EFFECTS OF SPORT HUNTING ON RACCOON REPRODUCTION, SURVIVAL AND BEHAVIOR

By

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EFFECTS OF SPORT HUNTING ON RACCOON

REPRODUCTION, SURVIVAL AND

BEHAVIOR

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PREFACE

This study is comprised of original research designed to answer a current management question concerning the effects that sport hunting with dogs has on raccoon, especially during the breeding and kitten rearing season. This information will be useful to wildlife management agencies in determining season dates and the best management practices for raccoon.

Sources of financial support which made this research possible include; the National Wildlife Federation, the Oklahoma Federation of Coon Hunters, and the U. S. Department of the Army, Fort Sill Military Reservation, Directorate of Facilities and Engineering. Agencies cooperating with the Oklahoma Cooperative Wildlife Research Unit on this research include; the U. S. Fish and Wildlife Service, Oklahoma State University, the Oklahoma Department of Wildlife Conservation, and the Wildlife Management Institute.

I express appreciation to my major advisor, Dr. James H. Shaw, Associate Professor, Department of Ecology, Fisheries, and Wildlife, Oklahoma State University for his guidance and initiation of this project. I also thank Dr. Paul A. Vohs and Dr. John A. Bissonette for serving as committee members and their helpful suggestions on this manuscript. I thank Dr. John W. Thornton not only for serving as a committee member and helpful guidance to raccoon literature, but especially for providing his time, personal coonhounds, and insight to coon hunting when they were needed.

I also thank Gene G. Stout, Wildlife Biologist, Fort Sill Military Reservation, and his employees for their suggestions and help with the field work.

Finally, special appreciation and a pat on the head is extended to my personal coonhound, Slingshot, who hunted countless hours with unquestioned devotion in pursuit of raccoon on the study areas so that the objectives of this research could be fulfilled.

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INTRODUCTION

This thesis is comprised of one manuscript titled "THE EFFECTS OF SPORT HUNTING ON RACCOON REPRODUCTION, SURVIVAL AND BEHAVIOR" (Chapter II). The manuscript is written in the style of the Journal of Wildlife Management and is suitable to immediate submission for publication. Additional materials on morphological characteristics of raccoon on the study areas are presented in the Appendixes.

CHAPTER II

EFFECTS OF SPORT HUNTING ON RACCOON REPRODUCTION, SURVIVAL AND BEHAVIOR[1]

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Abstract: The effects of sport hunting with dogs during spring and summer on reproduction, survival and behavior of female raccoon (Procyon lotor) were studied from February 1978 through January 1980. Experimental and control study areas were selected on Fort Sill Military Reservation in southwestern Oklahoma. Reproduction in raccoon appeared inversely related to population density. Natural mortality and sport hunting pressure appeared directly related to density. Therefore, raccoon population density itself may influence reproductive success, subsequent population size, and the sport hunting pressure to which a population is subjected. Control areas closed to spring-summer sport hunting experienced immediate hunter use when reopened and higher harvest during the fur season than experimentally sport hunted areas, even though population densities on control areas were slightly lower. Female raccoon adjusted nocturnal behavior patterns to sport hunting pressures, and females with young had significantly shorter ($P < 0.025$) home ranges than females without young. Sport hunting of raccoon on

[1] Cooperators of the Oklahoma Cooperative Wildlife Research Unit include Oklahoma State University, Oklahoma Department of Wildlife Conservation, U. S. Fish and Wildlife Service, and the Wildlife Management Institute.

Fort Sill essentially represented a large, non-consumptive, recreational use of a renewable resource.

Sport hunting is defined in this study as pursuing raccoon (Procyon lotor) for the express purpose of training and chase, with no intention of catching or killing the quarry. The purpose of this study was to determine if spring-summer sport hunting with dogs affects reproduction, home range use, activity periods, and survival of adult female raccoon and their young.

Year around sport hunting of raccoon is a common practice in Oklahoma and other southern and western states. In contrast, approximately ½ the states in the United States prohibit sport hunting of raccoon during spring and summer months. Game management agencies are unsure if spring-summer sport hunting is a harmful practice because its' impact on survivorship and reproduction are unknown. A recent survey in Kentucky (Wright 1977) showed 36-47% of raccoon hunters checked during a dog training season were violating game laws and 28-73% of these violations involved carrying guns which could have resulted in illegal killing of raccoon out of season. It was believed that this illegal hunting pressure, especially during the kitten rearing season, could significantly reduce population levels. Stuewer (1943) also suggested that sport hunting could be harmful to young raccoon and should not be permitted before September.

