

# **Black Bear Damage and Landowner Attitudes Toward Bears in Arkansas**

**Joseph D. Clark**, *Arkansas Game and Fish Commission, No. 2  
Natural Resources Drive, Little Rock, AR 72205 and Department  
of Biological Sciences, University of Arkansas, Fayetteville, AR  
72701*

**Daniel L. Clapp**, *Department of Biological Sciences, University of  
Arkansas, Fayetteville, AR 72701*

**Kimberly G. Smith**, *Department of Biological Sciences, University of  
Arkansas, Fayetteville, AR 72701*

**T. Bently Wigley**, *Department of Forest Resources, University of  
Arkansas at Monticello, Monticello, AR 71655*

---

*Abstract:* Extent and types of damage caused by black bears (*Ursus americanus*) and landowner attitudes and perceptions of bears were determined by mail survey in Arkansas. Based on 1,353 returned surveys, monetary losses of livestock production attributed to bears appeared to be minimal, but honey production losses were more significant. Nevertheless, only 4.6% of the landowners stated that the damage was intolerable. Eighty-three percent of the respondents indicated that black bear populations should be increased or maintained at their present levels. Respondents that favored lower bear populations generally were those less knowledgeable about bears, with less education, and with lower incomes. A greater proportion of females also favored lower populations. More landowners that had experienced problems thought bears were a nuisance and that populations should be reduced or eliminated than did landowners without problem bears. Future plans for increasing bear populations as an aesthetic and harvestable resource must include an active landowner assistance program.

Proc. Annu. Conf. Southeast. Assoc. Fish and Wildl. Agencies 45:208-217

---

Nearly extirpated from Arkansas by 1900, there are now >2,000 black bears in the Ozark and Ouachita mountains of western Arkansas (Clark 1991). That increase is a result of translocation of 254 bears from Minnesota and Manitoba, Canada, by the Arkansas Game and Fish Commission (AGFC) between 1959 and 1968 (Rogers 1973, Smith et al. 1990). From 3 initial release sites, bear populations in Arkansas have dramatically increased and now encompass the entire Ozark and

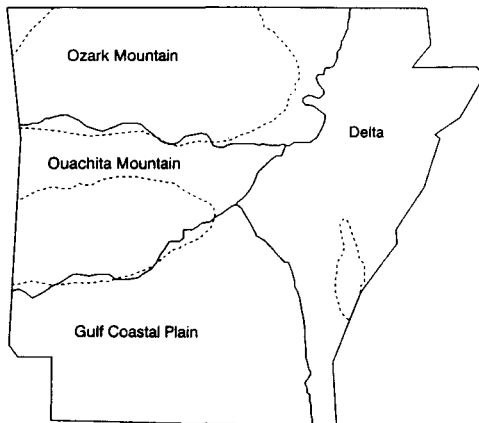
Ouachita mountain regions and parts of the Gulf Coastal Plain (Fig. 1). Bears also have spread northward into Missouri (Wilson 1984) and westward into Oklahoma (Caire et al. 1989), making this 1 of the most successful reintroductions of a large carnivore. Based on this success, an annual hunting season was initiated in the Ozark and Ouachita mountains in 1980 by the AGFC.

In addition to the reintroduced bears, a small population of native bears occur in and around the White River National Wildlife Refuge in the Mississippi Delta region in eastern Arkansas (Smith 1985). That population is excluded from hunting.

Reintroduction of bears into the Ozark and Ouachita mountains took place with very little public knowledge or comment (Smith et al. 1990). One reason the translocation project was terminated in 1968 was a growing opposition to the introduction of black bears. Many residents perceived bears as dangerous and destructive (Rogers 1973). AGFC assists landowners by providing technical advice and/or translocating problem animals and, in recent years, complaints about nuisance bears have risen dramatically (J. Clark, unpub. data). Thus, the AGFC is challenged with determining future management directions for this species, realizing that bears need public tolerance and support to ensure their long-term survival.

