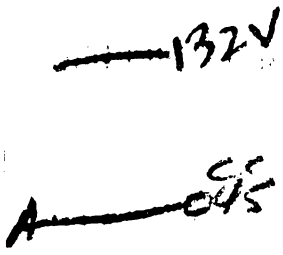

ABSTRACT

AN ANALYSIS OF THE PUBLIC USE
OF SOUTHERN MICHIGAN GAME AND RECREATION AREAS

by Walter Lawrence Palmer

This study measured visitor use on State Game and Recreation Areas open to public hunting in southern Michigan during 1961-62; compared the hunting season use with that of spring and summer, and also with hunting season of 1955-56; and, described several demographic and socio-economic characteristics of the hunters who used these lands.

A stratified random sampling system was adopted, and daytime use was measured on several hundred sample check-days. This was accomplished by systematically counting cars and by personally interviewing hunters and/or from data supplied by hunters on questionnaire postcards left on car windshields.

Daylight visitor use during the 1961-62 hunting season was about one million man-hours. Approximately 48,000 individuals hunted on these lands that year. Hunting pressure was about 60 per cent greater in 1961-62 than in 1955-56. The estimated kill of game increased 17 per cent, but the small game kill per 100 hours or per 100 acres was not significantly different from 1955-56. Small game composition showed a decided shift to forest species with a decline in farm game.

The daytime spring and summer use of State Game Areas was somewhat less than during the hunting season. But if after-dark hours

were included, use during the warm months would be much greater.

Fishing was the most popular spring and summer activity. Other favorites were picnicking, berry picking, swimming, camping and general sight-seeing.

From a questionnaire mailed to 4,004 hunters who had been contacted on a Game or Recreation Area, 98 per cent were males. They tended to hunt a variety of game rather than to specialize. In general, hunters were distributed as was the population. The number of hunters per county hunting on state lands seemed to be influenced by the presence of state-owned land, and by the proportion of hunters living in urban communities. Hunters were apt to be rural residents; 60 per cent of them had spent some part of their childhood on a farm or had lived in the country. The current trend toward urbanization may adversely affect the future popularity of hunting by making it increasingly hard for hunters to reach hunting lands; and, more important, urban youth have fewer opportunities to develop interests in hunting.

Hunters tended to have middle-class incomes. Skilled and semi-skilled craftsmen were well represented; fewer hunters than expected were from the professional and "white collar" occupations. The average education level of hunters was just under grade 11. Their age distribution was probably similar to the general population, but the sample was biased because most hunters polled were car-owners. Hunters in certain age classes harvested some game species more intensively than did others. Game and Recreation Areas and Game Districts were ranked according to the relative hunting pressure sustained. Various hunting habits such as distances traveled, number of days hunted, and problems of access to privately-owned lands are correlated

with socio-economic factors and place of residence.

Differences in some characteristics appeared to exist in a sample of non-respondents who were interviewed by telephone. Ethnic and socio-economic factors apparently affect response rates to mail questionnaires.

AN ANALYSIS OF THE PUBLIC USE OF SOUTHERN MICHIGAN GAME AND RECREATION AREAS

By

Walter Lawrence Palmer

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INTRODUCTION

In 1961-62 there were 58 State Game, Recreation, Forest and Experiment station lands scattered throughout the 34 southernmost counties in Michigan. These comprised over 220,000 acres, of which almost 200,000 acres were open to public hunting.

A multitude of questions had arisen in recent years regarding these areas. How much are these lands used for hunting? For other purposes? What other types of uses are there? Is the intensity of use increasing? Are certain areas more heavily used, and if so, which ones? Where should future state-owned lands be located? Which type of land yields the best cost-benefit ratio - the low-cost, wild-land type or the high-cost type located in agricultural areas? How many and what types of people use these areas? Why do these people hunt on state-owned areas? Answers to these and other questions are needed in order to manage these areas in the best public interest.

