

Landowner-reported Beaver Damage in the Arkansas Delta

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Abstract: Landowner perceptions of damage caused by beavers (*Castor canadensis*) in the Arkansas Delta were determined by mail survey. Beavers were reported on lands owned by 64% of the 460 respondents. Blocked culverts, flooded row crops, and girdled timber were the most common forms of damage. Of those with beavers on their lands, 90% requested decreased populations and 72% had tried removing beavers. Many landowners were unfamiliar with accepted control methods and where to get assistance. Landowners most often requested information on controlling beavers (49%) and demonstration of control techniques (47%). Coordinating assistance programs among several agencies, emphasizing education and demonstration, and loaning traps might improve landowner assistance programs.

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Beavers have caused damage throughout the southeastern United States since their reintroduction by state agencies during the 1940s and 1950s. Recent estimates of area flooded included approximately 29,000 ha in Mississippi (Arner and DuBose 1978), 116,477 ha in Georgia (Godbee and Price 1975), 4,444 ha in South Carolina (Woodward et al. 1976), and 4,112 ha in North Carolina (Woodward et al. 1985). Economic losses due to beaver-caused damage are high. For example, annual timber damage caused by beavers was projected at \$17 million in Mississippi (Arner and DuBose 1980).

The nature and extent of damage caused by beavers remains undocumented in Arkansas. Landowner perceptions of this damage and assistance provided through government agencies are also not understood. Knowledge of these perceptions is necessary to conduct an effective landowner assistance program. The Mississippi River Delta region of Arkansas is susceptible to beaver damage because topography is flat and large areas are under agricultural management. Thus, large areas may be

flooded easily through beaver activities. Our objective was to determine, through a mail survey, landowner perceptions in the Arkansas Delta of beaver damage and assistance programs.

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Study Area

The Delta region in eastern Arkansas constitutes 28% of the land base in the state (3.8 million ha). Topography consists of level to gently sloping terraces with elevations ranging from 30 m to 125 m above sea level. Soils are primarily Alfisols, Inceptisols, or Entisols developed from deep clayey, loamy, or sandy alluvial sediments. It is the most extensively farmed physiographic region within Arkansas; about 70% of the Delta is in cropland (Arkansas Crop and Livestock Reporting Service 1984). Soybeans, wheat, cotton, and rice are important row crops.

Although only 19% of the Delta in Arkansas is forested, 43% of the valuable bottomland hardwood resource is located in this area (USDA Forest Service 1979). Typical overstory species on bottomland sites include sweetgum (*Liquidambar styraciflua*), bald cypress (*Taxodium distichum*), sugarberry (*Celtis laevigata*), ash (*Fraxinus* spp.), black willow (*Salix nigra*), and cottonwood (*Populus deltoides*). Dominant understory species are poison ivy (*Rhus radicans*), rattan vine (*Berchemia scandens*), wild grape (*Vitis* spp.), greenbriar (*Smilax* spp.), blackberry (*Rubus* spp.), panic grass (*Panicum* spp.), sedge (*Carex* spp.), and cut grass (*Leersia* spp.).

Methods

Questionnaires used by Woodward et al. (1976) and Hill (1976) were adapted for this study. The survey contained 30 questions divided into 5 sections. These sections were designed to provide: (1) a profile of landowners and their lands; (2) descriptions of current land use practices, (3) beaver damage descriptions, (4) methods being used to control beaver damage, and (5) an evaluation of control assistance programs sponsored by government agencies.

Names and addresses of 895 rural, noncorporate landowners owning >2 ha were randomly selected from property tax records in the Delta. A questionnaire, cover letter, and stamped return envelope were mailed to these landowners during February 1985. Postcard reminders were mailed 1 and 4 weeks after the initial mailing. Twenty-five randomly selected nonrespondents were surveyed by tele-

phone during June 1985. Eight randomly selected respondents who reported beavers on their property were visited to validate landowner estimates of damage.

Landowner characteristics were associated with opinions toward beaver control methods and assistance programs using Chi-square analysis. Statistical significance was accepted at the 0.05 level.

Results and Discussion

A total of 460 (51%) usable responses was received. Survey respondents owned 160,780 ha, 4% of the Delta land base. Average ownership was 366 ha (SD = 1,094), of which 241 were in row crops, 103 were forested, and 16 were in pasture. Respondents were typically white (95%), male (89%), and high school graduates (75%). They averaged 59 years old (SD = 13) and had owned their lands an average of 28 years (SD = 17). Primary land ownership objectives reported were agriculture (77%), timber (7%), residence (7%), and grazing (5%).

Beavers were reported present on lands owned by 64% of respondents who estimated beavers had been present on their property an average of 13 years (SD = 9). Most (88%) suggested that beavers had been present >5 years. Beavers had once been present on lands owned by 9% of respondents without beavers. Beavers were reported present by 8 (32%) of 25 nonrespondents surveyed by telephone. Beavers had once been present on lands owned by an additional 3% of nonrespondents. Survey respondents, therefore, were either more likely to have beavers or more aware of their presence. These data suggest that 32% to 64% of landowners in the Delta have beavers on their land and 3% to 9% once had beavers.