A number of assessments of bear damage to property and suggested preventative solutions have been published (e.g., Davenport 1953, Feng 1969, Colvin 1975, Pelton et al. 1976, Caron 1978, Lord 1979, Alt 1980, Brady and Maehr 1982, Maehr 1982, Maehr and Brady 1982, Garshelis 1989, Vaughan et al. 1989), but the AGFC needed more specific information on bear damage and attitudes of landowners toward bears in Arkansas. To that end, a questionnaire was developed to determine how Arkansas landowners felt about bear damage and future management. The objectives of the survey were to determine the extent and types of damage caused by bears and to determine landowner attitudes and perceptions concerning bears.

The authors thank G. Gray and D. Turner of the Southeastern Cooperative Wildlife and Fisheries Statistics Project, North Carolina State University, for their



**Figure 1.** Physiographic regions and black bear range in Arkansas. The dotted lines outline primary black bear range, 1988.

help and guidance with questionnaire design and data analyses. We also appreciate the help of R. Barnhill with data entry. This study was funded under provisions of the Federal Aid in Wildlife Restoration Act (Pittman-Robertson Act), administered by the AGFC.

## Methods

A mailing list from a previous beaver (*Castor canadensis*) damage assessment (Wigley and Garner 1987) was used in this study. That list was assembled from tax records of county tax assessors for each of the 75 counties in Arkansas. Landowners were defined as private individuals that owned >2 ha of land during 1985. Every fifth name on the list for each county was chosen until 45 landowners were selected. Some of the 3,375 addresses were not used because the landowner had moved or was deceased.

In January 1988, we mailed a cover letter and a questionnaire to each landowner in accordance with procedures outlined by Fillion (1980). Three weeks after the initial mailing, a postcard reminder was sent to non-respondents. Three weeks after that, a second cover letter and survey were mailed to those who still had not responded.

The survey consisted of 30 questions. The first 5 questions concerned the description of the landowner's property. The next 11 questions dealt with bear sightings, damage, and management. Three questions dealt with bear hunting in Arkansas. We also included 5 multiple-choice questions about bear biology and behavior to assess the respondent's general knowledge about bears (Burghardt et al. 1972). An additional 6 optional questions at the end of the survey dealt with income, ethnic background, level of education, sex, and age. Chi-square contingency tables were used to determine whether observed counts differed from expected (Snedecor and Cochran 1980).

The available mailing list consisted of an equal number of landowners within each county. However, counties with a disproportionately large number of landowners may have been undersampled; this could affect regional or statewide totals. We assumed that variation of responses to survey questions between counties was not sufficient to seriously bias the regional means; chi-square contingency tests were performed on those data. Statewide means, however, likely would be more affected by disproportionate sampling at the regional level due to broad differences in land use. Therefore, statewide means are reported as a weighted average based on the relative proportion of landowners estimated to reside within each region (U.S. Dep. Agric. 1984). Even so, weighted means differed little from unweighted means in most cases.

## Results

Nearly one-half of the 3,366 surveys mailed (1,675) were returned and 322 were rejected because of unreadable or missing data. Nine-hundred thirty-five (40.2%) of

the 1,353 usable responses were from landowners that responded to the first mailing, and 418 were from those that responded to the second. The percentage of responses from the Delta, Coastal Plain, Ouachita Mountain, and Ozark Mountain physiographic regions were 22.8%, 22.8%, 23.8%, and 30.6%, respectively.

The average survey respondent owned 160 ha of land; the mean was 352, 214, 112, and 112 ha in the Delta, Coastal Plain, and Ouachita and Ozark mountains, respectively. Total landholdings of respondents were 257,109 ha, which is 2.0% of the Arkansas land base. Only 0.4% of the respondents owned >4000 ha whereas 77.0% owned between 2 and 200 ha. About 71% of the respondents lived on their rural property, but proportions differed among regions ( $X^2 = 39.8$ , 3 df,  $P < 0.0001$ ). Ozark residents most often lived on their land (78%).

