

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

**PROJECT CODE NO.:** 06210

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

**JOB CODE NO.:** 21016

**TITLE:** Survival and harvest rates of white-tailed deer in rifle and shotgun hunting areas of southeastern Pennsylvania

**PERIOD COVERED:** 1 July 2012 through 30 June 2013

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

**WORK LOCATION(S):** Private and public lands in Wildlife Management Unit 5C

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**ABSTRACT** In January 2012, we initiated fieldwork to capture and monitor white-tailed deer (*Odocoileus virginianus*) in Wildlife Management Unit 5C to estimate survival and harvest rates of deer in rifle and shotgun only (Special Regulations counties) hunting areas. From January-April 2013, we captured 309 deer, marking 265 with \$100 reward ear tags and 45 with radio markers. From February 2012 to January 2013, 38 radio-marked deer died. The main cause of death for radio-marked deer was legal hunting. Intensive monitoring will continue through the 2013-14 hunting seasons.

**OBJECTIVES**

1. Determine the harvest rate of antlered and antlerless deer in WMU 5C.
2. Determine the effect of rifle versus shotgun on harvest rates of antlered and antlerless deer in WMU 5C.
3. Determine annual survival rates of antlered and antlerless deer in WMU 5C.
4. Determine mortality causes of antlered and antlerless deer in WMU 5C.
5. Determine whether the PASAK model can estimate deer populations in WMU 5C.

6. Determine feasibility of current regulations to reduce deer populations in WMU 5C.

## METHODS

### Deer Capture, Survival, and Mortality Causes

We conducted fieldwork to capture and monitor white-tailed deer (*Odocoileus virginianus*) in Wildlife Management Unit (WMU) 5C. Firearms for deer hunting are limited to shotguns in half of the study area (Special Regulations counties), while in the other half, shotguns and centerfire firearms are legal (Figure 1). We used drop nets (Conner et al. 1987), rocket nets, and modified Clover traps (Clover 1954, McCullough 1975) baited with corn to capture deer. Deer captured using drop-nets and rocket nets were sedated with a light, intramuscular (IM) dose of xylazine hydrochloride (XYL), and face-masked. Xylazine was delivered via hand syringe at about 0.6 mg/kg body weight, or about 20 mg for a fawn, 30 mg for a yearling, and 40 mg for an adult. Our XYL dosages were well below the dosage recommended by Bubenik (1982) for immobilization of white-tailed deer using xylazine alone; complete sedation was not required to facilitate handling deer tangled in the nets. We manually restrained and face-masked deer captured in Clover traps.

We marked all deer with numbered ear tags or reward ear tags. Most male deer received numbered ear tags and 2 ear-tag transmitters to ensure continued monitoring if one transmitter is lost. Some males received radio collars designed to allow for growth via the breaking of a loop sewn into the collar as described by Diefenbach et al. (2003). The transmitter for female deer was attached to a collar. Adult doe collars for were fixed in size, while collars for fawn does were padded with foam designed to deteriorate and allow growth. We marked all deer receiving radio markers with numbered ear tags inscribed with a toll-free phone number. All remaining deer received bicolored reward ear tags (white on the inside of the ear and black on the outside) to reduce visibility of tags to hunters. Each reward tag was labeled with a random identification number, toll-free phone number, and \$100 reward for reporting the tagged animal. Rewards would be paid by the Pennsylvania Cooperative Fish and Wildlife Research Unit (PCFWRU) through a grant agreement with the Pennsylvania Game Commission (PGC).

We antagonized chemical immobilizations with IM injections of tolazoline hydrochloride (TOL; 2.0 mg/kg) because it provides a more consistent antagonism of xylazine than yohimbine hydrochloride (Kreeger 1996). Deer manually restrained by personnel were immediately released after individual markers were applied.

We determined cause of mortality with gross examination of the carcass or a necropsy by the PGC veterinarian.

## RESULTS

### Deer Capture, Survival, and Mortality Causes

We captured 310 deer plus 7 recaptures (Table 1). Two hundred and sixty-five deer were marked with reward tags, and 45 were marked with radio markers (Table 2). From February 2012 to January 2013, 38 radio collared deer died (Tables 3 and 4). The primary cause of

mortality was from legal hunting. Four of the 317 deer we handled in 2013 were lost as a result of capture (Table 5).

## **RECOMMENDATIONS**

1. Intensively monitor deer movement, and survival and harvest rates through February 2014.
2. Continue to record mortality reports through February 2015.
3. Complete final report by June 2015.

## **LITERATURE CITED**

- Bubenik, G. A. 1982. Chemical immobilization of captive white-tailed deer and the use of automatic blood samplers. Pages 335-354 *in* L. C. Nielsen, J. C. Haigh, and M. E. Fowler, editors. Chemical immobilization of North American wildlife. Wisconsin Humane Society, Milwaukee, USA.
- Conner, M. C., E. C. Soutiere, and R. A. Lancia. 1987. Drop-netting deer: costs and incidence of capture myopathy. *Wildlife Society Bulletin* 15:434-438.
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- Diefenbach, D.R., C.O. Kochanny, J.K. Vreeland, and B.D. Wallingford. 2003. Evaluation of an expandable, breakaway radiocollar for white-tailed deer fawns. *Wildlife Society Bulletin* 31:756-761.
- Kreeger, T. J. 1996. Handbook of wildlife chemical immobilization. International Wildlife Veterinary Services, Laramie, Wyoming, USA.
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Table 1. White-tailed deer captures and recaptures by sex-age class from January - April 2013 in rifle and shotgun areas of Wildlife Management Unit 5C, Pennsylvania. Captures represent the initial capture of a deer. Total captures equal captures plus recaptures. An adult is classified as an animal 1.5 years old or older.

