Missouri Fifth Graders' Knowledge About Deer

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Abstract: Missouri fifth grade students (N = 2,581) selected from a stratified random sample of 100 public elementary schools were surveyed to determine their knowledge about white-tailed deer (*Odocoileus virginianus*). Students possessed good general knowledge about deer biology, management and hunting. Statements about habitat management and specialized information for deer proved most difficult for students as indicated by mean correct responses of only 51% and 45%, respectively. It was noteworthy that only 45% of the students agreed that deer hunting is a good method for controlling the deer population, and only 42% believed it an acceptable activity. Students attending schools in Ozark Plateau and Glaciated-Osage Plains natural divisions possessed better knowledge about deer than did students in Mississippi Lowland and urban regions of the state. Recreation and meat were recognized as primary reasons people hunt deer.

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Conservation education and outdoor skills education are vital to restoration and sustained quality of Missouri's fish, wildlife, and forest resources. The Missouri Department of Conservation Education Section accomplishes this responsibility by developing and teaching conservation courses, workshops, and seminars for educators and youth leaders. The Section also provides free student-ready materials to all preschool through secondary Missouri public, private, and parochial teachers and students.

Social researchers have reported that development of more effective conservation education programs is dependent upon improved evaluation of children's understanding about conservation concepts (Chemers and Altman 1977; Moore 1977; Pomerantz 1977, 1983; Kellert and Westervelt 1983; Whittaker 1983). Accepting conclusions of these studies, Education Section administrators desired to research the effectiveness of Missouri Department of Conservation education programs.

A study of Missouri fifth grade students was completed in 1986. The purpose of this study was to measure fifth graders' knowledge about deer biology, deer management strategies, and general attitudes toward deer hunting by major ecological natural divisions of Missouri (Thom and Wilson 1980).

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Methods

A questionnaire was developed to determine fifth grade students' knowledge about basic deer biology, management, and hunting concepts. Pretests of the questionnaire determined that statements were clear in meaning, were not regionally biased, and were appropriate for the fifth grade level.

Survey forms were mailed to a stratified random sample of 117 public elementary schools in Missouri. Selected schools received a cover letter explaining the purpose of the study, detailed instructions for completing the survey, and sufficient questionnaires for surveying a maximum of 30 fifth graders in each school. Stratification of elementary schools was based on Missouri natural divisions (Thom and Wilson 1980). Natural division classifications were Glaciated-Osage Plains, Ozark Plateau, Mississippi Lowlands, and urban (St. Louis and Kansas City areas). Sex of students was also stratified statewide. Data analyses were performed by computer using the SAS System statistical software package (SAS Inst. Inc. 1982). Weighted-means were calculated as described by Steel and Torrie (1980).

Results

Survey results were based on a mail questionnaire completed by 2,581 fifth grade public school students in Missouri. Completed questionnaires were received from 86% of the schools selected in the stratified random sample.

Ages of students ranged from 9 to 13 years. Ninety-one percent of the survey group was either 10 (26%) or 11 (65%) years old and the mean age was 10.8 years. Males made up 51% of the population surveyed. Almost 75% of the students resided within the limits of a town or city and the remainder lived in the country. Eighty-two percent of the students indicated they had seen a wild deer (Statement 14).

Knowledge Of Deer Biology

Data analyses of statements 1, 4, and 5 indicated that about two-thirds of the students had a good understanding of basic deer biology (Table 1). A gradual decrease in students' knowledge of deer biology was observed when comparing rural schools to urban schools. For example, percentages of correct respnses by Ozark

Table 1. Weighted-mean percentages of Missouri public school fifth grade students responding correctly to survey statements about deer biology, deer management and deer hunting by natural division.