Primary uses of land were livestock production, grain crops, forest products, residence, and wildlife-related recreation (Table 1). Differences in land use existed among regions ( $X^2 = 601.1$ , 39 df,  $P < 0.0001$ ). Livestock production was the most common primary use in the Ozark and Ouachita mountains, forest products was the most common use in the Coastal Plain, and grain crops was the most common use in the Delta (Table 1).

Thirty-two percent of all respondents had seen a bear in the wild in Arkansas. Ozark residents saw bears most often (34.5%) and Coastal Plain residents least often (15.9%). Eighteen percent of the respondents had seen bears or bear sign on their land within the last 12 months. Twenty-one percent of the respondents in the Ozarks had seen bears on their land in the last 12 months compared to 10.9% from the Ouachita Mountains, 10.7% from the Delta, and 3.9% from the Coastal Plain; a regional difference was detected ( $X^2 = 38.7$ , 3 df,  $P < 0.0001$ ). These data reflect present knowledge of the species' range in the state (Fig. 1).

Thirty-four percent of respondents that had seen bears or bear signs on their

**Table 1.** Regional and statewide primary uses of land owned by bear damage survey respondents in Arkansas, 1988.

Primary use (%)	Region				
	Delta (N = 240)	Coastal Plain (N = 227)	Ouachita (N = 222)	Ozark (N = 290)	Statewide (N = 979)
Livestock <sup>a</sup>	6.3	22.9	41.9	42.1	31.7
Grain cash crops <sup>a</sup>	65.8	4.8	7.2	3.8	18.8
Forest products <sup>a</sup>	6.3	42.7	12.6	11.4	14.1
Residential <sup>a</sup>	4.2	7.1	10.8	12.4	9.6
Wildlife <sup>a</sup>	6.3	5.3	6.8	10.0	7.8
Investment	0.8	2.2	5.0	3.5	3.0
Dairy	0.8	0.0	2.3	4.1	2.5
Recreation	1.3	2.2	0.5	3.5	2.2
Vegetable crops	0.8	2.2	3.6	0.3	1.3
Poultry	0.0	0.4	2.3	2.1	1.5
Other	7.5	10.1	7.2	6.9	7.4

<sup>a</sup>A significant difference ( $P < 0.05$ ) was detected among regions.

property stated that populations had increased in their county during the last 5 years, 29.0% stated that populations were the same, and 9.4% said there were fewer bears. No regional differences were detected in that response ( $X^2 = 8.7$ , 9 df,  $P = 0.467$ ).

Only 4.5% of respondents had ever hunted bears, and only 1.3% had done so within the last 12 months. The proportion of landowners hunting bears differed among regions ( $X^2 = 19.4$ , 6 df,  $P = 0.004$ ). The highest proportion of bear hunters was in the Ozarks (6.5%). When asked whether bears should be hunted, regional differences again were detected ( $X^2 = 41.0$ , 6 df,  $P < 0.0001$ ). Among respondents expressing an opinion, Ozark residents most often felt that bears should be hunted (68.7% versus 42.7, 49.2, and 55.2% in the Coastal Plain, Delta, and Ouachita Mountain regions, respectively).

Twenty-five (15.1%) of the 165 respondents that had seen bears or bear sign on their property indicated that bears were illegally killed within their county during the past 12 months. They reported 14 bears were illegally killed by deer (*Odocoileus virginianus*) hunters, 5 by landowners, 4 by racoon (*Procyon lotor*) hunters, and 13 by other types of poachers. Many of those poaching reports were from the same counties, so we assume some repetitious reporting.

Fifty-three percent of respondents with bears on their property said they enjoyed seeing bears or finding their sign, 10.8% said they enjoyed hunting them, and 3.9% listed other benefits. Compared to residents of other regions, Ozark residents least often said that they enjoyed bears and most often reported that they enjoyed hunting bears.

