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POSTAL AND PERSONAL INTERVIEW SURVEYS OF SOUTH CAROLINA DEER HUNTERS

by

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ABSTRACT

A postal survey of 1,323 game management area permit holders (5%) was made in early 1972 to determine the utilization of game management areas for deer hunting. Responses (777) were inadequate for projecting utilization of many of the 35 state game management areas for deer hunting. Thus responses from the postal survey and from a subsequent personal contact survey, were grouped into major hunt units.

Sixteen percent of the 777 postal survey respondents were selected for personal contact. This survey was more comprehensive than the postal survey, and provided an estimate of the number of management area deer hunters utilizing non-management areas.

Estimates from the personal interview survey were uniformly higher and more variable than those projected from the responses of the same hunters in the postal survey. The apparent overestimation from the interview data on buck deer killed, for example, may be viewed as confirming the tendency of hunters to report number of kills greater than had occurred. The personal-contact survey with its smaller sample size and more extensive questions provided less reliable information than that of the complete postal survey.

Comparisons of projected mean estimates of the utilization data from the personal contact survey, its counterpart from a postal survey and the entire postal survey are included along with standard deviations.

INTRODUCTION

Check stations to monitor deer harvest and game management area utilization in South Carolina were not required during the 1971 deer hunt season. To provide some continuity of deer harvest estimates taken from stations from 1964 through 1970, a postal survey was conducted employing a technique similar to that outlined by Legler and Haynes (1967). A recognized problem with such techniques is the inaccuracy of responses due to the faulty recall by hunters of numbers killed and locations of harvesting. Webb and Loadholt (1971) found that archery hunters reported in April the killing of three times as many deer than were reported by the same hunters at the conclusion of the archery hunts during the previous December. It was suggested by biologists and administrators that some comparison be made between data from the postal survey and those collected during the personal interview survey, with both surveys involving identical hunters.

METHODS

A 5 percent random sample was made of 26,460 hunters who had purchased "game management area permits" by 1 December 1971. The postal survey was initiated on 3 January 1972 immediately after deer hunting stopped on the management areas. The questionnaire asked for specific information on the number of visits, number of hours hunted, and the number of deer killed on each management area during the 1971 season. The survey was conducted according to procedures recommended by the Southeastern Cooperative Statistics Project. The third mailing to nonrespondents was made 1 February 1972 and, after allowing time for responses, the returned questionnaires were coded and delivered to the Experimental Statistics Unit, College of Agricultural Sciences, Clemson University (hereafter ESU) in early March for keypunching and analysis.

Following receipt of the questionnaires, 126 respondents were selected for the personal contact survey. A 10 percent random sample was selected from respondents for each major management area (or hunt unit). No hunter was selected twice if he hunted on two or more areas, but his responses for each area were used in the study.

The names of the 126 hunters were grouped according to the counties of residence, and were subsequently assigned to the nearest district biologist, who was then responsible for the personal interviews. This phase was initiated on 21 April 1972. Six of those selected could not be contacted due to death, sickness, fraud, or falsified records. Randomly selected alternates were provided by the ESU. The survey of the 126 hunters (or their alternates) was completed in July and the coded data forms, along with general instructions, were delivered to the ESU in August 1972.

Estimates were made of total (hours, bucks killed, etc.) over subpopulations (hunt units) for which the size (number of hunters) of the subpopulations was unknown (Mendenhall, Ott and Scheaffer 1971). The number of deer hunters for each category was estimated using simple proportions.

RESULTS AND DISCUSSION

Of the 1,323 game management permit holders included in the postal survey, 919 (69.46 percent) responded. An additional 50 questionnaires were returned because the hunters had moved without leaving forwarding addresses or addresses were insufficient. The 919 respondents included 132 who did not hunt deer and 10 who hunted only on private lands. Thus, only 777 permit holders responded as having hunted deer on one or more of the game management areas, and the projected data included in this report represent only 22,372 hunters, although 26,460 permits had been sold by 1 December 1971. (Approximately 30,000 permits were sold during the 1971-72 hunt season, but many of these were purchased for purposes other than deer hunting or the file copies had not been returned to the Columbia Office prior to the taking of the survey samples.)