In addition to illegal and accidental killing, sport hunting of raccoon during the reproductive season may alone significantly influence breeding, parental care, and survival of young. Domestic animals were shown to suffer fetal dwarfing and embryo mortality due to

elevated body temperatures and stress (Ulberg and Burfening 1967). Deer chased by trailing hounds did not exhibit these ill effects (Gavitt et al. 1975, Gipson and Sealander 1975).

Conversely, year around running may promote increased survival through forced dispersal of concentrated populations and conditioning young raccoon to elude dogs prior to fur harvest season. If sport hunting does not significantly reduce reproduction and survival of raccoon, its' practice would represent a large, non-consumptive, recreational use of a renewable resource.

I acknowledge J. H. Shaw, Associate Professor, Department of Ecology, Fisheries, and Wildlife, Oklahoma State University as major advisor, and G. G. Stout, Wildlife Biologist, Fort Sill Military Reservation for field assistance throughout the study. Funding was provided by the Oklahoma Federation of Coon Hunters, National Wildlife Federation, and U. S. Department of the Army, Fort Sill Military Reservation, DFAE through the Oklahoma Cooperative Wildlife Research Unit. J. A. Bissonette, P. A. Vohs, and J. W. Thornton provided helpful comments on the manuscript.

STUDY AREA

Fort Sill Military Reservation (FSMR) in Comanche County, southwestern Oklahoma, was chosen as the study area. Approximately 2.5 km lengths of 2 separate, permanently flooded creek bottoms, East Cache Creek and Medicine Creek, were specific sites for this research. Hunter access to Medicine Creek was somewhat easier than for East Cache Creek.

Most of FSMR is comprised of mixed grass eroded plains (Duck and Fletcher 1943) with some former cropland reverting to natural vegetation

types. Wooded areas are located along stream bottoms and comprised of elm (Ulmus americana), pecan (Carya illinoensis), hackberry (Celtis occidentalis), persimmon (Diospyros texana), mulberry (Morus alba), cottonwood (Populus deltoides), and various oaks (Quercus spp.) (Buck 1964).

Riparian habitat on FSMR has developed into over-mature, mixed hardwood stands that should provide an abundance of food and den cavities for raccoon. Prairie grasslands adjoining stream bottoms were periodically mowed by hay leasees, a practice that restricts expansion of riparian type vegetation and raccoon movements from grassland areas.

FSMR has an average annual rainfall of 77 cm falling primarily during spring and summer. Winters are generally mild with only occasional freezing weather. Mean January temperature is 4 C and mean July temperature is 34 C, with an extreme range of -24 to 46 C (unpubl. Nat. Res. Cons. Rep., FSMR, OK., 1978).

FSMR does not allow trapping of furbearers, maintains its own game ranger patrol, is fenced to restrict unauthorized access, and can control hunting pressure. These factors permitted an opportunity for strict experimental manipulation of study areas.

METHODS AND MATERIALS

East Cache Creek and Medicine Creek were selected as specific study sites because FSMR biologists believed they were similar in habitat and raccoon numbers. During 1978 and 1979, raccoon on both areas were sport hunted from September through November and open to fur harvest, using dogs only, during December and January. According to the experimental design, no sport hunting was permitted on the control area (Medicine

Creek) from February through August 1978, while raccoon on the experimental area (East Cache Creek) were run on a regular basis. Experimental treatment of study areas was reversed in 1979 to allow for unseen differences in population structure and habitat conditions.

Raccoon on both areas were trapped during February and March using Tomahawk #108 live traps (Tomahawk Trap Co., Tomahawk, WI.). (Reference to specific equipment and manufacturers does not indicate endorsement by the author or cooperators). Raccoon were immobilized using Keta-Set (Ketamine hydrochloride) injected intramuscularly in doses varying from 0.5-1.0 cc (100 mg/ml), depending on estimated weight of each animal. All raccoon were weighed, sexed, ear tagged using numbered metal ear tags (National Band and Tag Co., Newport, KY.), and standard mammalian measurements were recorded. Age class, either adult (older than 2 years) or subadult (younger than 2 years), was determined for males using externally measured length of bacculum and extrusibility of os penis through the preputial opening, and for females by size and pigmentation of mammae (Sanderson 1950, Johnson 1970). Female raccoon were fitted with a radio transmitter package attached to a neck collar (Wildlife Materials, Inc., Carbondale, IL.). All raccoon were released at their capture site upon recovery from drugging effects.