Blocked culverts were the most common form of damage and flooded row crops ranked second (Table 1). Girdled timber was the most often cited damage in Alabama (Hill 1976), South Carolina (Woodward et al. 1976), and North Carolina (Woodward et al. 1985), but ranked third in the Delta. A total of 11,417 ha was reported flooded by beavers (7% of lands owned by all respondents). Of this flooded area, 62% was row crops, 37% was timber land, and 1% was pasture.

Table 1. Percentage of respondents ($N = 439$) and respondents with beavers on their lands ($N = 283$) reporting beaver-related damages and benefits in the Arkansas Delta, 1985.

Damage	% Respondents		Benefit	% Respondents	
	All	With beavers		All	With beavers
Blocked culverts	44.9	69.6	Water for livestock	8.1	12.5
Flooded row crops	43.6	67.7	Duck hunting area	7.1	11.0
Girdled timber	42.2	65.5	Enjoyment from watching	6.1	9.5
Flooded timber	34.3	53.2	Water for irrigation	5.6	8.7
Damaged dams or levees	25.5	39.6	Trapping opportunities	4.6	7.1
Damaged roads	23.9	37.1	Fishing area	3.4	5.3
Damaged water control structures	23.5	36.4	Meat	2.3	3.5
Flooded pasture	14.5	22.5	Income from fur	1.6	2.5

Landowners with beavers were asked to describe cumulative damage to their property as: no damage, light, moderate, substantial, or severe. Twenty-eight percent described damage as severe, and 27% said it was substantial. Damage was described by 23% as moderate, and 17% as light. Only 5% said they had no damage. Respondents with beavers were also asked to describe their feelings about cumulative damage. Fifty-four percent felt damage to their land was unreasonable. The remaining landowners felt damage was tolerable (35%), negligible (6%), or no damage (5%).

Benefits from beavers were not often recognized by landowners (Table 1). The benefit most often cited was provision of water for livestock. This is understandable given the agricultural ownership objectives of many respondents. Provision of a duck hunting area was the second most commonly mentioned benefit. However, only 1 of the 31 respondents citing this benefit reported financial rewards from beavers (\$200) during 1984. Leasing agricultural lands for waterfowl hunting is a source of income for many landowners in the Delta, but surveyed landowners were not benefitting from this management option. Although recreation through trapping was a frequently cited benefit, income from fur was not. Meat from beavers was mentioned almost as infrequently as a benefit, as was income from fur (Table 1). Results suggest that landowners who harvest beavers are often not utilizing the carcasses.

Of respondents with beavers, 79% regarded them as a nuisance and felt they could get along without beavers. An additional 13% said that they could enjoy a few beavers, but they worried about damage. Four percent reported that they enjoyed having beavers on their land and agreed that beavers have an aesthetic value. Only 4% had no particular feelings about beavers. Ninety percent of those with beavers desired decreased beaver populations on their property. Increased population densities were desired by 9%, and static densities were requested by 1%.

Seventy-two percent of respondents with beavers had tried removing them. Of those who had attempted control, 75% had tried trapping, 67% had used shooting, and 10% had tried poisons. Twenty-eight percent of landowners who attempted removal also considered destruction of dams to be a method of beaver control. Only 48% of respondents in South Carolina had attempted trapping, and 50% had used shooting as a control measure (Woodward et al. 1976). In North Carolina, 62% used trapping and 50% used shooting (Woodward et al. 1985).

Sixty-seven percent of respondents who trapped had used Conibears, 43% tried leghold traps, 7% used snares, and 6% used live traps. Woodward et al. (1976) reported that 40% of landowners who trapped in South Carolina had used Conibears and 60% had used leghold traps. Although beavers were taken with Conibear and leghold traps, neither trap was perceived by respondents as particularly helpful in controlling damage. Fifty-four percent using leghold traps and 54% using Conibear traps thought traps were ineffective.

Breaking beaver dams was also perceived as an ineffective method of controlling damage. Of respondents with beavers, 84% had broken dams but only 13% reported that breaking dams without using other control measures controlled dam-

age. Although 16% of respondents stated that trapping and breaking dams controlled damage, 22% found this combination ineffective.

Fifty-three percent of respondents with beavers were not willing to pay for beaver removal. Landowners who themselves had tried beaver control were more likely to pay for beaver removal than those who had not attempted control (58% versus 19%; $\chi^2 = 29.53$, 1 df, $P < 0.001$). Willingness to pay was also associated with education ($\chi^2 = 8.70$, 3 df, $P = 0.033$) and income ($\chi^2 = 18.96$, 5 df, $P = 0.002$). Respondents with at least 1 year of college education or annual incomes exceeding \$25,000 were most willing to pay for beaver control. Those willing to pay perceived beavers as a nuisance more often than those not willing to pay (89% versus 69%; $\chi^2 = 14.87$, 3 df, $P = 0.002$), and agreed more often that damage to their land was unreasonable (67% versus 46%; $\chi^2 = 8.81$, 3 df, $P = 0.032$). Willingness to pay was not associated with awareness of professional trapping services ($\chi^2 = 2.44$, 1 df, $P = 0.118$). Respondents willing to pay for beaver control suggested an average price of \$36.31/ha damaged or \$9.04/beaver.