Gordinier (1957) measured the amount of visitor use during the 1955-56 hunting season on 27 of these Game Areas. In addition, he reported hunting success, species composition and total kill. As time passed, it appeared that visitor use was increasing. By repeating the earlier study in 1961-62 I hoped to detect and measure the magnitude of the change between the two years, but in addition all Game and Recreation Areas in southern Michigan open to public hunting were studied. A use study was also conducted on the 27 State Game Areas during the spring and summer of 1962.

Aldo Leopold (1933) defined game management as "the art of making land produce sustained annual crops of wild game for recreational use". But this definition is inadequate because game management also includes

the harvest of these crops by the sporting public. The manipulation of hunting regulations and seasons to effect this harvest by the public can be as complex a procedure as producing the game.

During the three decades since Leopold defined game management, much has been learned about animal life histories, population dynamics and ecological relationships. During this same span, the social sciences have also made great progress. The wildlife biologist has been preoccupied with biological problems. But despite making these important discoveries researchers have been frustrated when the public did not accept recommendations based on scientific findings. The history of deer management in Michigan is a good case in point. Field investigations in 1930 showed that deer were too abundant in some districts, starving during severe winters (Bartlett, 1950). Recommendations to reduce the herd to a level commensurate with the carrying capacity of the range were not adopted. Biologists realized that it was one thing to recommend solutions to problems, but quite another for the public to accept those recommendations. In fact, 20 years elapsed before the Michigan public agreed to shoot significant numbers of antlerless deer and thereby try to reduce the size of the herd by utilizing surplus animals.

This problem of converting scientific knowledge and fact into action programs that the public will accept is an important one. And communications between a resource management agency and the public can be improved when the desires and needs of the people are clearly understood. Survey techniques developed in the social sciences can be used to keep abreast of public opinion regarding vital issues or to detect and attempt to correct through educational means a troublesome situation before it has become a serious problem.

Southern Michigan is different from the northern part of the state-in physiography, climate, economics and geology. Ninety per cent of the state's people live in southern Michigan. Moreover, more than half of the state's residents live in three counties in the vicinity of Detroit. Five other cities exceed 100,000 population. There are no large metropolitan areas in the northern part of the state.

Because most of the people live in southern Michigan, this is where the people-oriented problems are. A mail questionnaire was sent to 4,004 hunters who had been contacted on one of the Game or Recreation Areas during the study which measured the visitor use during hunting season. Answers to the questions provide a description of the people who use these areas and it is hoped they permit an improved service to them while at the same time our resources continue to be scientifically managed.

GENERAL METHOD OF STUDY

The study had four principal purposes:

1) to determine the volume of visitor use and the game harvest on all State Game and Recreation Areas located in the southern 34 counties of Michigan during the 1961-62 hunting season.

2) to compare these use and kill data with that determined on 27 Game Areas also studied in 1955-56.

3) to determine the types of visitor use made of the 27 Game Areas during the spring and summer of 1962, and to compare the intensity of this use with that during the hunting season.

4) to determine the number of people who hunted these lands in 1961-62 and to describe their demographic and socio-economic characteristics, and wherever possible, to relate them to problems of resource management.

Visitor use surveys

During the period October 1, 1961 - September 30, 1962, two separate visitor use surveys were conducted on 51 state Game and Recreation Areas open to public hunting. For each survey the areas were classified (stratified) according to the expected level of daily use and systematic counts of cars were made three times during randomly selected days. Additional data were obtained in the field while conducting the counts (see beyond).

The two survey periods were: 1) the hunting season from the first day of waterfowl hunting on October 13, 1961 to the last day of rabbit season on March 1, and 2) the spring and summer from April 28, 1962, the opening day of trout and general fishing season, to September 30, 1962 the last day before the start of archery deer hunting. Other

methods were used to calculate the volume of visitor use during two brief periods of this year when systematic counts were not made. Thus, total use for an entire calendar year was estimated.