Radio-equipped female raccoon were relocated using a portable receiver and hand held, 3-element yagi type, directional antennae (Wildlife Materials, Inc., Carbondale, IL.). Relocations were plotted to determine home range length. Maximum distance between relocations was used as a home range index due to the linear nature of the riparian habitat. Comparisons of home range lengths were made between study areas and for females with and without young. Daily activity periods

were recorded to determine behavior of female raccoon under experimental and control conditions. Causes of mortality were verified by veterinary services on FSMR.

An estimation of conception and parturition dates were made from observations of vulvar swelling in live captured animals and crown-rump measurements of fetuses from dead study animals (Llewellyn 1953). The number of surviving kitten raccoon in each litter was counted in August using a military model starlight scope that allowed night vision and compared between study areas to determine the effects of spring-summer sport hunting on young raccoon survival.

Hunting pressure measured as number of hunter man-days, and numbers of harvested raccoon from each area were obtained from daily records of hunter use collected by FSMR biologists.

Differences in mean productivity of female raccoon and mean home range lengths were tested with Students t-test. The level of significance used was $P < 0.10$ since sample sizes were limited and differences at this level were believed to be real.

RESULTS

Differences in population characteristics of raccoon between East Cache Creek and Medicine Creek were obtained from comparisons of live-trapped animals during both 1978 and 1979 (Table 1). A significant difference was observed only for mean sex ratio ($P < 0.10$). Both populations averaged approximately 30% subadults in both 1978 and 1979. Male raccoon weighed from 2.8-7.8 kg with a distinct division between subadults and adults at 4.8 kg. Weights of females ranged from 2.0-5.9 kg and age classes distinctly separated at 4.0 kg. Population size

apparently decreased on both study areas from 1978 to 1979. Trapping effort, indicated by number of trapnights was increased from 368 in 1978 to 1086 in 1979. Total captures of raccoon, however, decreased from 38 to 26, and number of recaptures increased from 7 to 13, in 1978 and 1979 respectively.

Productivity and mortality of female raccoon were compared between 1978 and 1979 and between experimental and control treatments (Table 2). Female raccoon showed a marked increase in number of surviving young ($P < 0.10$) and number of young per female ($P < 0.05$) from 1978 to 1979 even though population levels were lower in 1979. Neither of 2 subadult females were observed with young either year. No differences ($P > 0.50$) were apparent between experimental and control treatments when pooling results of 1978 and 1979. Although results between 1978 and 1979 show variation in reproduction of raccoon, comparisons between control and experimental treatments showed little variation in reproduction.

Causes of mortality of radio-equipped female raccoon other than during fur harvest season were divided into 3 categories (Table 2). High natural mortality, particularly canine distemper, was recorded with high population levels in 1978 and accounted for the deaths of 5 transmittered females. During May and June 1978, 15 cases of canine distemper in both tagged and untagged raccoon, were verified from an area between and including parts of both study areas. At lower population levels during 1979, no natural mortality was observed on either study area. One radio-equipped female was caught and killed by dogs in 1978, but could have been suffering effects of canine distemper. Fate was classified as unknown for animals in which cause of death could not be positively verified. Radio contact was lost with several

female raccoon and could have been due to transmitter failure.

Home range length ranged from 400-4200 m (Table 3). The extreme home range length of 4200 m was observed in a subadult female on an experimental area that presumably was chased from its' normal home range but returned 2 days later. No difference existed in average home range length between experimental and control areas ($P > 0.40$) or between East Cache Creek and Medicine Creek ($P > 0.50$), but females with young had significantly shorter home ranges ($P < 0.025$) than females without young.

Relocations of collared female raccoon during summer months indicated an average activity period of from 5½ - 6 hours each night, both under sport hunted and control treatments. Average onset of nocturnal activity began at 2130 hours and ended at 0330 hours (Central Daylight Saving Time), except on the experimental area during 1979 where average nocturnal activity was initiated at 2330 hours and ended at 0500 hours.