Statement	Glac. Osage	Oz. Plat.	Miss. Lowlands	Urban	Statewide
1. Newborn deer called a buck.	74	66	64	52	70
2. Adult male deer have antlers all year long.	39	36	29	29	35
3. Term "deer habitat" means to change deer behavior.	48	54	38	45	48
4. Deer eat other animals for food.	68	70	60	56	66
5. Female deer give birth in late spring and early summer.	65	66	58	58	64
6. People who kill deer when they are not supposed to, hurt the deer pop. in Missouri.	83	85	78	78	83
7. The Mo. Dept. of Cons. sets a deer hunting season for people to kill deer with a rifle.	72	75	69	58	71
8. Do you think deer hunting is okay?	45	45	40	27	42
9. Hunting is a good way to control the number of deer in Missouri.	48	52	38	29	45
10. People killing deer when they are not supposed to is an important cons. problem.	87	90	84	82	88
11. "Poacher" is a word used to describe a person who breaks deer hunting laws by killing deer when he is not allowed to.	56	62	56	56	58
12. People who hunt deer at night are breaking the law.	37	43	38	46	40
13. Conservation agents arrest people who break deer hunting laws.	63	63	60	63	63
14. Have you ever seen a wild deer when visiting or traveling in the country?	87	88	75	64	82
15. People should be allowed to hunt deer whenever they want to because too many deer will destroy farm crops.	90[a]	89	84	79	87
16. Laws to stop people from hunting deer when they are not allowed to should be enforced better by the Missouri Department of Conservation.	77[b]	80	75	73	78

[a]Weighted mean for students disagreeing with statement for a natural division.
[b]Weighted mean for students agreeing with statement for a natural division.

Plateau and urban schools to basic biology statements produced the highest and lowest scores, respectively (Table 1).

Statements about specific biological information (Statements 2 and 3) resulted in substantially lower scores than did basic biology statements. The statement, "Adult male deer have antlers year-round," produced the lowest scores observed in the survey (Table 1). Natural division scores to statement 2 ranged from a low of 29% correct in urban and Mississippi Lowland schools to a high of 39% correct in Glaciated-Osage Plains schools. Overall, only 35% of students knew the correct respnse to statement 2 (Table 1).

Percentages of students responding correctly to biological statement 3 were also low. Ozark Plateau students scored the highest number of correct responses (54%) and Mississippi Lowland students the lowest percentage of correct responses (38%) to the statement, "deer habitat means to change deer behavior." Statewide, slightly less than half the students surveyed responded correctly to statement 3 (Table 1).

Scores for boys ranged from a high of 75% correct responses to basic biological statements 1 and 4 to a low of 40% correct responses to statement 2. In comparison, girls' scores ranged from a high of 67% correct to statement 1 to a low of 29% correct to statement 2.

Knowledge and Attitudes of Deer Management and Hunting

Questionnaire statements 6, 7, 8, 9, 10, 11, 12, 13, 15, 16, 17, and 19 determined fifth graders' knowledge of basic deer management, habitat requirements, and attitudes towards hunting as a deer management tool. Statewide, 83% of students surveyed responded "yes" to the statement "People who kill deer when they are not supposed to hurt the deer population in Missouri." Natural division scores to statement 6 ranged from a high of 85% correct in Ozark Plateau schools to a low of 78% correct in both Mississippi Lowland and urban schools (Table 1). Eighty-four percent of boys responded correctly to statement 6 compared to 82% correct responses for girls.

Statement 7 concerning whether Missouri has a firearms deer hunting season resulted in a high percentage of correct responses. Seventy-one percent of students surveyed were aware that the Missouri Conservation Department sets an annual firearms deer hunting season. Ozark Plateau schools had the highest percentage of correct responses (75%), and urban schools the lowest percentage of correct responses (58%) to this statement (Table 1). Boys (76%) were more knowledgeable than girls (66%) about the annual firearms deer season.