Twenty-three percent of respondents that had bears or bear sign on their property indicated that bears had caused damage. The most common problem identified by respondents was livestock depredation (29.4%) and beehive damage (21.9%). Other problems were damaged fruit trees (7.6%), bears threatening family or friends (7.2%), damaged crops (5.3%), damaged buildings (1.5%), and miscellaneous other damages (27.3%). There were no regional differences in the proportion of landowners with bears on their land that experienced damage ( $P > 0.05$ ).

Individual landowners with bears reported damage estimates of up to \$1,000 for livestock, \$500 for beehive damages, \$500 for fruit tree damages, and \$300 for other losses. However, annual losses were low for the average landowner. Mean livestock losses per respondent were \$2.48 (SE = 2.45,  $N = 322$ ) and \$2.06 (SE = 1.12,  $N = 414$ ) in the Ouachita and Ozark regions, respectively. No losses were reported by landowners in the Delta or Coastal Plain. Mean apiary losses per landowner were \$0.12 (SE = 0.15,  $N = 322$ ) and \$1.04 (SE = 1.03,  $N = 414$ ) in the Ouachita and Ozark regions, respectively. Likewise, no beehive losses were reported in the Delta or Coastal Plain.

Respondents to the first mailing generally reported higher damage estimates than those to the second mailing, suggesting that persons who had experienced damage were more eager to respond than those that had not. To estimate total statewide damage to livestock and apiaries, we assumed non-respondents would have reported the same amount of damage as respondents to ensure that our estimates of damage per respondent would not be underestimated. No figures for total number

of landowners in Arkansas are available, but there were 50,525 farm operators in Arkansas in 1982 (U.S. Dep. Agric. 1984). Fifty-eight percent of the 979 respondents that indicated the primary use of their land, were classified as farms. Assuming that figure is consistent with other respondents that did not answer that question, the estimated number of landowners in Arkansas was 87,112, with 20,070 and 34,491 landowners in the Ouachita and Ozark mountains, respectively. Based on those figures, the estimated losses to livestock production during 1987 were \$49,800 in the Ouachita and \$71,000 in the Ozark mountains with no losses in the Delta or Gulf Coastal Plain (\$120,000 statewide, SE = 67,300). Estimated losses to honey production were \$36,000 in the Ozark and \$2,400 in the Ouachita mountains, with no losses reported in the Delta or Gulf Coastal Plain (\$38,400 statewide, SE = 37,800).

When asked to characterize bear damage, 4.6% of the respondents with bears on their land said damage was intolerable, 22.6% stated that damage was negligible, and 72.7% were unaware of any damage. Descriptions did not differ among regions ( $X^2 = 7.96$ , 6 df,  $P = 0.230$ ). Only 7.2% of those people with bears on their land had complained to AGFC.

Eighty-three percent of all respondents indicated that bear populations in their county should be increased or left at present levels (Table 2). Responses did not differ among regions ( $X^2 = 7.7$ , 9 df,  $P = 0.566$ ), but were different by knowledge score ( $X^2 = 109.2$ , 9 df,  $P < 0.0001$ ), income ( $X^2 = 111.4$ , 12 df,  $P < 0.0001$ ), level of education ( $X^2 = 61.4$ , 9 df,  $P < 0.0001$ ), sex ( $X^2 = 73.3$ , 6 df,  $P < 0.0001$ ), and age ( $X^2 = 23.6$ , 6 df,  $P < 0.001$ ) (Tables 3, 4). Respondents that were more likely to suggest that bear populations should be increased were those that answered 3 or more of the knowledge questions correctly, were males, were 40 to 69 years of age, had post-high school educations, and had incomes  $> \$30,000$ .

Attitudes towards bears differed depending on whether landowners had experienced prior damages ( $X^2 = 29.6$ , 3 df,  $P < 0.0001$ ). Most (62%) landowners with bears on their land who had not experienced damages said that bears had aesthetic value and they enjoyed them (Table 5). Only 10% indicated they were a nuisance. In contrast, 48.6% of the landowners with previous bear damage felt that bears were a nuisance and only 20.0% enjoyed them. Landowners that had experienced damage

**Table 2.** Regional and statewide wishes of Arkansas landowners for future bear population levels in their county, 1988.