On the Pte. Mouillee and Fennville State Game Areas and the Rose Lake and Swan Creek Wildlife Experiment Stations, information was obtained by local staffs using various methods of hunter checks. Consequently these areas were not included in the group of Game and Recreation Areas studied (Fig. 1). The 27 Game Areas which had been studied during the 1955-56 hunting season (Gordinier, 1957) were included and were also systematically sampled during the spring and summer.

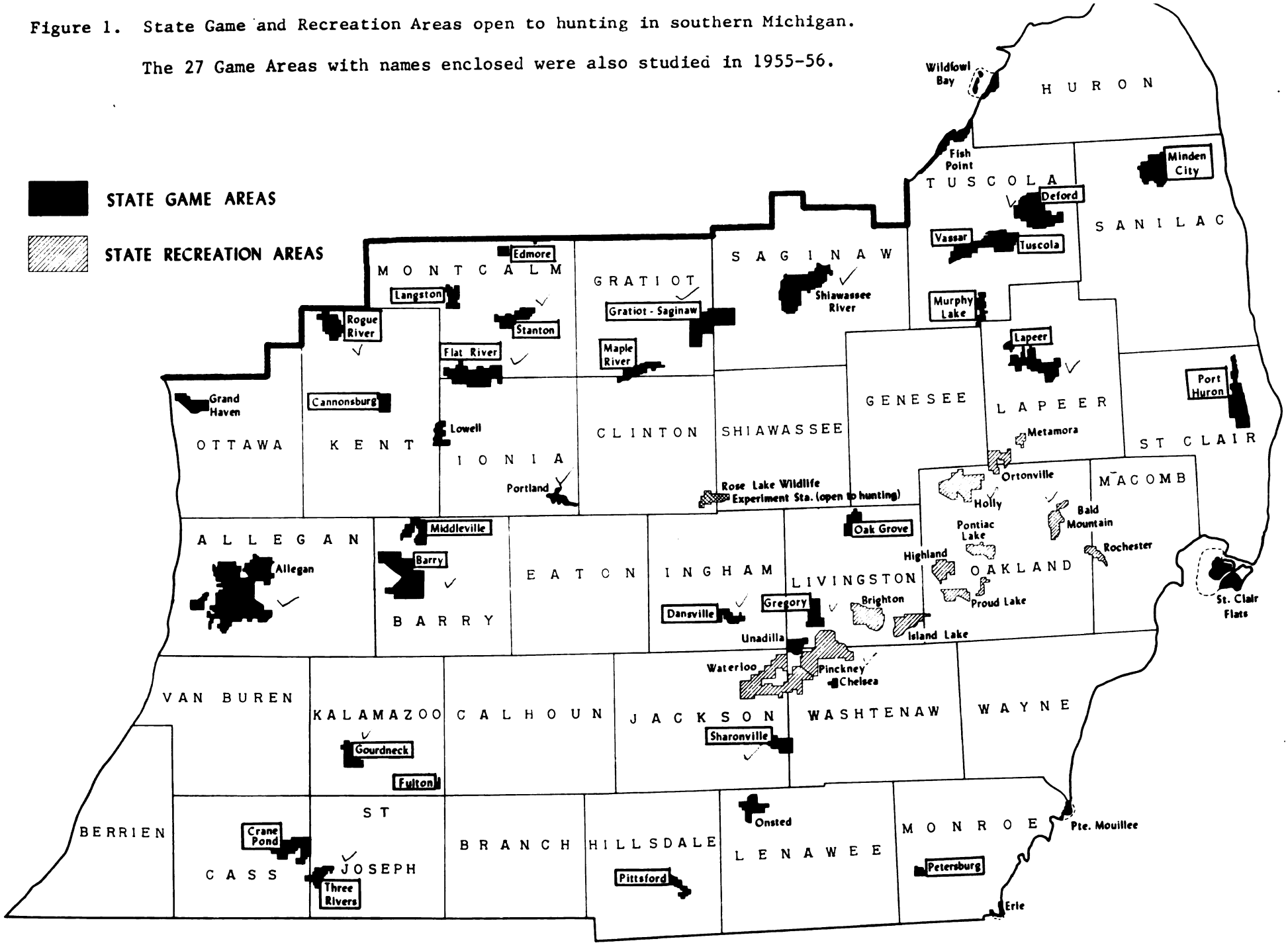
The number of occupants per car, the length of time spent on the area, type of activity and hunting data were obtained both by interviewing people in the field and from returned pre-addressed stamped postcards left on car windshields. Up to two reminder notices were sent when car owners failed to return cards.

