

Landowner Reports of Deer Damage in the Arkansas Coastal Plain

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Abstract: We surveyed 611 rural landowners in the Arkansas Coastal Plain in 1987 to determine perceptions of white-tailed deer (*Odocoileus virginianus*) damage to agricultural and forestry crops. Respondents ($N = 231$) owned an average of 148 ha, with the 2 greatest areas in row crops (98 ha), such as soybeans, cotton, and rice, and forests (38 ha). One-half (50%) of respondents had sustained deer damage, most (52%) of whom described it as minimal. Landowners who estimated financial losses from deer reported an average loss of \$1,650: 61% lost <\$1,000, and 1% lost >\$10,000. Of those with damage, 23% said that damage was unreasonable and 46% had tried control. Respondents most often used scare devices, chemical repellents, and fences, but few respondents (<3%) felt that these devices worked. Most respondents (71%) wanted deer on their land, 15% wanted deer but they worried about damage, and 7% did not want deer. Thirty-nine percent wanted deer populations in their area to remain static, 36% wanted deer numbers to increase, and 24% wanted deer numbers to decrease.

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White-tailed deer are an important resource in Arkansas. About 60,076 deer were harvested legally in the state during the 1985–86 hunting season by an estimated 217,600 Arkansans (Pollock and Cornelius 1986). Deer numbers in Arkansas have increased steadily since restocking efforts of the 1940s, from an estimated low of 500 in 1930 to an estimated 500,000 in 1986 (Low 1986). Most of the increase in deer numbers has been in the Arkansas Coastal Plain; 66% of the 1985–86 deer harvest was from the Coastal Plain (Cartwright 1987).

As deer numbers have increased, so have complaints of deer damage to crops, fruit trees, gardens, and other landowner activities. In 1986, the Arkansas Game and Fish Commission (AGFC) received 574 complaints of deer damage, 90% of which were from the Coastal Plain (Cartwright 1989). Because of increasing concern among landowners regarding deer damage and to properly manage deer populations, wildlife managers need to understand the nature and extent of damage in the Coastal Plain. In this study, we surveyed rural landowners in the Arkansas Coastal Plain to determine perceptions of deer damage to forestry and agricultural crops, and the measures being used to control damage.

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Methods

A questionnaire modeled after surveys used in New York (Brown et al. 1978) was mailed to 611 rural landowners in the Arkansas Coastal Plain during January 1987. Personnel from ACES randomly selected names from lists of rural landowners maintained at each county ACES office. The number of names selected in each county was proportional to the number of farm operators in each county (U.S. Dep. Agric. 1984); 11 to 62 names were selected from each county. The sample size was selected to provide bounds on error of estimates for proportions of 4% if all surveys were returned (Mendenhall et al. 1971).

All data summaries and analyses were conducted using SPSS/PC+ (Norusis 1988). Contingency table analysis was used to evaluate associations between perceptions of damage and landowner characteristics. Statistical significance was accepted at the 0.05 probability level.

Results

We received 231 (35%) responses to our survey, which provided 6.5% bounds on error of estimates for proportions. We did not survey nonrespondents; therefore, our results may not typify all landowners in the region. Most respondents were white (95%) males (92%) with >12 years of education (47%) (\bar{x} = 13 years). Most (85%) lived on their land. Some (9%) landowners had household incomes of \leq \$10,000, 25% had incomes of \$10,001–\$20,000, 24% had incomes of \$20,001–\$30,000, and 41% had incomes of >\$30,000. Some (34%) respondents received <10% of their household income from their land, 30% received 10%–75% of their income from their property, and 36% received >75% of their income from their land.

The average respondent owned 148 ha (SD = 26). Of this ownership, landowners had averages of 44 ha in soybeans, 38 ha in forest, 38 ha in other grains (wheat, milo, rice, oats, corn), 18 ha in cotton, and 10 ha in other uses. Primary land uses

were livestock production (47%), grain cash crops (19%), forest products (15%), poultry production (8%), and vegetable cash crops (4%).