Response (%)	Region				Statewide (N = 1237)
	Delta (N = 276)	Coastal Plain (N = 278)	Ouachita Mountain (N = 304)	Ozark Mountain (N = 379)	
Increase	41.7	36.3	35.5	38.5	39.1
Present level	43.5	45.0	47.4	42.5	43.5
Decrease	4.0	2.2	3.0	2.9	3.1
Total elimination	10.9	16.5	14.1	16.1	14.3

**Table 3.** Arkansas landowner wishes for future bear population levels in their county by knowledge score, income, and sex, 1988.

	Knowledge score <sup>a</sup>				Income level				Sex	
	0	1	2	3	<\$10,000	\$10,000– \$20,000	\$20,000– \$30,000	>\$30,000	Female	Male
<i>N</i> respondents	368	308	345	122	175	221	180	368	163	945
Response (%):										
Increase	19.8	37.7	52.8	58.2	24.6	38.9	46.7	51.9	21.5	44.0
Present level	56.5	46.1	36.5	34.4	54.3	43.9	43.3	39.4	50.9	42.0
Decrease	3.5	3.2	2.3	1.6	3.4	2.7	2.8	2.2	4.9	2.2
Elimination	20.1	13.0	8.4	5.7	17.7	14.5	7.2	6.5	22.7	11.7

<sup>a</sup>The number of general bear biology questions out of 5 answered correctly.

**Table 4.** Arkansas landowner wishes for future bear population levels in their county by education and age of respondent, 1988.

	Years of education			Age		
	<12	12	>12	<40	40–69	>69
<i>N</i> respondents	245	383	453	223	722	292
Response (%):						
Increase	32.7	38.4	48.3	35.0	42.5	29.5
Present level	48.6	44.4	38.9	43.0	43.1	49.0
Decrease	3.3	2.6	2.6	4.9	1.9	4.5
Elimination	15.5	14.6	10.2	17.0	12.5	17.1

were more likely ( $X^2 = 25.5$ , 3 df,  $P < 0.0001$ ) to want the bear population decreased or totally eliminated than those landowners that had not experienced damage (Table 6).

## Discussion

Although damage estimates and numbers of landowners reporting damage were greater in the Ozarks, the proportion of landowners with bears reporting damage did not differ by region. This was despite smaller individual landholdings, a higher proportion of residences on the rural property, and greater livestock production in the region. Damages appear to be related most closely to the high density of bears in the Ozark Mountains (Clark 1991) and least closely to land usage characteristics. As a result, an increase in bear numbers in the Gulf Coastal Plain and Delta probably can be expected to produce a concomitant increase in bear damage.

Although imprecise, these statewide damage estimates illustrate the relative impact of bears on the livestock and honey industries in Arkansas. The upper 95% confidence limit for statewide livestock losses to bears (\$252,700) amounts to only 0.1% of the 1987 statewide production (Ark. Agric. Stat. Serv. 1989); thus, damage

**Table 5.** Landowner attitudes toward bears by region in Arkansas, 1988.

Response (%)	Delta		Coastal Plain		Ouachita Mountain		Ozark Mountain		Statewide	
	No damage (N = 26)	Had damage (N = 6)	No damage (N = 9)	Had damage (N = 0)	No damage (N = 23)	Had damage (N = 10)	No damage (N = 57)	Had damage (N = 19)	No damage (N = 115)	Had damage (N = 35)
Enjoy	73.1	16.7	55.6	0.0	65.2	30.0	56.1	15.8	61.7	20.0
Enjoy but worry	7.7	33.3	0.0	0.0	8.7	20.0	7.0	5.3	7.8	14.3
Nuisance	7.7	16.7	11.1	0.0	8.7	30.0	12.3	68.4	10.4	48.6
No feelings	3.8	16.7	33.3	0.0	17.4	10.0	21.1	5.3	17.4	8.6
No response	7.7	16.7	0.0	0.0	0.0	10.0	3.5	5.3	3.5	8.6