Breeding of raccoon, determined by examination of 2 sets of fetuses and vulvar swelling in live captured animals, was observed from mid-February through mid-March. Kitten raccoon became visibly active in May and June.

Hunting pressure ranged from 3 to 98 man-days per month (Fig. 1). From February 1978 through January 1980, Medicine Creek was the preferred area with a total of 658 man-days compared to 440 man-days on East Cache Creek. Spring-summer sport hunting accounted for 412 man-days of recreation. Most intense use of study areas occurred during December of the December-January fur harvest season. General trends indicate that least use occurred during January, February, and May. However,

a noticeable increase was apparent during March and April. Sport hunting continued at moderate levels through the summer months of June July, and August. A gradual increase in sport hunting activity occurred during September, October, and November prior to fur harvest season. Sport hunters immediately utilized control areas closed to spring-summer sport hunting when reopened in September.

Thirteen raccoon from the experimental area and 19 raccoon from the control area were reported harvested in the 1978-79 fur season. During the 1979-80 fur season, 9 and 11 raccoon were reported harvested from experimental and control areas respectively. Although population levels were lower on control areas each year, the control areas experienced higher harvest than the experimental areas.

DISCUSSION

The basic assumption of the experimental design, that both study areas were similar in raccoon population characteristics and numbers, appeared valid from results of live trapping (Table 1). Population levels on both Medicine and East Cache Creek were higher in 1978 than in 1979. High natural mortality, particularly canine distemper, occurred at high population levels during 1978. A low percentage of breeding females and low production of offspring on both areas were associated with high population size. These factors, along with increased fur harvest in 1978, combined to reduce population levels. At lower population levels in 1979, no natural mortality was observed and an increase in percent breeding females was evident. The number of offspring produced per female also increased. This suggests that population density and production of young were inversely related,

while density and natural mortality were directly related.

No adverse effects of spring-summer sport hunting on raccoon reproduction or survival were detected. Counts of surviving young during August probably represented actual litter size and production of young per adult female. Similarly, Johnson (1970) found no evidence of prenatal mortality, and juvenile mortality was believed minimal by Stuewer (1943) and Sanderson (1950).

Generally, a sport hunt for raccoon began shortly after dusk and continued for 2 - 3 hours. Behavioral changes in nocturnal activity of raccoon were not observed on East Cache Creek in 1978, probably because hunting activity was at low levels. However, in 1979, female raccoon on Medicine Creek apparently adapted to continued heavy sport hunting pressure by delaying onset of nocturnal activity periods. This change in behavior effectively reduced their chances of being pursued, because most hunters had finished hunting for the night when female raccoon became active. Consequently, sport hunters complained of difficulty in locating raccoon and hunting activity did not show the August - November increase that was evident in 1978. This suggests that sport hunting pressure may be directly influenced by either actual population density or the population density which is perceived by hunters.

Sport hunting activity on FSMR varied in intensity through the year. Activity was characteristically at low levels during the late winter breeding period. Unfavorable weather and low hunter motivation following the fur harvest season are suspected reasons for this decline. Therefore, breeding raccoon were probably little affected by the observed distribution and intensity of sport hunting on FSMR. Sport hunting

activity during the spring months increased and may have been due to improved weather and tracking conditions for trailing hounds. Young raccoon are not active at this time so presumably would not be affected by sport hunting. Summer hunting activity, when kitten raccoon became active, was at low levels. High night time temperatures, poor trailing conditions for hounds, abundant insects, and poisonous snakes probably caused this decline. The impact of sport hunters at this time of year was believed minimal. Sport hunting in fall probably increased with increased hunting motivation, favorable weather, and improved trailing conditions for hounds. Young raccoon should have been able to elude dogs by that time of year.

Sport hunting activity showed an immediate increase upon reopening of control areas in September. Motivation for hunters to make use of a protected, essentially "easy treeing" raccoon population may have been the main reason for this rise. This increased hunting pressure coupled with raccoon that were unaccustomed to being pursued by hounds were probable reasons why more raccoon were harvested from control study areas than experimental areas, even though population levels were slightly lower on control areas, in both 1978 and 1979.