Almost all respondents (99%) had seen deer on their property during the previous year. Respondents estimated that deer numbers were the same as (42%), more (35%), or less (18%) than in 1982. One-half (50%) of respondents reported deer damage on their land. Those reporting damage described it as minimal (52%), moderate (19%), substantial (15%), and severe (13%). Landowners with damage estimated that they had lost an average of 16% (range = 1%–100%) of their crop value (Table 1). This damage was perceived as negligible (26%), tolerable (50%), or unreasonable (24%). Landowners with losses reported losing an average of \$1,650; the maximum loss was \$15,000 (soybeans). More respondents reported financial losses from damage to soybeans than for any other crop. However, average losses were greatest for sweet potatoes. The percentage of landowners reporting damage did not differ by household income level ($X^2 = 3.9$, 3 df, $P = 0.412$), the percentage of income derived from the property ($X^2 = 8.8$, 4 df, $P = 0.065$), or residence on the land ($X^2 = 0.01$, 1 df, $P = 0.748$).

Of landowners with damage, only 6% had applied to AGFC for a permit to shoot deer. Many (45%) respondents said that during 1986 they used control measures other than shooting deer. Other control measures included scare devices (20%), chemical repellents (16%), fence construction (14%), fence maintenance (13%), and other (5%) methods including human hair, crop rotation, and buffer crops (Table 2). Few

Table 1. Landowner reports of dollars and percent of crop value lost to deer in the Arkansas Coastal Plain, 1986.

Crop damaged	Dollars lost			% crop value lost		
	<i>N</i> ^a	\bar{x}	Maximum	<i>N</i>	\bar{x}	Maximum
Sweet potatoes	4	3,244	10,000	4	69	100
Milo	5	2,880	7,200	5	15	50
Soybeans	30	2,328	15,000	27	14	100
Melons	5	1,930	7,000	6	21	50
Wheat	5	1,600	4,200	4	38	90
Oats	2	1,050	2,000	2	8	10
Tomatoes	3	667	1,000	2	10	10
Timber	2	500	1,000	2	26	50
Peppers	1	400	400	1	100	100
Peas	17	330	1,500	16	58	100
Hay	5	294	500	5	4	5
Corn	4	275	500	5	35	100
Gardens	11	174	500	13	32	100
Fruit trees	6	125	300	7	31	100
Christmas trees	1	100	100	1	1	1
Strawberries	1	100	100	1	10	10
Rye	1	100	100	1	5	5
Pasture	1	20	20			

^aNumber of landowners reporting financial losses to crop.

Table 2. Landowner reported costs of deer damage control in the Arkansas Coastal Plain, 1986.

Control method	N ^a	Cost (\$)	
		\bar{x}	Maximum
Scare devices	8	205.13	1,000
Fence construction	24	148.94	1,000
Chemical repellents	16	121.81	1,000
Fence maintenance	12	112.17	1,000

^aNumber of landowners.

($\leq 3\%$), however, believed that control measures stopped damage. Respondents who tried controlling damage spent an average of \$241.47 ($N = 34$); 39% tried more than 1 control method. Scare devices were most expensive and fence maintenance was least expensive.

Many (51%) respondents reported damage from wildlife species other than deer. Of all respondents, 22% said that deer caused the most damage on their land; beavers (*Castor canadensis*) ranked second (13%). Other animals causing damage included armadillos (*Dasypus novemcinctus*) (4%), blackbirds [probably common grackles (*Quiscalus quiscula*) and red-winged blackbirds (*Agelaius phoeniceus*)] (4%), raccoons (*Procyon lotor*) (3%), and coyotes (*Canis latrans*) (3%). Only 2 landowners applied for financial compensation for wildlife damage; 1 applied to an insurance company and 1 applied to AGFC. Neither landowner received compensation.

Most respondents (71%) acknowledged that deer had an aesthetic value, and wanted deer on their land. Others (15%) said that they could enjoy a few deer, but they worried about damage to their property. Only 7% did not want deer on their land and said that deer were a nuisance. Landowner perceptions of the value of deer varied by presence or absence of damage ($X^2 = 49.4$, 4 df, $P < 0.001$). Landowners with damage were less likely than those without damage to acknowledge the aesthetic value of deer and to want deer on their land (54 vs. 89%, respectively).