Analysis of the question, "Do you think deer hunting is okay?" pointed out that only 42% of students statewide agreed (Table 1). Surprisingly, only 45% of students in Ozark Plateau and Glaciated-Osage Plains natural divisions, where deer hunting is traditional, were in favor of hunting deer. Only 27% of students attending urban schools approved of hunting deer (Table 1). About two times as many boys (54%) than girls (28%) viewed deer hunting as acceptable.

Statewide, a low 45% of the students gave the correct response to statement 9 (Table 1). Ozark Plateau schools had a majority (52%) of students who understood hunting as a deer management tool (Table 1). Other natural division scores to this statement were 48%, 38%, and 29% in Glaciated-Osage Plains, Mississippi Lowland, and urban schools, respectively. Only 52% of the boys responded correctly as compared to 37% of the girls surveyed.

Statement 10 was very similar to 6 in that it requested students to respond to whether or not illegal deer hunting is a conservation problem. Statewide, 88% of the students recognized that people killing deer when they are not allowed to is an

important conservation problem (Table 1). Natural division scores to the statement ranged from a high of 90% correct responses by students in Ozark Plateau schools to a low of 82% in urban schools (Table 1). Boys (88%) and girls (87%) showed good knowledge that poaching deer causes severe deer management problems.

Only 58 percent of the students recognized the term "poacher" as meaning a person that kills deer in closed-season (Table 1). Natural division scores to statement 11 were very similar to the statewide percentage of students responding correctly (Table 1). One-half the girls surveyed recognized the poacher definition as compared to two-thirds of the boys.

Overall, 40% of the students responded correctly to statement 12 (Table 1). Percentages of correct responses to this statement were similar for all natural divisions (Table 1). Boys (43%) showed slightly more knowledge than girls (37%) about the legality of night deer hunting. Statement 13 was included in the survey to distinguish whether students recognized that "conservation agent" identified a person who enforced deer regulations. Table 1 shows that results to this statement were similar throughout all natural divisions. Data analysis based on student sex, however, pointed out that boys (69%) more readily identified the title "conservation agent" than did girls (55%).

Results to statement 15 indicated that recent deer related crop damage complaints from rural areas were having no apparent negative influence on fifth graders attitudes toward deer. Statewide, 87% of the students disagreed with the statement (Table 1).

Statement 16 dealt with the need for better enforcement by the Department concerning deer hunting. Overall, 78% of students believed that deer laws should be enforced better (Table 1). Eighty percent of the boys and 75% of the girls agreed with this statement.

Table 2 provides results of responses to statement 17 which asked students the meaning of the words "improve deer habitat." Statewide, only 55 percent of the students surveyed selected the correct meaning of creating more food, water, and cover. Students responding incorrectly (45%) interpreted "improve deer habitat" to mean decreasing the deer population (9%), changing deer behavior (21%), and 15% stated none of the definitions provided were correct (Table 2). It should be noted that the urban score to this statement does not appear substantially different from more rural natural divisions where major deer populations exist. Boys (55%) and girls (54%) had similar knowledge about deer habitat requirements.

Multiple responses were permitted for statement 18 to reduce potential confusion to students, since all 6 response choices were considered possible reasons for people to deer hunt. Seventy percent of the students selected more than 1 response to statement 18. Consequently, data analyses were based on treatment of each response as a separate agree–disagree statement.

Sixty-six percent of the students surveyed statewide agreed that people hunt deer for "sport" (Table 3). Surprisingly, urban schools showed the highest percentage of students (70%) agreeing with this response. Boy–girl analysis indicated that

Table 2. Weighted-mean percentages of Missouri public school fifth grade students responding to a deer habitat management statement by natural division.

Statement 17	Glaciated-Osage	Ozark Plateau	Miss. Lowlands	Urban	Statewide
The words "improve deer habitat" mean:					
a. Decreasing the number of deer in Missouri.	9	8	10	7	9
*b. Creating more food, water and places for deer to find a home.	55	57	45	54	55
c. Changing normal behavior of deer so that they become less wild.	13	12	18	19	15
d. Making deer behave better.	4	6	7	8	6
e. None of the above.	17	14	14	12	15

*Correct response.