The projections of the number of hunters utilizing various hunt areas, number of trips, hours and deer killed, as determined from the postal survey, are depicted in Tables 1 through 5. Included in these tables are similar deer hunt data obtained from the personal contact survey of 126 of the postal survey respondents, as well as comparable postal survey data from the same 126 permit holders. The number of hunters that utilized each individual management area was found to be insufficient to project valid estimates of area utilization. Thus, the data presented are for the larger hunt units or groups of isolated management areas (hunt areas) as footnoted beneath each table. Estimates are presented in each table, along with the appropriate sample size and standard deviation, as they were obtained from the personal interview survey, the postal survey of the same hunters, and the 777 permit holders who responded in the postal survey as having hunted on one or more management areas.

Confidence limits for totals appearing in the various tables may be computed using the following formula:

$$L_{(r)} = T \pm t_{(\alpha/2, n-1)} S_T$$

where T is estimated total

S_T is sample standard deviation of the estimated total

α is the level chosen for 100 (1- α)% confidence limits

n is the number of hunters sampled

$t_{(\alpha/2, n-1)}$ is the upper $\alpha/2$ percentage point of the student's

t distribution with n-1 degrees of freedom

Number of Hunters: As previously stated, the data presented herein are primarily related to 22,372 deer hunters that hunted management areas. The remainder of the known 26,460 permit holders were considered as non-deer hunters on the management areas. However, two possible sources of error existed when attempting to estimate the total number of deer hunters. First, some of the 26,460 permits sold prior to 1 December 1971, had not been reported to the South Carolina Wildlife and Marine Resources Department when a random sample was taken. In fact, some returns by permit distributors were not made until late in the 1971-72 hunting season. The second possible source of error involved hunters who purchased hunt permits for purposes other than deer hunting; these permits being required for shooting of dove, quail, rabbits, squirrel, etc. on management areas. A total of 36,013 hunt permits were sold during the entire 1971-72 hunt season, but some of these were undoubtedly sold for hunting other than that of deer, and some permits sold to deer hunters were not included in those sampled. None of the 1,323 permit holders included in the random sample for the postal survey were from out of state. Selection against out-of-state permit holders was not by design, but such hunters did not appear in the random sample.

From the 126 permit holders interviewed personally, a projection of 7,102 deer hunters on non-management areas was obtained (Table 1). This information was not requested in the postal survey.

The complete postal survey indicated that 21.1 times as many hunters utilized the Central Piedmont hunt unit than the lowest used hunt area. The number of deer hunters utilizing the Central Piedmont exceeded by 0.4 times the number reported as hunting on the Western Piedmont hunt unit. The estimated number of hunters that utilized each hunt unit (or group of management areas) along with the standard deviation of the estimate is reflected in Table 1.

Number of Deer Hunting Trips: Based on the postal survey, the estimated number of deer hunting trips made by 22,372 permit holders to all management areas was 160,286 (an average of 7.2/hunter). The personal contact survey data projected an average of 10.2 trips per hunter, but the postal responses of the same 126 hunters provided an estimate of 8.0 hunting trips/hunter. The discrepancy between the two estimates from the 126 hunters may be due to faulty recall because of the time elapsed between the postal and personal contact interviews or to the complexity of the interviews. The larger discrepancy between the personal contact and the complete postal survey is likely the result, in addition to the above reasons, of the differences in the sizes (126 and 777) of the two samples. The projections of the complete postal survey are less variable than those of the personal interview survey and, we think possibly more accurate.

Approximately 90 percent of all hunting trips were made on the Central Piedmont and the Western Piedmont hunt units. Estimated numbers of visits to all hunt areas are shown in Table 2.

Number of Hours: The number of hunter hours spent deer hunting on all management areas was 778,223 according to postal survey data. The personal contact survey projection was 1,278,933 hours, or 1.6 times that of the postal survey. The personal contact survey did indicate that over 425,000 hours were spent by permit holders in hunting deer on non-management areas (Table 3). The postal survey projected an average of 100 hours for each deer harvested, while the personal contact estimate was 150 hours, based on kill data presented in Tables 4 and 5.

Since the Central Piedmont and Western Piedmont hunt units received 90 percent of the hunting trips, it is not surprising that 89.3 percent of all hunting hours was spent on the two hunt units. Hunt Areas 5 and 6 required only 34 hours per kill while the Central Piedmont and Western Piedmont hunt units required 108 hours. The Mountain Unit hunters spent 172 hours for each buck killed. Estimated hours spent hunting on each of the hunt areas are depicted in Table 3.