<b>Sex/age class</b>	<b>Rifle area</b>		<b>Shotgun area</b>		<b>Total captures</b>	<b>Total recaptures</b>
	<b>Captures</b>	<b>Recaptures</b>	<b>Captures</b>	<b>Recaptures</b>		
Male adults	12	2	21	2	33	4
Male juveniles	53	0	50	1	103	1
Female adults	54	0	58	2	112	2
Female juveniles	31	0	31	0	62	0
<b>Total</b>	<b>150</b>	<b>2</b>	<b>160</b>	<b>0</b>	<b>310</b>	<b>7</b>

Table 2. Radio-marked and reward tagged white-tailed deer by sex-age class in rifle and shotgun areas in Wildlife Management Unit 5C, Pennsylvania, January - April 2013. An adult is classified as an animal 1.5 years old or older. Fawns are less than 1 year old.

Sex/age class	Rifle area			Shotgun area			WMU
	Reward ear tags	Radio-marked	Total	Reward ear tags	Radio-marked	Total	Total
Male adults	12	0	12	21	0	21	33
Male fawns	39	14	53	39	11	50	103
Female adults	54	0	54	58	0	58	112
Female fawns	21	10	31	21	10	31	62
Total	126	24	150	139	21	160	310

Table 3. Mortality causes for radio-marked white-tailed deer in rifle area of WMU 5C, Pennsylvania, February 2012 – January 2013. Adults are classified as animals older than 2 years of age.

Sex – age class	Hunting			Roadkill	Unknown/other
	Legal	Red Tag	Illegal/Unknown		
Male adults	3	0	1	2	2
Male juveniles	4	1	0	0	2
Female adults	0	0	0	0	0
Female juveniles	0	0	0	0	2
Total	7	1	1	2	6

Table 4. Mortality causes for radio-marked white-tailed deer in shotgun area of WMU 5C, Pennsylvania, February 2012 – January, 2013. Adults are classified as animals older than 2 years of age.

Sex – age class	Hunting			Roadkill	Unknown/other
	Legal	Red Tag	Illegal/Unknown		
Male adults	4	0	2	0	0
Male juveniles	1	0	3	1	2
Female adults	4	0	1	0	0
Female juveniles	2	0	0	0	1
Total	11	0	6	1	3

Table 5. Capture related mortalities from 317 white-tailed deer handled in WMU 5C, Pennsylvania, January - April 2013. An adult is classified as an animal 1.5 years old or older. Fawns are less than 1 year old.

Sex – age class	Cause of death			Total
	Broken back	Capture myopathy	Asphyxiation	
Male adults	0	0	0	0
Male fawns	1	1	0	2
Female adults	0	1	0	1
Female fawns	1	0	0	1
Total	2	2	0	4

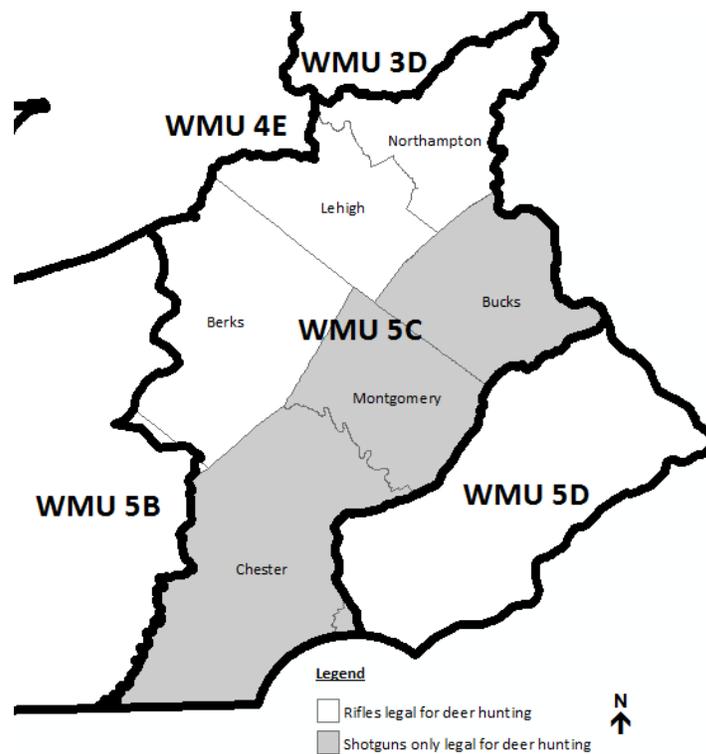


Figure 1. Map of WMU 5C study area identifying counties where rifles and shotguns are legal firearms for deer hunting, Pennsylvania 2012.