Characteristics of hunters

A 4-page questionnaire was mailed to the total of 4,004 hunters who had been seen on one of the state-owned areas or whose car had been tallied there. A randomly selected sample of about 17 per cent of the nonrespondents were interviewed by telephone to determine whether they differed in any of several ways from respondents.

Figure 1. State Game and Recreation Areas open to hunting in southern Michigan.

The 27 Game Areas with names enclosed were also studied in 1955-56.



VISITOR USE DURING THE HUNTING SEASON

The sampling method

The method of sampling daily visitor use as reported by Gordinier (1957) was used since he obtained reliable results. The method utilized stratified random sampling. The basic sampling unit was the number of cars present on an area during a check day as counted three times; mid-morning, mid-day and mid-afternoon. Friley (1954) showed that the number of hunters in the field during the day exhibits a bi-modol distribution with peak numbers afield in mid-morning and mid-afternoon. A mid-day low was typical. It was assumed that this distribution is a normal one for all Game and Recreation Areas. The car-counts yielded the number of car-hours of visitor use each check-day (see beyond) and these were later converted to man-hours after the number of occupants per car was obtained from interviews made in the field and from post-cards returned.

Stratifying, allocating and selecting the sample of check days

Before the hunting season, 1961-62, it was necessary to stratify all of the Game and Recreation Areas by each day of the hunting season according to the expected level of man-hours of use. Nine expected levels or strata were established for the early part of the hunting season from October 13 (opening day of waterfowl hunting) through November 30 when hunting pressure was heaviest. Only four strata were necessary for the more lightly hunted period between December 1 and March 1. During this latter period the expected range for stratum IV was 141+ man-hours (Table 1).

In stratifying areas the assistance of District Game Biologists was obtained and their special knowledge of the areas was invaluable. The

Table 1. Levels of expected daily use in man-hours during the hunting season survey of southern Michigan State Game and Recreation Areas, October 13, 1961 - March 1, 1962.

Stratum	Expected visitor-hours of use
I	0-30
II	31-80
III	81-141
IV	141-200
V	201-250
VI	251-300
VII	301-400
VIII	401-500
IX	501+

estimated amount of use dictated in which stratum each area-day would occur according to criteria established in the 1955-56 study.

Before drawing the random sample of check days the total sample size to be drawn was determined on the basis of the number needed to adequately sample the total use, based again on results of the earlier study. After this was done, the number of field check-days was designated by strata.

As mentioned earlier, it was desirable to compare data for the group of 27 Game Areas studied in 1955-56. Therefore, these areas were sampled at the same intensity as before. In effect, the 24 areas added in 1961-62 were treated as an independent survey, designed similarly in all respects, to allow combining data according to use-intensity strata from the two surveys. Combining the two surveys made possible a single estimate of total use for all 51 areas with narrower confidence limits than if the two surveys had been dissimilar.

One hundred and thirty-six field checks were necessary to duplicate the number made on the original 27 Game Areas. Eighty checks were needed to sample the 24 remaining Game and Recreation Areas at the same rate. Thus, a total of 216 field checks were necessary. These were assigned by strata by disproportionate, rather than proportionate allocation. Disproportionate allocation utilizes data from earlier work reducing variability (Snedecor, 1956). Specifically in this study each stratum sample size was determined by weighting (multiplying) the average daily man-hours of use within strata from the 1955-56 study (Column 4 in Tables 2-5), by the proportion of stratum area-days to total area-days (Column 3 in Tables 2-5). These values (Column 5) were expressed as proportions (Column 6) and were then used to prorate the number of sample

check days for each stratum.