Buck deer kill: The postal survey of 777 deer hunters reflected an estimate of 5,442 bucks being killed on all of the management areas in 1971-72. The personal contact survey indicated 6,570 bucks were harvested, or 1.23 times the 5,327 bucks estimated from the postal responses of the same 126 hunters.

The Central and Western Piedmont hunt units produced 81 percent of all bucks harvested. While the Central Piedmont hunt unit had the larger total kill, the Western Piedmont had the better kill/trip ratio (.032 bucks/trip to .029 bucks/trip). The estimated kill of buck deer for major hunt units and groups of management areas is shown in Table 4.

The larger standard deviations arising from the personal contact survey indicates that a sample much larger than 126 should have been taken to assure reliable results. For example, the projected sample size for usable buck deer kill information was computed at 487 hunters when there are 30,000 hunters. For estimating doe harvest, a sample of 1,222 would be required. To estimate buck and doe deer kill within 10 percent of the true value when 50,000 hunters were participating would require sample sizes of 1,337 and 3,305 hunters, respectively.

Doe deer kill: The estimated doe deer kill on all management areas was 2,203 as determined from the postal survey. The estimate of 1,953 doe deer killed from the personal contact survey is the only estimates from this survey that were smaller than those of the postal survey. The variation in all estimates of doe kill may be due to a higher falsification rate for does than for bucks. There may also be more resistance to reporting doe kill in personal interviews than on questionnaires.

The doe kill estimate from separate hunt units (hunt areas) was considered invalid in some cases due to the small sample sizes. However, the doe kill on the Central Piedmont (1,094) and the Western Piedmont (905) should be good estimates. At the same time, the estimates reflected 86 does being killed on the Mountain Unit, an area where no doe season was scheduled. The respondents' questionnaires did show, however, that two hunters reported killing two and one doe respectively on

Table 1. Deer hunters utilizing hunt areas and non-management areas in 1971 as estimated from data obtained in personal interviews with 126 deer hunters and data obtained previously in a postal survey from the same 126 hunters, along with the estimated number of deer hunters as determined from 777 respondents to a postal survey.

Hunt Areas*	PERSONAL INTERVIEW (126)			POSTAL SURVEY (126)			POSTAL SURVEY (777)		
	Sample Size	Number of Hunters	Standard Deviation	Sample Size	Number of Hunters	Standard Deviation	Sample Size	Number of Hunters	Standard Deviation
Central Piedmont (1)	75	13,317	641	79	14,027	485	463	13,331	213
Western Piedmont (2)	63	11,186	723	63	11,186	437	330	9,501	227
Mountain Unit (3)	15	2,663	250	14	2,486	83	74	2,131	464
Francis Marion (4)	5	888	161	6	1,065	132	22	633	377
Hunt Area 5	10	1,776	103	10	1,776	105	48	1,382	241
Hunt Area 6	4	710	204	6	1,065	96	28	806	338
Total All Hunt Areas	126	22,372	664	126	22,372	428	777	22,372	258
Non-Mgt. Areas	40	7,102	1,167		INR			INR	

* Hunt Area 5 is made up from the following management areas: Palachucola, Bonnie Doone, Call Pen, Gruber, Baker, Phosphate, Bear Island, Santee-Cooper and Hartley.

* Hunt Area 6 is made up from the following management areas: Pee Dee, Santee-Delta, Buist, Walker Farm, Gapway Bay, Kilssock, Skufful, Lake Wallace, Clemson and Waccamaw.

Non-management Areas are made up of all areas other than game management areas.

INR — Information not requested.

Table 2. The number of trips that hunters made to Hunt Areas in 1971 as projected from data obtained in personal interviews with 126 deer hunters and data obtained previously in a postal survey from the same 126 hunters, along with the estimated deer hunting trips as determined from 777 respondents to the postal survey.