was not great in total, but was serious to some landowners. However, the maximum estimated loss to honey production (\$112,488) represents a more sizeable percentage, about 9% of the \$1.2 million produced annually (D. Bailey, Ark. Apiary Board, pers. commun.). Apiary losses, however, are one of the most preventable forms of bear damage (Caron 1978, Alt 1980, Brady and Maehr 1982, Maehr 1982, Flanigan 1989). Again, these estimates probably are inflated due to non-response bias.

Most respondents, including those with bears on their land, had positive perceptions about black bears. This is similar to results of a survey by Pelton et al. (1976) who found that 64% of Great Smoky Mountains National Park visitors involved in a bear incident did not feel that bears posed a serious problem, and 99% still approved of bears being in the park. However, the attitudes of landowners whose property had previously been damaged by bears differed from unaffected landowners. Although not a demonstrated cause/effect relationship, these data suggest that having a bear damage incident could change the opinion of a landowner about bears. Furthermore, it illustrates the importance of responding quickly and efficiently to landowners' complaints concerning damage problems. Few of the respondents with bears on their land had requested that AGFC assist them with nuisance bears, and several respondents reported bears killed illegally by landowners. An increased effort should be made to increase public awareness of AGFC's capture and release program and preventative techniques (e.g., electric fences, proper garbage disposal).

**Table 6.** Arkansas landowner wishes for future bear population levels in their county of residence by presence and absence of bear problems, 1988.

Response (%)	Nuisance problems	
	No (N = 1199)	Yes (N = 38)
Increase	38.7	18.4
Present level	44.7	36.8
Decrease	2.8	13.2
Elimination	13.8	31.6



The socio-economic characteristics of landowners that are less tolerant of black bears may be related to the likelihood that they have or will experience nuisance bear problems. Those landowners with less education and in lower-income classes probably live in situations more conducive to bear problems. Additionally, if they occur, monetary losses would be more significant to the household budget. Other studies (Kellert 1985) also have found that level of education is correlated with positive attitudes toward large predators.

A higher proportion of females also favored lower bear populations. Kellert and Berry (1987) discussed such differing attitudes about wildlife between males and females, stating that women expressed substantially more fear of animals. Fear of these large carnivores in Arkansas may influence the opinions of females regarding future bear population levels.

Attitudes and perceptions of landowners toward bears may be conditioned according to whether they have experienced previous damage and the likelihood that they may have bear problems in the future. Damage caused by nuisance bears, particularly apiary damage, can be significant and landowners obviously are concerned. AGFC does not pay landowners for losses caused by bears but many landowners feel they should be compensated, particularly because bears were reintroduced. Much suitable habitat in Arkansas is presently uninhabited by bears and the reintroduced bear population continues to expand. Any future plans for increasing the black bear population as an aesthetic and harvestable resource should be coupled with increased support for assisting landowners with problem bears.