CONCLUSIONS

Spring-summer sport hunting on FSMR, compared to fur harvest and natural mortality, exerted no detectable effects on raccoon population size and productivity. Low density raccoon populations during 1979 experienced reduced natural mortality, increased reproductive success, and were not sport hunted as intensively. Dense populations during 1978 were susceptible to high natural mortality, decreased reproductive

success, and more intensive sport hunting. If reproduction in raccoon is inversely related to density, and sport hunting pressure and natural mortality are directly related to population density, raccoon density itself would tend to influence reproductive success, subsequent population size, and the sport hunting pressure to which a population is subjected.

Sport hunting on FSMR exerted only short term effects on home range size of female raccoon and females with young had significantly smaller home range lengths than females without young. Female raccoon also adjusted activity patterns to sport hunting pressures.

Prohibiting spring-summer sport hunting may not be beneficial to low density raccoon populations, as in 1979 on East Cache Creek. Hunters showed increased motivation to sport hunt and harvest raccoon from this previously protected population that was not conditioned to escaping dogs.

Since no harmful effects of spring-summer sport hunting of raccoon on FSMR were apparent, this practice essentially represented a large, non-consumptive, recreational use of a renewable resource on a small area.

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Table 1. Comparison of raccoon density, population characteristics, and productivity on East Cache Creek and Medicine Creek, 1978-79, Fort Sill Military Reservation, Oklahoma.

	East Cache Creek 1978-79[a]	Medicine Creek 1978-79[a]	Probability
Trapnights	631	823	
Captures (recaptures not included)	34	30	
Trapnights/capture	19	27	
Recaptures	12	8	
Sex ratio (males/100 females)	79	114	($P < 0.10$)
Subadults (%)	29	27	
Mean weight, males (kg)	5.6	4.8	
Mean weight, females (kg)	3.9	3.8	
Females observed	8	9	
Litters observed	6	5	
Young observed	15	11	
Young/litter	2.5	2.2	($P > 0.50$)
Young/female	1.9	1.2	($P > 0.40$)

[a] Results of 1978 and 1979 are pooled for each study area.

Table 2. Comparison of productivity and mortality of female raccoon between the years 1978 and 1979, and between experimental and control study areas, Fort Sill Military Reservation, Oklahoma.

	1978		1979	Experimental areas 1978-79[a]		Control areas 1978-79[a]
Productivity						
Females observed	11		6	8		9
Litters observed	6		5	5		6
Young observed	9		17	12		14
Young/litter	1.5	($P<0.10$)	3.4	2.4	($P>0.50$)	2.5
Young/female	0.8	($P<0.05$)	2.8	1.5	($P>0.50$)	1.5
Causes of mortality						
Canine distemper	5		0	4		1
Dogs	1		0	1		0
Unknown	0		1	1		0
Radio contact lost	4		2	2		4

[a] Results of 1978 and 1979 are pooled for each treatment.