Hunt Areas*	PERSONAL INTERVIEW (126)			POSTAL SURVEY (126)			POSTAL SURVEY (777)		
	Sample Size	Number of Trips	Standard Deviation	Sample Size	Number of Trips	Standard Deviation	Sample Size	Number of Trips	Standard Deviation
Central Piedmont (1)	75	101,301	12,301	79	86,647	9,081	463	84,102	4,626
Western Piedmont (2)	63	101,178	16,178	63	72,975	9,891	330	60,060	3,795
Mountain Unit (3)	15	12,606	4,872	14	6,747	2,075	74	7,515	1,017
Francis Marion (4)	5	3,196	1,675	6	4,616	1,972	22	2,390	587
Hunt Area 5	10	4,794	1,562	10	4,439	1,983	48	2,534	427
Hunt Area 6	4	4,794	2,465	6	3,729	1,668	28	3,254	642
Total All Hunt Areas	126	229,047	14,925	126	179,154	8,954	777	160,286	4,853
Non-Mgt. Areas	40	66,761	8,905						
									INR

* Hunt Area 5 is made up from the following management areas: Palachucula, Bonnie Doonee, Calf Pen, Gruber, Baker, Phosphate, Bear Island, Santee-Cooper and Hartley.
 * Hunt Area 6 is made up from the following management areas: Pee Dee, Santee-Delta, Bunst, Waker Farm, Gapway Bay, Kilscock, Skuffil, Lake Wallace, Clemson and Waccamaw.
 Non-management Areas are made up of all areas other than game management areas.
 INR — Information not requested.

Table 4. The number of buck deer killed on Hunt Areas in 1971 as estimated from data obtained in personal interviews with 126 deer hunters and data obtained previously in a postal survey from the same 126 hunters, along with the computed number of buck deer killed as determined from 777 respondents to the postal survey. (** — indicates insufficient data.)

Hunt Areas*	PERSONAL INTERVIEW (126)			POSTAL SURVEY (126)			POSTAL SURVEY (777)		
	Sample Size	Number of Deer	Standard Deviation	Sample Size	Number of Deer	Standard Deviation	Sample Size	Number of Deer	Standard Deviation
Central Piedmont (1)	75	3,018	826	79	2,308	788	463	2,476	295
Western Piedmont (2)	63	1,953	611	63	1,598	475	330	1,929	250
Mountain Unit (3)	15	**	**	14	**	**	74	202	80
Francis Marion (4)	5	**	**	6	178	159	22	115	64
Hunt Area 5	10	533	281	10	533	299	48	346	104
Hunt Area 6	4	1,065	629	6	710	536	28	374	130
Total All Hunt Areas	136	6,570	974	126	5,327	890	777	5,442	376
Non-Mgt. Areas	40	3,374	1,434						
									INR

* Hunt Area 5 is made up from the following management areas: Palachucola, Bonnie Doone, Calf Pen, Gruber, Baker, Phosphate, Bear Island, Santee-Cooper and Hartley.
 * Hunt Area 6 is made up from the following management areas: Pee Dee, Santee-Delta, Buist, Walker Farm, Capway Bay, Kilscock, Skufful, Lake Wallace, Clemson and Waccamaw.
 Non-Management Areas are made up of all areas other than game management areas.
 INR — Information not requested.

Table 5. The number of doe deer killed on the game management areas (Hunt Areas) in 1971 as projected from data obtained in personal interviews with 126 deer hunters and data obtained previously in a postal survey from the same 126 hunters, along with the computed number of doe deer killed as determined from 777 respondents to the postal survey. (** — indicates insufficient data.)

Hunt Areas*	PERSONAL INTERVIEW (126)			POSTAL SURVEY (126)			POSTAL SURVEY (777)		
	Sample Size	Number of Doe Deer	Standard Deviation	Sample Size	Number of Doe Deer	Standard Deviation	Sample Size	Number of Doe Deer	Standard Deviation
Central Piedmont (1)	75	710	80	79	355	216	463	1,094	177
Western Piedmont (2)	63	710	363	63	710	285	330	950	167
Mountain Unit (3)	15	**	**	14	**	**	74	86	59
Francis Marion (4)	5	178	178	6	**	**	22	**	**
Hunt Area 5	10	355	223	10	**	**	48	144	57
Hunt Area 6	4	**	**	6	**	**	28	29	5
Total All Hunt Areas	126	1,953	464	126	1,065	307	777	2,303	228
Non-Mgt. Areas	40	355	251		INR			INR	

* Hunt Area 5 is made up of the following management areas: Palachucola, Bonnie Doone, Calif Pen, Gruber, Baker, Phosphate, Bear Island, Santee-Cooper and Hartley.
 * Hunt Area 6 is made up from the following management areas: Pee Dee, Santee-Delta, Buist, Walker Farm, Capway Bay, Kilscock, Skufful, Lake Wallace, Clemson and Waccamaw.
 Non-Management Areas are made up of all areas other than game management areas.
 INR — Information not requested.