Most respondents wished deer numbers in their county to remain constant (39%) or increase (36%). Only 25% of landowners wanted deer numbers to decrease. Respondent wishes for changes in deer numbers also varied by presence or absence of deer damage ($X^2 = 50.58$, 4 df, $P < 0.001$). Compared to landowners without damage, those with damage were more likely to want deer numbers to decrease (43 vs. 6%, respectively) and less likely to want deer numbers to increase (19 vs. 52%, respectively).

Deer affected landowners in ways other than through direct damage to crops. Many respondents (59%) said they hunted deer during 1986; another 8% said they were deer hunters but had not hunted during 1986. More than half (58%) of landowners reported problems with deer hunters using their lands; 38% reported minor

problems and 20% reported substantial damage from hunters. The most common forms of damage were fences cut (14%), road damage (6%), cattle shot (4%), crop damage (4%), and open gates (2%). Other problems included careless shooting (2%), stolen property (<1%), cut locks (<1%), and trespass resulting in unspecified losses (<1%) (Table 3). The average landowner with damage related to deer hunting sustained \$234 in losses. The most expensive damages were crop damage and cattle shot.

Despite problems with hunters, many (39%) permitted public hunting at no charge. Others posted their land with "no hunting" (35%) or "hunting by permission only" signs (7%). Few landowners (7%) posted as specified in Arkansas Act 1090 of 1985 which requires boundaries to be marked with purple paint. The most common reason landowners posted their land was desire to know who was on their property (72%). Most (62%) also said they posted because of problems with hunters; 56% posted because they had experienced damage from off-road vehicles. Other common reasons for posting were to reserve the land for family use (58%) and fear of liability (33%). Most respondents permitted friends (75%), family members (63%), and strangers who asked permission (25%) to hunt on their property. Only 4% of landowners leased their lands for deer hunting during 1986, charging an average fee of \$23.50 per ha.

Access policies of respondents did not vary by presence or absence of deer damage. Landowners with damage were no more likely than those without damage to post their land ($X^2 = 0.08$, 1 df, $P = 0.778$), to permit free hunting ($X^2 = 0.58$, 1df, $P = 0.447$), to lease ($X^2 = 1.89$, 1 df, $P = 0.169$), or to permit friends to hunt on their land ($X^2 < 0.01$, 1 df, $P = 0.999$). Further, respondents with damage were no more likely than those without damage to allow individuals asking permission to hunt on their land ($X^2 = 0.02$, 1 df, $P = 0.877$) or to hunt deer themselves ($X^2 = 5.88$, 1 df, $P = 0.118$). Those with damage, however, were more likely than those without damage to permit family members to hunt on their land (75 vs 51%, respectively) ($X^2 = 13.00$, 1 df, $P < 0.001$).

Table 3. Landowner reported costs of damage caused by deer hunters in the Arkansas Coastal Plain, 1986.

Damage	N ^a	Dollars lost	
		\bar{x}	Maximum
Damage to crops	5	1,500.00	2,000
Cattle shot	6	1,321.00	5,000
Damage to roads	9	832.00	4,000
Fences cut	20	260.15	1,000
Escaped livestock	2	192.50	350
Stolen property	1	120.00	120
Trespass	1	100.00	100

^aNumber of landowners.

Discussion

These data may not be accurate estimates of damage for several reasons. First, these data represent landowner estimates rather than our estimates. Second, landowners may have attributed to deer damage by birds, raccoons (*Procyon lotor*), rabbits (*Sylvilagus* spp.) and other animals. Additionally, respondents to our survey may have sustained more or less damage than nonrespondents. However, these data do represent landowner perceptions of damage and, therefore, warrant consideration from a management perspective.

As in studies in other states (Flyger and Thoerig 1962, McNeil 1962, Brown et al. 1978) damage by deer was common, and the most severe damage was concentrated on the lands of relatively few landowners. For those few landowners, reducing damage in the Arkansas Coastal Plain is difficult for several reasons. First, deer numbers are high because of excellent habitat quality. Therefore, reducing deer numbers on a few farms or ownerships will probably have little effect on damage in the region. Second, many landowners cannot implement herd reduction because of land ownership patterns. Farmers commonly own or lease only the land on which they produce crops but not surrounding forest land. Landowners often are unable or reluctant to gain access to adjoining forest land to regulate deer numbers. Deer damage is typically most severe near the edge of forests and cropland (Flyger and Thoerig 1962, Garrison and Lewis 1987). Third, many forest lands in the Arkansas Coastal Plain are leased or controlled by hunting clubs that actively discourage the harvest of does. Failure to regulate the number of does results in higher deer densities and more damage to crops.

