

**PENNSYLVANIA GAME COMMISSION  
BUREAU OF WILDLIFE MANAGEMENT  
RESEARCH DIVISION  
PROJECT ANNUAL JOB REPORT**

**PROJECT CODE NO.:** 06210

**TITLE:** White-tailed Deer Research/Management

**PROJECT JOB NO.:** 21009

**TITLE:** Evaluation of Biological Effects and Social Acceptance of New Antler Restrictions for White-tailed Deer Hunting Season in Pennsylvania

**PERIOD COVERED:** 1 July 2004 through 30 June 2005

**COOPERATING AGENCIES:** Pennsylvania Cooperative Fish and Wildlife Research Unit, The Pennsylvania State University

**WORK LOCATION(S):** Centre and Armstrong counties and statewide

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**DATE:** 1 July 2005

**Abstract:** We monitored 67 yearling and 69 adult bucks with radiocollars in Armstrong County, and 59 yearling and 47 adult bucks in Centre County for survival and dispersal. From May through September 2004, 4 bucks died in Armstrong County, and 2 died in Centre County. During the 2004-05 hunting season, 23 yearlings and 27 adults were harvested in Armstrong County. In Centre County, 17 yearlings and 24 adults were harvested. After the hunting season to 30 June 30 2005, 2 bucks died in Armstrong County, while 3 died in Centre County. In Armstrong County, 77% of yearling bucks dispersed (21% in spring, 56% in fall). In Centre County, 70% of yearling bucks dispersed (17% in spring, 53% in fall). The average dispersal distance was 7.5 and 8.8 km in Armstrong and Centre counties, respectively. Pre- and post-hunting season deer hunter surveys were conducted for the final year. Only those panel members completing the first 4 surveys were sent the final pre-season survey, and only those panel members completing the pre-season survey were sent the post-season survey. Ninety percent of remaining panel members completed the pre-season survey, and 94% of panel members who completed the fall survey completed the post-season survey. Panel members who completed all 6 surveys will be used to monitor trends in hunter opinion and attitude over time. In a separate, randomly chosen group for each survey, 66% and 67% responded to the pre-season and post-season survey, respectively. The randomly selected group is chosen for each survey to ensure that the estimates for a given point in time are representative. A preliminary analysis was conducted for 11 questions of interest, with the results presented to the Board of Game Commissioners in April 2005. The results indicate that hunters continue to support antler point restrictions.

**OBJECTIVES**

1. To estimate survival and identify mortality causes of male white-tailed deer from 6 to 30 months of age.

a. Survival of males from 6 to 18 months of age will provide an estimate of how many yearling males survive the hunting seasons under antler restrictions. This information will be used, in part, to evaluate the

effectiveness of Pennsylvania's antler restriction regulations for protecting yearling bucks.

b. Survival of males from 19 to 30 months of age will estimate the proportion of males that survive consecutive hunting seasons. This information will quantitatively address survival rates of males, which will be used for modeling herd dynamics and to simulate population responses to proposed management strategies.

c. For explanatory purposes, it is important to determine proximate causes of mortality to individuals in a population. Further, this information will facilitate refining management strategies. For example, minimum-point restrictions may need to be adjusted if buck harvest rates do not significantly decrease over time.

2. To monitor movements of male white-tailed deer from 6 to 30 months of age. Some males are expected to disperse between 10 and 30 months of age. Information related to dispersal (distance, timing, and rates) may explain differences in behavior among deer populations occupying different landscapes. These movement data may be used to develop spatially explicit population models and may assist in developing transmission of disease models.

3. To evaluate hunter acceptance and satisfaction with antler restrictions. We anticipate hunter attitudes and satisfaction will change as hunter expectations change from an altered sex- and age-ratio in the pre-hunt deer herd. This information will provide insight about hunter acceptance and satisfaction of future changes in Pennsylvania's deer management program.

## **METHODS**

Radiomarked deer were monitored for survival at least once per week after capture through the following hunting seasons. From March through May, telemetry locations were obtained twice per week to delineate home ranges before the anticipated spring dispersal during late May and June. Ground tracking was used whenever possible to locate deer, but deer that could not be found with ground tracking were located via aerial telemetry. After the deer hunting season, radiomarked deer were monitored for survival one time per month.

Dispersal was defined as permanent emigration from a natal range to a distinct adult range, such that pre-dispersal locations did not overlap post-dispersal locations. We calculated dispersal distance as straight-line distance between median x and y natal and adult coordinates (Kenward et al. 2002), and we calculated dispersal rate using a Kaplan-Meier survival model (Pollock et al. 1989) adapted for use with dispersal data (Rosenberry et al. 1999). For dispersers, timing of dispersal was used to define formation of adult range; however, for non-dispersers, adult range formation was defined to have begun on November 1, at which point deer were approximately 1.5 years old, and subsequent locations of these non-dispersers were considered to be adult locations that overlapped natal locations.