This system was used to determine sample sizes by strata for the two groups of areas for each of the two hunting season survey periods (Tables 2-5). The actual selection of the precise check-days was made from a table of random numbers.

Conducting the field checks

Observers made three counts of cars and other vehicles on an assigned area during the daylight period of the day. Car licenses and starting and ending times of each count were recorded. People were interviewed at their cars and the following information obtained: number of people in the car, length of time spent on the area to the nearest one-half hour, type of activity, and when hunting the species and numbers of game bagged. When people were not at their cars, which was most often the case, a short letter asking for cooperation and explaining the objectives of the study and a self-addressed postcard addressed to the Rose Lake Wildlife Research Station were placed on car windshields. Car owners were requested to fill in and mail the postcards. If the cards were not received within a week, the cars were traced through the Title and Registration Division, Office of the Michigan Secretary of State and the owner of the car was sent a reminder notice postcard. Two reminders were sent when necessary. A sample recording form with instructions, letter and postcards used appear as Appendices I, II and III.

One important source of error in the method described here might be the number of cars missed in the field. This possibility was minimized by having local Conservation Department personnel who were familiar with all roads and trails in the area make the counts. Efficiency could often

Table 2. Data used to allocate the number of area-day field checks by strata during the October 13-November 30, 1961 period for 27 State Game Areas.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Stratum	Total number of area-days assigned by strata	Proportion of total number of area-days	Mean daily man-hours of use from the 1955 study	Weighted mean daily man-hours of use	Weighted daily use expressed as a proportion	Allocation of area-day field checks by strata
I	1313	.600	25.8	15.48	.253	27
II	401	.183	61.3	11.22	.184	20
III	143	.065	52.0	3.38	.055	6
IV	184	.084	172.6	14.50	.237	25
V	44	.020	453.6	9.07	.148	16
VI	43	.020	197.5	3.95	.065	7
VII	18	.008	173.7	1.39	.023	2
VIII	29	.013	103.6	1.35	.022	2
IX	12	.005	151.3	0.76	.012	1
	2187	.998		61.10	.999	106

Table 3. Data used to allocate the number of area-day field checks by strata during the period December 1 - March 1 for 27 State Game Areas.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Stratum	Total number of area-days assigned by strata	Proportion of total number of area-days	Mean daily man-hours of use from the 1955 study	Weighted mean daily man-hours of use	Weighted daily use expressed as a proportion	Allocation of area-day field checks by strata
I	2552	.624	6.8	4.24	.240	7
II	887	.217	32.7	7.10	.403	12
III	425	.104	27.8	2.89	.164	5
IV	227	.055	61.8	3.40	.193	6
	4091	1.000		17.63	1.000	30

Table 4. Data used to allocate the number of area-day field checks by strata during the period October 13 - November 30, 1961 for 24 State Game and Recreation Areas.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Stratum	Total number of area-days assigned by strata	Proportion of total number of area-days	Mean daily man-hours of use from the 1955 study	Weighted mean daily man-hours of use	Weighted daily use expressed as a proportion	Allocation of area-day field checks by strata
I	645	.516	25.8	13.31	.205	12
II	322	.258	61.3	15.81	.244	15
III	91	.073	52.0	3.80	.059	3
IV	66	.053	172.6	9.14	.141	8
V	27	.022	453.6	9.98	.154	9
VI	31	.025	197.5	4.94	.076	5
VII	20	.016	173.7	2.78	.043	3
VIII	14	.011	103.6	1.14	.017	1
IX	33	.026	151.3	3.93	.061	4
	1249	1.000		64.84	1.000	60