State policy regarding deer damage historically has been for AGFC personnel, at the request of landowners, to visit lands sustaining deer damage. If, in the opinion of AGFC personnel, control of deer numbers is warranted, the landowner is issued a permit to shoot depredating deer. Shooting deer in this manner often does not control damage, and is frequently unacceptable to members of surrounding hunting clubs. A policy recently implemented by the Virginia Game and Inland Fisheries Commission, called the Damage Control Assistant Program (DCAP) (Duncan and Kopf 1989), has features that might be useful in the Arkansas Coastal Plain. Under DCAP, the landowner experiencing damage is issued deer damage seals, which serve as permits to harvest deer during the regular hunting season. Hunters in surrounding clubs may qualify for special purpose tags, enabling them to harvest deer using the damage seals supplied to the landowner. This policy encourages communication between the landowner and surrounding hunting clubs, and diverts the harvest of depredating deer to the regular season.

Conclusions

Deer damage will continue in the Arkansas Coastal Plain unless deer are excluded from crops or the number of deer is reduced through hunting or lowered habitat quality. Enclosing large areas with the quality of fence required to exclude

deer would not be cost-effective. Further, many landowners believe that controls (including fencing) do not reduce damage. Because most land in the Arkansas Coastal Plain is privately owned, reducing the quality of deer habitat also would be difficult, if even desirable.

Reducing deer numbers may be the most feasible method of reducing damage. Yet, herd reduction would not be in accord with the wishes of the majority of landowners; most (75%) wanted to maintain or increase deer numbers on their land. Landowners with damage generally wanted lower deer numbers but did not modify their access policies to encourage greater public access and increased deer harvests on their land because of past problems with hunters. Therefore, public agency efforts to control damage in specific areas should focus on improving relationships between hunters and landowners, and educating hunters and adjacent landowners about the importance of cooperating in regulating local deer numbers.

Literature Cited

- Brown, T. L., D. J. Decker and C. P. Dawson. 1978. Willingness of New York farmers to incur white-tailed deer damage. *Wildl. Soc. Bul.* 6:235-239.
- Cartwright, M. E. 1987. 1986 deer harvest. *Ark. Game and Fish Comm.* unpubl. rep. Little Rock, Ark. 26pp.
- . 1989. White-tailed deer population management, harvest analysis and hunting pressure. *Ark. Game and Fish Comm., Fed. Aid Proj. No. W-56-28.* Little Rock, Ark. 66pp.
- Duncan, R. W. and V. P. Kopf. 1989. Response by landowners and hunt clubs to two new deer management programs in Virginia. *Abst. Annu. Meet. Southeast Deer Study Group, Okla. City, Okla.* 12:6.
- Flyger, V. and T. Thoerig. 1962. Crop damage caused by Maryland deer. *Proc. Annu. Conf. Southeast. Assoc. Game and Fish Comm.* 16:45-52.
- Garrison, R. L. and J. C. Lewis. 1987. Effects of browsing by white-tailed deer on yields of soybeans. *Wildl. Soc. Bul.* 15:555-559.
- Low, J. 1986. The age of recovery—1945-present. *Ark. Game and Fish Mag.* 17:14-22.
- McNeil, R. J. 1962. Population dynamics and economic impact of deer in southern Michigan. *Mich. Dep. Conserv., Game Div. Rep.* 2395. 143pp.
- Mendenhall, W., L. Ott and R. L. Schaeffer. 1971. *Elementary survey sampling.* Wadsworth Publ., Co., Inc. Belmont, Calif. 247pp.
- Norusis, M. J. 1988. *SPSS/PC+ V2.0 base manual.* SPSS, Inc. Chicago, Ill. 605pp.
- Pollock, K. H. and W. L. Cornelius. 1986. *Vital statistics '86.* Southeast. Coop. Wilfl. and Fish. Stat. Proj. N.C. State Univ., Raleigh. 143pp.
- U.S. Department of Agriculture. 1984. 1982 census of agriculture; vol. 1, part 4, Arkansas state and county data. *U.S. Dep. Commerce, Bur. of the Census.* 401pp.