios (female:male), wounding loss could potentially be a significant source of mortality for male deer.

The 50% wounding rate from our data is similar to data reported from other studies. Downing (1971) and Boydston and Gore (1987) reported wounding rates of 50% with archery equipment for white-tailed deer in Georgia and Texas. Similar wounding rates have been reported in Georgia (44%; Croft 1963), Indiana (58%; Stormer et al. 1979), New Jersey (55%; Lohfield 1980), Wisconsin (31–37%; Herron 1984), South Dakota (48% McPhillips et al. 1985), and Michigan (43%; Langenau

Table 1. Wounding data from traditional archery hunts at the McAlester Army Ammunition Plant during 1995–1997.

Year	Collared deer[a]	Archery hits	Lived	Died	
				Found by hunter	Not found by hunter
1995	47	7	4	2	1
1996	45	7	1	5	1
1997	37	8	3	4	1
Total	129	22	8	11	3

a. Number of collared deer present at the beginning of the hunting season (1 Oct).

1986). Other studies have reported lower wounding rates in Wisconsin (10%; DeBoer 1958), New York (7%; Severinghaus 1963), Iowa (17%; Gladfelter 1982; Gladfelter et al. 1983) and Michigan (12%; Langenau and Aho 1983). With the exception of Gladfelter et al. (1983) and Severinghaus (1963) who noted traditional archery, these studies did not indicate the type of archery equipment (e.g., compound or traditional) used by hunters. We speculate that in studies before 1975 the predominant archery type was probably traditional, with a gradual shift to compound equipment during 1975–1985.

Although wounding data are valuable, they cannot be used to adjust demographic models without information on the fate of the wounded deer. The most comprehensive study of archery wounding rates to date has been the Camp Ripley study in Minnesota (Krueger 1995). Through a complex study design involving hunter surveys, ground searches for dead deer, and infrared video searches for wounded deer, Krueger (1995) calculated a wounding loss estimate of 13% and noted that 45% of these deer were recovered by other hunters. Similarly, Herron (1984) and Lohfield (1980) reported wounding loss estimates based upon ground searches of 9% and 11%, respectively.

Other researchers have attempted to document the fate of wounded deer, but their results have been conflicting and confusing due to the form in which the data were reported. Based on searches for dead deer after archery hunts, Severinghaus (1963) found that 0.67 deer died from archery related wounds for every 10 deer harvested. Stormer et al. (1979) reported that when bowhunting accounted for 25% of the hunting effort, 18% of deer carcasses located in searches had died from archery related wounds.

Although we feel our estimates for both wounding and the proportion of deer that die from their wounds are realistic, our data could potentially be biased in 2 ways. First, some hunters may have failed to report that they had shot a collared deer. If this occurred, the actual wounding rate would have been greater and the proportion of wounded deer that died would have been lower than our estimates. Another possible source of error could have been caused by hunters incorrectly reporting that they had shot a collared deer. However, we find this scenario to be unlikely because hunters were rigorously questioned to ensure their arrow had actually struck the deer, and wounded deer were monitored closely for signs of wounds (visual sightings, activity patterns, etc.).

Our data suggest that wounding rates of white-tailed deer approaching 50% are possible when using archery equipment, but the majority (73%) of those deer survive. These estimates corroborate other comprehensive studies that have reported wounding loss estimates below 20% (Lohfield 1980, Herron 1984, Krueger 1995). As a result, inflated estimates based upon conjecture (Dechert 1967, Benke 1989) rather than science should be accepted as opinion rather than fact. Hopefully, our data will be used to improve management programs by providing accurate wounding estimates to be incorporated into demographic models, and will help eliminate some of the confusion and controversy which surrounds archery hunting.

Literature Cited

Benke, A. 1989. The bowhunting alternative. B. Todd Press, San Antonio, Texas. 110pp.

Boydston, G. A. and H. Gore. 1987. Archery wounding rates: a synopsis. Page 77 *in* R. F. Harlow and D. C. Guynn, Jr. eds. Southeast Deer Study Group annotated bibliography, 1977 to 1990. The Samual Roberts Noble Found., Ardmore, Okla.

Croft, R. L. 1963. A survey of Georgia bowhunters. Proc. Southeast Assoc. Game and Fish Comm. 17:155–163.

DeBoer, S. G. 1958. Less waste in the woods. Wisc. Conserv. Bull. 23:13–17.

Dechert, J. A. 1967. The effects of overpopulation and hunting on the Fort Knox deer herd. Proc. Southeast Assoc. Game and Fish Comm. 21:15–23.

Ditchkoff, S. S., E. R. Welch, Jr., R. L. Lochmiller, R. E. Masters, W. C. Dinkines, and W. R. Starry. 1996. Deer harvest characteristics during compound and traditional archery hunts. Proc. Annu. Conf. Southeast. Assoc. Fish and Wildl. Agencies 50:391–396.

———, ———, W. R. Starry, W. C. Dinkines, R. E. Masters, and R. L. Lochmiller. 1997. Quality deer management at the McAlester Army Ammunition Plant: a unique approach. Proc. Annu. Conf. Southeast. Assoc. Fish and Wildl. Agencies 51:389–399.

Downing, R. L. 1971. Comparison of crippling rates of white-tailed deer caused by archery, buckshot, and shotgun slugs. Proc. Annu. Conf. Southeast. Assoc. Game and Fish Comm. 25:77–82.

Duck, L. G. and J. B. Fletcher. 1943. A survey of the game and furbearing animals of Oklahoma. State Bull. No. 3, P-R Series No. II. 144pp.

Gladfelter, H. L. 1982. Deer in Iowa – 1981. Iowa Res. Bull. No. 32. 23pp.

———, J. M. Kienzler, and K. J. Koehler. 1983. Effects of compound bow use on deer hunter success and crippling rates in Iowa. Wildl. Soc. Bull. 11:7–12.

Herron, J. S. C. 1984. Deer harvest and wounding loss associated with bowhunting white-tailed deer. M.S. Thesis, Univ. Wisc., Madison. 35pp.

Krueger, W. 1995. Aspects of wounding of white-tailed deer by bowhunters. M.S. Thesis, Univ. W. V., Morgantown. 118pp.

Langenau, E. E., Jr. 1986. Factors associated with hunter retrieval of deer hit by arrows and shotgun slugs. Leisure Sci. 8:417–438.

——— and R. W. Aho. 1983. Relative impact of firearms and archery hunting on deer populations. Pages 97–121 *in* K. H. Beattie and B. A. Moss, eds. Proc. Midwest Bowhunting Conf., Wisc. Chap., Wildl. Soc.

Lohfield, M. L. 1980. Crippling losses and illegal kill of white-tailed deer (*Odocoileus virginianus*) during a controlled hunt in a New Jersey state park. M. S. Thesis, Rutgers Univ., New Brunswick, N. J. 25pp.

McPhillips, K. B., R. L. Linder, and W. A. Wentz. 1985. Nonreporting, success, and wounding by South Dakota deer bowhunters – 1981. Wildl. Soc. Bull. 13:395–398.

Ramsey, C. W. 1968. A drop-net deer trap. J. Wildl. Manage. 32:187–190.

Severinghaus, C. W. 1963. Effectiveness of archery in controlling deer abundance on the Howland Island Game Mangment Area. N.Y. Fish Game J. 10:186–193.

Stormer, F. A., C. M. Kirkpatrick, and T. W. Hoekstra. 1979. Hunter inflicted wounding of white-tailed deer. Wildl. Soc. Bull. 7:10–16.