Table 3. Weighted-mean percentages of students agreeing to response choices that identified possible reasons people hunt deer by natural division.[a]

Statement 18	Glaciated-Osage	Ozark Plateau	Miss. Lowlands	Urban	Statewide
People who hunt deer:					
a. Enjoy hunting as a sport activity.	64	68	60	70	66
b. Like to have deer meat to eat.	69	74	67	56	69
c. Enjoy being outside in the woods.	33	39	35	38	36
d. Have nothing else they want to do in their free time.	10	10	10	14	11
e. Are killing "Bambi" and should be stopped.	14	13	13	21	15
f. Like to kill animals.	19	18	20	26	20

[a]Each response choice was considered an agree-disagree question for data analysis because students were allowed to select more than 1 response choice.

approximately two-thirds of each group believed "sport" a prime motivation for people to hunt.

The most popular response to statement 18 was "like deer meat to eat." Overall, 69% of the students agreed with this response. It is important to note, however, that only slightly more students agreed to this response choice as compared to the "sport activity" choice (Table 3).

Regionally, students attending Ozark Plateau schools selected the "meat to eat" response more often than did students in other natural divisions. In contrast and somewhat surprising, urban school students (56%) agreed least often with the "meat" premise for deer hunting. Slightly over 70% of the boys and girls surveyed agreed to the "meat to eat" response.

Thirty-six percent of the students surveyed agreed to the response choice "enjoy being in the woods," whereas 20% of students felt that people hunted deer simply because they liked to kill animals (Table 3). The "Bambi" response was agreed to by 15% of students surveyed (Table 3). Once again this response occurred

Table 4. Weighted-mean percentages of Missouri public school fifth grade students responding to a statement about their deer hunting experience by natural division.

Statement 19	Glaciated-Osage	Ozark Plateau	Miss. Lowlands	Urban	Statewide
Please check the answer that applies to you:					
a. Have hunted—go again	22	23	23	7	20
b. Have hunted—didn't like	8	9	8	9	8
c. Never hunted—like to go	19	26	25	24	26
d. Never hunted—never want to go	43	40	44	60	46

most often in urban schools. Nineteen percent of the girls held this attitude toward deer hunting as compared to only 11% of the boys.

The least often selected response to statment 18 was "have nothing to do with their free time" (Table 3). Urban schools showed the highest percentage of students (14%) who believed this response described why people hunt deer.

Statement 19 provided data about students' deer hunting interest and experience. Students from non-urban schools were 2 times more likely to have hunted deer with someone than were urban students. Overall, 28% of the survey group had hunted deer (Table 4). Analysis by sex pointed out that 40% of the boys had hunted deer with someone as compared to 20% of the girls.

The most noteworthy data derived from statement 19 were the rather high percentages of students that had no desire to ever hunt deer (54%). On a natural division basis, 69% of urban students stated they never wanted to hunt deer as compared to 51%, 49%, and 52% of Glaciated-Osage Plains, Ozark Plateau, and Mississippi Lowland students, respectively (Table 4).

Discussion

Percentages of correct responses by Missouri fifth-graders (N = 2,581) to survey statements were variable. Some statements consistently showed high percentages of correct responses whereas, others resulted in erratic response patterns. This variability was observed throughout all stratifications of the survey population.

Survey statements most frequently answered correctly by respondents were those that required only a fundamental understanding of deer biology, management, and hunting. Statewide, schools averaged 75% correct responses to statements requiring a basic knowledge about deer. Results indicated that schools in areas having major deer populations (Glaciated-Osage Plains and Ozark Plateau natural divisions) had students who showed a better fundamental understanding of deer than schools located in regions of the state (Mississippi Lowlands and urban natural divisions) having small or no deer populations.