Table 6. Expenditures* of 22,372 hunters for deer hunting on game management areas and non-management areas during the 1971 deer season, as estimated for a personal contact survey of 126 randomly selected permit holders. (***) — indicates insufficient data.)

Hunt Areas**	Transportation			Meals			Lodging			Ammunition			
	Sample Size	At		Cost	Standard Deviation	Cost	Standard Deviation	Cost	Standard Deviation	Cost (not necessarily expended)		Standard Deviation	Total
		10 cents per mile	Standard Deviation							Standard Deviation	Standard Deviation		
Central Piedmont (1)	75	\$679,859	\$ 81,561	\$ 75,108	\$15,225	***	***	***	***	\$66,997	\$8,558	\$821,964	
Western Piedmont (2)	63	639,447	102,196	88,070	17,095	888	740	888	740	63,865	10,174	792,270	
Mountain Unit (3)	15	43,591	16,082	10,298	8,250	***	***	***	***	1,642	987	55,531	
Francis Marion (4)	5	60,903	29,998	15,803	8,055	***	***	***	***	2,956	2,149	79,662	
Hunt Area 5	10	86,667	28,819	8,079	2,921	3,551	1,970	3,551	1,970	7,040	2,642	105,337	
Hunt Area 6	4	45,278	23,273	12,784	6,659	***	***	***	***	906	486	58,968	
Total all Hunt Areas	126	1,558,409	95,611	211,829	20,047	4,439	1,723	4,439	1,723	143,495	8,899	1,918,172	
Non-Mgt. Areas	40	\$407,784	\$121,830	\$106,181	\$48,703	\$5,149	\$3,647	\$5,149	\$3,647	\$15,670	\$5,669	\$534,784	

* Miscellaneous expenses not included.

** Hunt Area 5 is made up from the following management areas: Palachucola, Bonnie Doone, Call Pen, Gruber, Baker, Phosphate, Bear Island, Santee-Cooper and Hartley.

** Hunt Area 6 is made up from the following management areas: Pee Dee, Santee-Delta, Buist, Walker Farm, Capway Bay, Kilsock, Skilful, Lake Wallace, Clemson and Waccamaw

** Non-Management Areas are made up of all areas other than game management areas.

the Mountain Unit. Although these kills were illegal, the estimated kill is probably larger than the actual illegal kill because of the small number of respondents (74) that reported hunting on the mountain area. The estimated doe kill data, along with standard deviations, are presented in Table 5 for each hunt unit that had an adequate number of hunters responding.

The 126 hunters interviewed in the personal survey supplied data from which it was estimated that the 22,372 permit holders killed an additional 355 doe deer on non-management areas. Similar data from non-management areas hunting were not requested in the postal survey.

Economics involved: From the 126 permit holders personally contacted, we estimate that the 22,372 hunters expended approximately two million dollars while hunting deer on the management areas. This estimate of \$1,920,000 involved the money spent by the hunters for transportation (at 10 cents per mile), meals, lodging other than camping, and ammunition purchased in 1971 for deer hunting even though all of the ammunition may not have been expended. The estimated expenditures for some individual hunt units (areas) are not considered valid because of the small sample sizes involved. As stated previously, the state-wide sample size of 126 hunters was considered low but the estimates are presented in Table 6 since these are the first estimates made of expenditures by hunters while hunting deer on South Carolina game management areas. It was estimated that the 22,372 permit holders spent \$534,784.00 while hunting deer on non-management areas in South Carolina (Table 6).

Miscellaneous notes: One deer (buck or doe) was killed on the management areas for every 2.89 hunters who participated. The killing of one deer required an average of 20.69 trips by hunters to the management areas, while an average of 100.48 hours were spent for each deer harvested. Deer hunters spent an average of \$225.06 for each deer killed. Included in this total expenditure per deer kill was \$182.85 that represented travel. The total amount expended represents only the money spent in travel, meals, lodging other than camping, and ammunition. The cost of hunting licenses, hunt permits and miscellaneous expenses was not included.

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