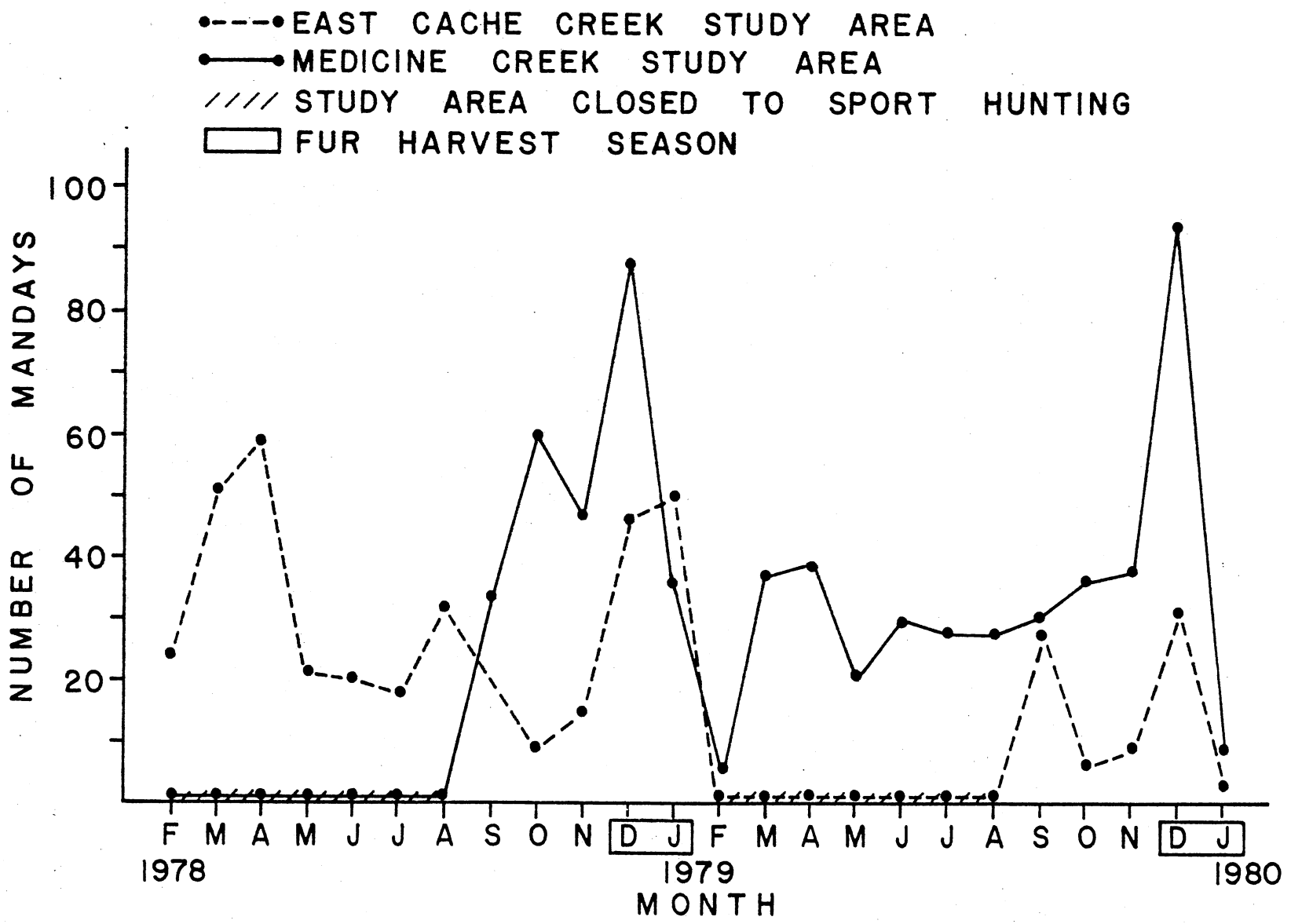
Table 3. Comparison of home range length between female raccoon with and without young, East Cache Creek and Medicine Creek, and for 1978 and 1979, Fort Sill Military Reservation, Oklahoma.

	1978		1979	
	East Cache Creek[a]	Medicine Creek	East Cache Creek	Medicine Creek[a]
Individual home range lengths (meters)	2000	1500[b]	1500[b]	1300[b]
	750[b]	2200	1200[b]	1400[b]
	4200	1200	1450[b]	2400
	1500[b]	1100[b]		
	1550[b]	400[b]		
Comparisons of home range lengths				
East Cache Creek 1978-79	1769			
		($P>0.50$)		
Medicine Creek 1978-79	1438			
Sport hunted areas 1978-79	1888			
		($P>0.40$)		
Control areas 1978-79	1381			
Females with young 1978-79	1290			
		($P<0.025$)		
Females without young 1978-79	2400			

[a] Experimental sport hunted area.

[b] Female raccoon with young.

Fig. 1. Man-days of sport hunting and fur harvest on East Cache Creek and Medicine Creek. Fort Sill Military Reservation, Oklahoma.


EAST CACHE CREEK STUDY AREA
MEDICINE CREEK STUDY AREA
STUDY AREA CLOSED TO SPORT HUNTING
FUR HARVEST SEASON
NUMBER OF MANDAYS
100
80
60
40
20
F M A M J J A S O N D J F M A M J J A S O N D J
1978
1979
1980
MONTH