Table 5. Data used to allocate the number of area-day field checks by strata during the period December 1 - March 1 for 24 State Game and Recreation Areas.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Stratum	Total number of area-days assigned by strata	Proportion of total number of area-days	Mean daily man-hours of use from the 1955 study	Weighted mean daily man-hours of use	Weighted daily use expressed as a proportion	Allocation of area-day field checks by strata
I	1617	.915	6.8	6.22	.670	13
II	99	.056	32.7	1.83	.197	4
III	28	.016	27.8	0.44	.047	1
IV	23	.013	61.8	0.80	.086	2
	1767	1.000		9.29	1.000	20

be improved when it was possible to check the presence or absence of fresh car tracks at trail and road junctions saving time which could be used to search other parts of the area.

Estimating daily use

Two methods were used to compute the number of car-hours of visitor use for each check-day. The car-count method as previously described was conceived by L. L. Eberhardt in 1955-56 and used by Gordinier (1957). The total daily car-hours based on the three car-counts were computed by using the formula:

$$\text{Car-hours} = \frac{X_1 + X_2}{2}(t_1) + \frac{X_2 + X_3}{2}(t_2) + \ldots + \frac{X_4 + X_5}{2}(t_4)$$

where $X_{(i)}$ = the number of cars tallied per count and

$t_{(i)}$ = the elapsed time between counts. Counts X_1 and X_5 were hypothetical and were assumed to be zero, representing the number of cars just prior to daylight and just after darkness. Daylight and darkness times were recorded by the observers in the field. Car-hours were later converted to man-hours when the average number of occupants per car for the day was obtained from interviews or from postcard returns.

Following is a sample computation based on hypothetical data:

Data recorded in the field

The period of daylight: 7:00 a.m. - 6:30 p.m.

Round of area	Starting time	Ending time	Number of cars tallied
1 (X_2)	8:30 a.m.	10:00 a.m.	16
2 (X_3)	11:30 a.m.	1:15 p.m.	12
3 (X_4)	3:15 p.m.	5:15 p.m.	28

Average number of people per car: 3.0

Computing daily use

$$\text{Car-hours} = \frac{0 + 16}{2}(3.0) + \frac{16 + 12}{2}(3.25) + \frac{12 + 28}{2}(4.0) + \frac{28 + 0}{2}(1.25)$$

$$= 167.0$$

167.0 x 3.0 = 501 man-hours of visitor use for the day.

Eberhardt compared this method during a seven-day period with the number of man-hours of hunting recorded on the Rose Lake Wildlife Research Station where all hunters must check in and out. The method under-estimated the recorded use by about 12 per cent (Gordinier, 1957). Thus, it appears that the method is somewhat conservative. In using the method it was assumed that hunters afield during the day followed the bi-modal distribution reported by Friley (1954) and they were scattered throughout the area. Occasionally hunters and/or cars might not be so distributed but this would be exceptional.

To compare results with the car-count method, I also tallied the number of man-hours as reported on the postcard returns. But it was necessary on most days to adjust for non-respondents because rarely were all postcards returned even after two reminder notices had been sent. I assumed that the average length of time spent on the area and the average number of people per car of non-respondents did not differ from respondents. The assumption seemed valid since these two statistics did not vary significantly between original returns and those requiring one and two reminders. After making this adjustment the number of man-hours each day was simply the product of total people and average length of visit.

With each method (the car-counts and the postcard returns) daily sample means, variability within and between strata, and the confidence interval were computed for the final estimates of visitor use for the

survey period on the entire group of Game and Recreation Areas and also for the sub-group of 27 Game Areas.

Hunter success and species composition

Species composition, the estimated game kill, and hunter success per unit time and per unit area are summarized and compared with 1955-56 data.

RESULTS

Rate of postcard return

Two-hundred and seven field checks were completed for the 216 days originally selected. On the 207 check-days 4,489 parked cars were tallied and 3,294 (73.4%) usable postcards were eventually returned.