## Literature Cited

- Alt, G.L. 1980. Bears, beehives and beekeepers. *Gleanings in Bee Cult.* 108:137-139.
- Arkansas Agricultural Statistics Service. 1989. *Arkansas Agricultural Statistics, 1988.* Ark. Agric. Exp. Sta., Rep. Ser., 312, Univ. Ark., Fayetteville. 56pp.
- Burghardt, G.M., R.O. Hietala, and M.R. Pelton. 1972. Knowledge and attitudes concerning black bears by users of the Great Smoky Mountains National Park. *Internat. Conf. Bear Res. and Manage.* 2:255-273.
- Brady, J.R. and D.S. Maehr. 1982. A new method for dealing with apiary-raiding black bears. *Proc. Annu. Conf. Southeast. Assoc. Fish and Wildl. Agencies* 36:571-577.
- Caire, W., J.D. Tyler, B.P. Glass, and M.A. Mares. 1989. *Mammals of Oklahoma.* Univ. Okla. Press, Norman. 544pp.
- Caron, D.M. 1978. Bears and beekeeping. *Bee World* 59(1):18-24.
- Clark, J.D. 1991. Ecology of two black bear (*Ursus americanus*) populations in the Interior Highlands of Arkansas. Ph.D. Diss., Univ. Ark., Fayetteville. 228pp.
- Colvin, T.R. 1975. Aversive conditioning black bears to honey using lithium chloride. *Proc. Annu. Conf. Southeast. Assoc. Game and Fish Comm.* 29:450-453.
- Davenport, L.B., Jr. 1953. Agricultural depredation by the black bear in Virginia. *J. Wildl. Manage.* 17:331-340.
- Feng, R.B. 1969. Black bear questionnaire evaluating bear-bee depredation. Publ. MNR-G-225. Manitoba Dep. Nat. Resour. 24pp.
- Filion, F.L. 1980. Human surveys in wildlife management. Pages 441-453 in S.D. Schem-

- nitz, ed., *Wildlife management techniques manual*, Fourth ed. The Wildl. Soc., Washington, D.C.
- Flanigan, T.C. 1989. Protecting bees and saving bear with predator platforms. *Am. Bee J.* 129:721-722.
- Garshelis, D.L. 1989. Nuisance bear activity and management in Minnesota. Pages 169-180 in M. Bromley, ed. *Bear-People Conflicts: A Symposium on Management Strategies*. Northwest Territories Dep. Nat. Resour.
- Kellert, S.R. 1985. Public perceptions of predators, particularly the wolf and coyote. *Biol. Conserv.* 31:167-189.
- and J.K. Berry. 1987. Attitudes, knowledge, and behaviors toward wildlife as affected by gender. *Wildl. Soc. Bul.* 15:363-371.
- Lord, W.G. 1979. Black bear depredation of honey bees. *Am. Bee J.* 119:818-821.
- Machr, D.S. 1982. Beekeeping enters the solar age. *Am. Bee. J.* 122:280-281.
- and J.R. Brady. 1982. Florida black bear-beekeeper conflict: 1981 beekeeper survey. *Am. Bee J.* 122:372-375.
- Pelton, M.R., C.D. Scott, and G.M. Burghardt. 1976. Attitudes and opinions of persons experiencing property damage and/or injury by black bears in the Great Smoky Mountains National Park. *Internatl. Conf. Bear Res. and Manage.* 3:157-167.
- Rogers, M.J. 1973. Movements and reproductive success of black bears introduced into Arkansas. *Proc. Annu. Conf. Southeast. Assoc. Game and Fish Comm.* 27:307-308.
- Smith, K.G., J.D. Clark, and P.S. Gipson. 1990. History of black bears in Arkansas: Exploitation, elimination, and successful reintroduction. *Proc. East. Workshop Black Bear Res. and Manage.* 10: In press.
- Smith, T.R. 1985. Ecology of black bears in the bottomland hardwood forest in Arkansas. Ph.D. Diss. Univ. Tenn., Knoxville. 209pp.
- Snedecor, G.W. and W.G. Cochran. 1980. *Statistical methods*, Seventh ed. The Iowa State Univ. Press, Ames. 507pp.
- U.S. Department of Agriculture. 1984. 1982 Census of Agriculture: Volume 1, Part 4, Arkansas State and County Data. U.S. Dep. Commerce, Bur. Census. 401pp.
- Vaughan, M.R., P.F. Scanlon, S.E.P. Mersmann, and D.D. Martin. 1989. Black bear damage in Virginia. *Proc. East. Wildl. Damage Control Conf.* 4:147-154.
- Wigley, T.B. and M.E. Garner. 1987. Landowner perceptions of beaver damage and control in Arkansas. *Proc. East. Wildl. Damage Control Conf.* 3:34-41.
- Wilson, J.H., ed. 1984. *Rare and endangered species of Missouri*. Mo. Dep. Conserv., Jefferson City. 171pp.