A pre-hunting season and post-hunting season deer-hunter survey was mailed to a randomly selected group of hunters. Both surveys followed the procedures described by Dillman (2000). The pre-hunting season survey was conducted during October and November 2004. Only surveys received before or on the opening day of gun season for deer were accepted for the pre-season survey. The post-hunting season survey was sent out in January 2005.

The pre-season survey was designed to measure hunter's attitudes regarding antler restriction regulations in their third year, and to measure support for them. The post-season survey was to compare hunters' real experiences with

antler restriction regulations to those preconceived before the hunt. This is the third year of post-treatment data.

The survey was also designed to monitor changes in attitudes and opinions over time. Survey participants responding to the previous 4 surveys were kept as part of a survey panel (LaPage 1994). Only those panel members who complete the series of 6 surveys will be used in the final analysis. A separate, representative sample of all license holders was also used for each survey to provide accurate estimates for a given point in time. The confidence interval for the random sample is  $\pm 4\%$ . The confidence interval for the panel will depend on the number of participants who complete the series of surveys.

We mailed 2,033 and 1,976 surveys in the pre-season and post-season mailings, respectively. In the pre-season mailing 867 were mailed to panel members, and 1,166 were randomly selected. In the post-season mailing 775 were mailed to panel members and 1,201 were randomly selected.

We conducted a preliminary analysis of the random survey group for 11 critical questions regarding hunter support for antler restrictions. A Likert scale response (strongly agree, agree, neither agree or disagree, disagree, strongly disagree) was recorded for each question. We then lumped those in agreement (agree or strongly agree) and those who disagree (disagree or strongly disagree) for comparison and presentation at the April Commission meeting. The analysis was designed to show a trend across the past 3 years of hunting with the current antler point restrictions.

## RESULTS

In May 2004, there were 67 yearling and 69 adult bucks radiomarked in Armstrong County. In Centre County, there were 59 and 47 yearling and adult bucks radiomarked, respectively. From May through September, 4 bucks died in Armstrong County, while 14 were censored, or removed from data analyses, after losing radio contact. In Centre County, 2 bucks died, and 10 were censored.

During the 2004-05 hunting season, 49 bucks were harvested in Armstrong County, while 41 were harvested in Centre County (Table 1). After the close of hunting season through June 2005, 2 and 3 bucks had died in Armstrong and Centre counties, respectively. One buck in Armstrong County was poached, and one was legally harvested in the PGC's agricultural depredation program (Red Tag). In Centre County, 2 bucks died of unknown causes and 1 was shot for crop damage.

In 2004, 70% of yearling bucks radio-marked in Centre County dispersed from their natal range. Of these, 17% dispersed in the spring (May - June) and 53% dispersed in the fall (September - November). On average, bucks dispersing in Centre County traveled 8.8 km between natal and adult range (median = 7.2 km), and maximum observed dispersal distance was 40.0 km. In Armstrong County, 77% of yearling bucks dispersed, with 21% dispersing during spring and 56% dispersing during fall. Average dispersal distance in Armstrong County in 2004 was 7.5 km (median = 5.9 km), and maximum dispersal distance was 40.2 km.

In the pre-season survey 775 panel members (those responding to the first 4 surveys) responded, 2 were undeliverable, and 18 requested to be deleted from the panel. After adjusting for undeliverable surveys, 90% (775 of 865) chose to remain as part of the survey panel. Of the 1,166 hunters chosen for the random sample, 743 responded, and 48 had undeliverable addresses, for a 66% (743 of 1118) response rate. In the post-season survey to 775 panel members (those responding to the first 5 surveys) responded, 1 was undeliverable, and 3 requested to be deleted from the panel. After adjusting for undeliverable surveys, 94% (728 of 774) of the remaining panel members chose to complete all 6

surveys. Of the 1,202 hunters chosen for the random sample, 764 responded and 54 had undeliverable addresses, for a 67% (764 of 1,148) response rate.

Most hunters agree that current regulations for bucks will result in more bucks with larger antlers and more, older aged bucks (Table 2). However, at the end of the 3-year study, 25% agreed there would not be an increase in the quality of bucks because the large bucks would be poached before season. Thirty-eight percent disagreed; indicating they did not think poaching of large bucks would be a problem. Our field data with radio-marked bucks indicates that poaching was not a problem in the Centre or Armstrong county study areas (Table 1).