APPENDIXES

APPENDIX A

STANDARD MEASUREMENTS, SEX, WEIGHT, AND AGE CLASS OF RACCOON ON MEDICINE CREEK, 1978

Sex	Weight (kg)	Bacculum	Nose-Tail	Nose-Foot	Rear Foot	Right Ear	Age Class
			(lengths in mm)				
F	5.0	-	790	810	120	60	Adult
F	4.1	-	700	740	105	50	Adult
F	4.8	-	770	805	115	53	Adult
F	5.0	-	770	800	110	54	Adult
F	4.5	-	800	820	113	56	Adult
F	5.5	-	790	810	110	53	Adult
F	3.6	-	730	750	105	60	Adult
F	2.7	-	715	730	100	45	Subadult
F	3.4	-	760	780	110	50	Subadult
M	5.1	115	740	800	118	52	Adult
M	6.4	112	830	860	115	50	Adult
M	6.4	120	830	840	125	60	Adult
M	4.8	110	790	810	115	55	Adult
M	4.1	80	730	760	118	55	Subadult
M	2.8	80	700	740	111	56	Subadult
M	4.8	95	780	800	113	55	Subadult

APPENDIX B

STANDARD MEASUREMENTS, SEX, WEIGHT, AND AGE CLASS OF RACCOON ON EAST CACHE CREEK, 1978

Sex	Weight (kg)	Bacculum	Nose-Tail	Nose-Foot	Rear Foot	Right Ear	Age Class
				(lengths in mm)			
F	4.5	-	770	780	98	50	Adult
F	4.2	-	760	770	105	53	Adult
F	3.7	-	720	770	102	55	Adult
F	3.7	-	730	770	108	55	Adult
F	5.9	-	805	835	118	60	Adult
F	4.1	-	830	830	120	60	Adult
F	4.1	-	780	800	107	55	Adult
F	4.5	-	790	810	110	55	Adult
F	4.5	-	760	780	105	52	Subadult
F	4.1	-	750	770	100	48	Subadult
F	4.1	-	720	730	100	45	Subadult
F	3.2	-	760	770	97	50	Subadult
M	5.0	110	760	790	115	54	Adult
M	5.5	100	840	890	124	55	Adult
M	5.7	105	790	830	110	57	Adult

Sex	Weight (kg)	Bacculum	Nose-Tail	Nose-Foot (lengths in mm)	Rear Foot	Right Ear	Age Class
M	6.3	110	840	870	110	53	Adult
M	6.4	110	830	870	115	60	Adult
M	5.0	110	770	720	130	62	Adult
M	5.9	110	770	800	112	51	Adult
M	5.0	70	810	810	120	60	Subadult
M	4.0	80	750	760	115	57	Subadult
M	4.5	80	770	800	120	61	Subadult

APPENDIX C

STANDARD MEASUREMENTS, SEX, WEIGHT, AND AGE CLASS OF RACCOON ON MEDICINE CREEK, 1979

Sex	Weight (kg)	Bacculum	Nose-Tail	Nose-Foot (lengths in mm)	Rear Foot	Right Ear	Age Class
F	4.9	-	770	805	104	55	Adult
F	5.0	-	760	800	110	51	Adult
F	3.2	-	690	715	103	56	Subadult
F	2.3	-	550	550	90	50	Subadult
F	4.0	-	740	750	112	57	Subadult
M	7.8	112	820	860	111	64	Adult
M	4.7	100	770	740	110	64	Adult
M	7.4	115	810	830	116	61	Adult
M	6.0	111	790	820	110	56	Adult
M	4.7	111	820	840	115	58	Adult
M	5.2	115	820	840	114	57	Adult
M	6.1	105	800	830	110	63	Adult
M	3.3	70	650	700	96	50	Subadult
M	4.0	80	700	760	114	50	Subadult

APPENDIX D

STANDARD MEASUREMENTS, SEX, WEIGHT, AND AGE CLASS OF RACCOON ON EAST CACHE CREEK, 1979

Sex	Weight (kg)	Bacculum	Nose-Tail	Nose-Foot	Rear Foot	Right Ear	Age Class
				(lengths in mm)			
F	4.2	-	720	760	105	53	Adult
F	4.6	-	780	780	117	52	Adult
F	4.3	-	710	730	110	60	Adult
F	5.5	-	770	800	107	52	Adult
F	3.1	-	700	720	107	51	Subadult
F	2.0	-	570	590	90	52	Subadult
F	2.0	-	565	580	90	55	Subadult
M	6.7	103	810	840	105	62	Adult
M	6.0	110	790	840	110	64	Adult
M	5.5	107	770	800	110	60	Adult
M	5.1	105	780	810	109	60	Adult
M	5.0	97	720	750	98	52	Adult

VITA[2]

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