In contrast to the impressively high statewide average score to fundamental statements (75%), respondents averaged only 45% correct responses to statements requiring a specialized knowledge of deer. Most schools surveyed showed a lack of in-depth knowledge about deer.

The low percentage of correct responses to specialized statements was not totally surprising especially when considering the age group surveyed and that wildlife concepts are discussed only in general terms in Department primary school materials. It was anticipated that schools located in natural divisions having major deer populations would have higher scores to specialized statements than schools in areas having small or no deer populations simply because these students were raised in a deer hunting environment. Obviously, the data does not appear to support this assumption. Data pointed out that students have a poor understanding as to the meaning of deer habitat. Only 51% of the students correctly answered statements about habitat. This obvious lack of understanding was disappointing, since about 97% of the schools surveyed receive Department education materials which teach fundamental wildlife management concepts. This particular finding indicates possible shortcomings in conservation education materials used to instruct elementary school teachers and students about habitat needs for wildlife.

Even though students showed excellent understanding about general effects of illegal deer hunting (81%), their overall score regarding specialized statements about deer poaching decreased dramatically. Statewide, only 54% of students responded correctly to statements describing specific aspects of illegal hunting. A comparison of natural division scores indicated that Ozark Plateau and Glaciated-Osage Plains students had a slightly better understanding about deer poaching than did Mississippi Lowland and urban students.

Perhaps the most important result of the study was the fact that Missouri fifth graders' general knowledge and attitude toward deer hunting reflected somewhat of an anti-hunting philosophy. Statewide only 42% of survey respondents agreed that deer hunting is "okay." These results occurred even though almost 70% of the students agreed that people hunt deer primarily for sport or meat. Pomerantz (1983) reported that children's anthropomorphic feelings toward animals may help explain their opposition to hunting. Kellert and Westervelt (1983) reported that Connecticut children in upper grade levels disapproved of sport hunting but approved of hunting for meat.

Whatever children's reasons for disapproving of hunting, the need for greater emphasis on teaching primary school-aged children about benefits of hunting to management of wildlife must be recognized by conservation educators. Shaw (1975) pointed out that a child's environment has a strong influence on his adult attitudes and behavior patterns. Kellert and Westervelt (1983) concluded that Connecticut children's factual knowledge about animals showed its greatest increase between fifth and eighth grades. Likewise, LaHart (1981) implied that programs designed to increase tolerance toward consumptive uses of wildlife should be directed at children before the eighth grade when most attitudes and behavior patterns are well formed.

Results indicated that students with deer hunting experience possessed greater knowledge about deer than students who never had hunted deer. Pomerantz (1977) reported that Michigan students attending seventh through twelfth grades who had

hunting experience scored higher on wildlife knowledge questions than non-hunting students.

The most noticeable differences in boy–girl responses were observed with deer hunting statements. Boys appeared more agreeable to "sport" and "meat" hunting than did girls. Kellert and Westervelt (1983) reported that girls expressed greater emotional affection for animals than did boys in a study of Connecticut school children. It was assumed that this would also be true in Missouri.

Conclusions and Recommendations

Missouri fifth grade students possessed good fundamental knowledge about deer biology, management, and hunting. Students attending schools located in natural divisions having major deer populations showed greater knowledge about deer than those in areas having small deer populations. Statements about habitat and requiring specialized knowledge produced the lowest scores in the survey. Importantly, students recognized the negative impacts of illegal deer hunting on deer management, but were not strongly supportive of legal hunting. Seventy percent of students surveyed agreed that people hunt deer primarily for "sport" and "meat."

We recommend that conservation educators focus on development of materials and services which teach wildlife management concepts in greater detail (fifth–eighth grade) and in accordance to individual species management requirements with emphasis on habitat needs. Further, more materials should be developed which discuss the purpose of hunting in wildlife management. These materials are needed to reduce the potential of children's anthropomorphic feelings about animals from becoming anti-hunting sentiments during adulthood.

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