Hunter support for the PGC's deer management program declined over the survey time period (Table 3). However, despite declining support for the overall program, hunters were supportive of antler point restrictions statewide (Table 3). Respondents hunting primarily in the 4-point area as well as those hunting in the 3-point area maintained their support for antler restrictions (Table 3). Based on the preliminary results of our survey, the discontent among hunters with the deer management program is due to factors other than antler point restrictions.

#### **RECOMMENDATIONS**

1. Continue telemetry monitoring to measure survival rates through the 2005-06 hunting seasons.

2. Conduct a follow-up survey of panel members who dropped out after the first survey. This is to determine if there are differences between hunters who were dropped from the panel and those who completed all 6 surveys.

3. Complete data analysis of hunter satisfaction surveys and have a final report of results by September 15, 2005.

#### **LITERATURE CITED**

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- LaPage, W. F. 1994. Using panels for travel and tourism research. Pages 481-486 in J.R. Ritchie and C.R. Goeldner, editors. Travel, tourism, and Hospitality research: A handbook for managers and researchers. Wiley, New York, New York, USA.
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Table 1. Cause of death of radiomarked male white-tailed deer in Armstrong and Centre counties from May 2004 through 30 June 2005.

Cause of death	County		Total
	Armstrong	Centre	
Roadkill	5	6	11
Legal Archery	14	1	15
Legal Rifle	19	26	45
Legal Muzzleloader	0	1	1
Illegal Hunting	11	9	20
Hunting Unk. Legality	5	4	9
Poached (Out of Season)	3	0	3
Crop Damage / Red Tag	1	1	2
Predation	0	0	0
Disease	0	0	0
Malnutrition	0	0	0
Unknown	2	3	5
Other	2	0	2
Total	62	51	113

Table 2. Preliminary results of selected questions from deer hunter surveys conducted from pre-hunting season 2002 to post-hunting season 2005. Responses were provided on a Likert scale of 1-5, with 1 = strongly agree, 2= agree, 3 = neither agree nor disagree, 4 = disagree, and 5 = strongly disagree. For this preliminary analysis, we compared those that agreed (1's and 2's) to those that disagreed with the statements provided. These questions were in regards to current harvest regulations for antlered deer, and was stated as "Current harvest regulations for bucks will result in...", with the statement completed as listed below. All numbers are listed as a percentage of the respondents.

		Survey Period					
		Fall 02	Winter 03	Fall 03	Winter 04	Fall 04	Winter 05
...more bucks with large antlers.	Agree	64	63	67	58	63	52
	Disagree	14	14	11	18	14	25
...more older aged bucks.	Agree	66	63	68	60	66	53
	Disagree	14	14	11	16	15	21
...no increase in quality of bucks because large bucks will be poached before season.	Agree	23	19	18	20	21	25
	Disagree	43	44	45	42	47	38

Table 3. Preliminary results of selected questions from deer hunter surveys conducted from pre-hunting season 2002 to post-hunting season 2005. Respondents were given the statement below, and asked to provide their level of agreement on a Likert scale of 1-5, with 1 = strongly agree, 2= agree, 3 = neither agree nor disagree, 4 = disagree, and 5 = strongly disagree. For this preliminary analysis, we compared those that agreed (1's and 2's) to those that disagreed with the statements provided. All numbers are listed as a percentage of the respondents. The final question was rated by respondents as excellent, good, fair, poor, or don't know.

		Survey Period					
		Fall 02	Winter 03	Fall 03	Winter 04	Fall 04	Winter 05
Hunters will shoot any antlered deer and leave them in the woods if they are not legal.	Agree	42	29	32	26	33	31
	Disagree	27	29	37	30	36	30
Concurrent antler restrictions are a good change for Pennsylvania's deer management program.	Agree	48	53	55	49	55	44
	Disagree	22	18	16	22	17	28
I support a statewide antler restriction.	Agree	57	61	64	59	65	56
	Disagree	23	19	15	20	16	26
I support a statewide antler restriction (for hunters in 3-point area).	Agree	63	71	71	69	72	62
	Disagree	22	19	15	16	14	26
I support a statewide antler restriction (for hunters in 4-point area).	Agree	53	61	59	55	60	59
	Disagree	32	24	22	32	24	34
I support an antler restriction in the wildlife management units I hunt.	Agree	55	59	62	56	62	54
	Disagree	24	18	16	22	17	26
I support a regulation that would increase the ratio of antlered bucks to antlerless deer in the statewide population.	Agree	63	65	68	56	64	47
	Disagree	15	13	9	18	13	26
I would rate the PGC deer management program as:	Excellent/ good	36	51	49	42	48	26
	Fair/poor	49	33	35	42	38	57