Sixty-eight percent of all landowners permitted trapping. Respondents with beavers permitted trapping more often than those without beavers (82% versus 35%; $\chi^2 = 74.31$, 1 df, $P < 0.001$). However, only 37% of those with beavers required trappers to harvest beavers in exchange for trapping privileges. Although professional trappers provide control services in Arkansas, only 28% of respondents were aware of beaver contractors. Those with beavers on their property were twice as likely as those without beavers to know that such services were available (42% versus 21%; $\chi^2 = 15.90$, 1 df, $P < 0.001$). Few landowners with beavers (10%), however, had hired a beaver contractor. Sixty-five percent of those who had not hired a contractor were unaware that such services were available. Woodward et al. (1976) found that only 2 of 956 surveyed landowners in South Carolina had hired professional trappers.

Twenty-eight percent of all respondents stated they were aware that government agencies offered programs to help landowners control beaver damage. This level of awareness did not differ with presence or absence of beavers ($\chi^2 = 3.41$, 1 df, $P = 0.065$), education ($\chi^2 = 0.66$, 3 df, $P = 0.883$), or income ($\chi^2 = 2.90$, 5 df, $P = 0.716$). Of respondents with beavers, 67% knew that help was available through the Arkansas Game and Fish Commission but only 16% had used these services. Landowners said they could receive help through agencies such as the U.S. Fish and Wildlife Service (21%), the Soil Conservation Service (24%), the USDA Forest Service (10%), the Arkansas Cooperative Extension Service (28%), and the Arkansas Forestry Commission (10%), even though assistance programs are not sponsored by these organizations.

Most respondents (96%) agreed that government agencies should provide services to landowners with beaver-related problems. Respondents most often agreed that agencies should show landowners how to remove beavers and distribute information on controlling beavers (Table 2). Landowners with beavers were more likely than those without beavers to agree that landowners should be reimbursed for damages ($\chi^2 = 4.54$, 1 df, $P = 0.033$), that beavers should be removed for a fee ($\chi^2 =$

Table 2. Percentage of respondents in the Arkansas Delta agreeing that certain services should be provided to landowners by government agencies.

Service	% Landowners agreeing		
	With beavers (<i>N</i> = 295)	Without beavers (<i>N</i> = 165)	Total (<i>N</i> = 460)
Distribute information on controlling beavers	48.6	50.7	49.3
Show landowner how to remove beavers	43.8	52.1	46.5
Remove beavers at no charge	35.4 ^a	17.4	29.4
Remove beavers for a fee	25.0 ^a	13.2	21.1
Sell landowner traps at cost	16.3	16.0	16.2
Reimburse landowner for damages	16.3 ^a	8.3	13.7
Give landowner traps	13.5	9.0	12.0
Provide no services	2.8	6.9	4.2

^aPercentages of respondents with and without beavers differ ($P < 0.05$).

7.35, 1 df, $P = 0.007$), and that beavers should be removed at no charge ($\chi^2 = 14.22$, 1 df, $P = 0.002$). Free traps and reimbursement for damages were the services fewest landowners agreed that agencies should provide.

Conclusions

Beaver populations and damage were reported in every county in the Arkansas Delta. A majority of respondents with beavers wanted populations to decrease and had attempted control, but felt that their control efforts were unsuccessful. Further, most landowners with beavers were unwilling to pay for beaver removal and were unaware that professional assistance was available. Many of these respondents perceived as ineffective control measures, such as trapping, that have been used successfully elsewhere (Hill 1976). These responses probably represent frustration and unfamiliarity with successful control techniques.

Although few respondents had received assistance from government agencies, most suggested that some form of help should be provided. Several respondents stated that the state wildlife agency should provide assistance because it was the agency that reintroduced beavers. However, information and education services were requested more often than services requiring financial assistance or reimbursement. Some landowners suggested that they merely be aided in contacting professional trappers or be loaned traps. These are services that could be provided through the state wildlife agency.

Beaver populations and damage will probably continue to expand in the Arkansas Delta unless pelt prices increase, or landowners are more effectively assisted in control efforts. A coordinated assistance program among agencies such as the Arkansas Game and Fish Commission, the Arkansas Forestry Commission, and the Arkansas Cooperative Extension Service might assure greater success of such activities. Such a program should concentrate on providing technical assistance in the form of information, inspection, and demonstration, and a system for loaning traps

(Woodward et al. 1976). Landowners need to be more fully informed of services that professional trappers can provide, where these services are available, and possible contractual arrangements. Care should be taken in any assistance program to also inform landowners of the benefits that beaver populations may provide.

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