Visitor use

During the part of the hunting season sampled systematically (October 13, 1961- March 1, 1962), the car-count method produced an estimate of 750,376 man-hours of visitor use (± 4.8% at the .05 level), (Table 6). Field data used to construct Table 6 are presented as Appendix IV.

The postcard method, on the other hand, resulted in an estimate of 1,115,984 man-hours (± 18.2%) for the same period, (Table7).

Both methods depend basically on the ability of field men to find cars in the field. The discrepancy between the two estimates is due to some other factor. It has been shown that the car-count method yielded an estimate which was 12 per cent conservative on the average. Even when this estimate was adjusted upward to become 840,000 man-hours it was still considerably below the postcard tally. Although I found no significant difference in length of visits or people per car between types of respondents (original returnees, one reminder, two reminders) the assumption that non-respondents did not differ may not be valid. If the non-respondents exaggerated their lengths of visit, the postcard tally would be inflated. Since the car-count method utilized a more scientific approach with more controls, the estimate of visitor use derived by it as presented in Table 6 should be used.

Table 6. Data and computed hunting season use of 51 southern Michigan Game and Recreation Areas, October 13, 1961 - March 1, 1962 using the car-count method.*

Stratum	Number of area-days (N)	Proportion of total area-days (W)	Number of check days (n)	Stratum mean in man-hours ($\bar{x}$)	Variance of stratum means (s^2)	Square of (W) (W^2)	Weighted variance of stratum means $\frac{(W^2)(s^2)}{(n)}$	Finite population correction $\frac{(W)(s^2)}{(N)}$
I	6127	.6592	56	32.03	1589.4198	.434545	12.3335	0.1710
II	1709	.1839	51	115.32	22648.6696	.033819	15.0187	2.4372
III	687	.0739	12	220.71	52702.5109	.005461	23.9840	5.6692
IV	500	.0538	40	209.25	25909.7452	.002894	1.8746	2.7879
V	71	.0076	23	400.89	91792.5172	.000058	0.2315	9.8257
VI	74	.0080	12	369.14	60564.3277	.000064	0.3230	6.5475
VII	38	.0041	5	248.58	26526.0226	.000017	0.0902	2.8620
VIII	43	.0046	3	348.11	29320.1537	.000021	0.2052	3.1366
IX	45	.0048	5	464.10	164760.5102	.000023	0.7579	17.5745
	9294	.9999	207				54.8186	51.0116

$\bar{X}$ (sample mean) $= \Sigma(W)(\bar{x})$

= 80.7377 man-hours and the standard error of the mean: $\sqrt{\Sigma\frac{(W^2)(s^2)}{(n)} - \Sigma\frac{(W)(s^2)}{(N)}} = 1.9512$

The confidence limits at the .05 per cent level are: $\frac{2(1.9512)}{80.7377} = 4.8$ per cent

The computed use: 80.7377 (9294) = 750,376 visitor-hours $\pm$ per cent

*

Field data on which this table is based appear in Appendix IV.

Table 7. Data and computed hunting season use of 51 southern Michigan Game and Recreation Areas, October 13, 1961-March 1, 1962 using the postcard method.

Stratum	Number of area-days (N)	Proportion of total area-days (W)	Number of check days (n)	Stratum mean in man-hours ($\bar{x}$)	Variance of stratum means (s^2)	Square of (W) (W^2)	Weighted variance of stratum means $\frac{(W^2)\ (s^2)}{(n)}$	Finite population correction $\frac{(W)\ (s^2)}{(N)}$
I	6127	.6592	56	61.1384	16853.0343	.434545	130.7750	1.8132
II	1709	.1839	51	101.1618	109308.8364	.033819	73.4846	11.7624
III	687	.0739	12	294.0217	96229.3571	.005461	43.7924	10.3513
IV	500	.0538	40	261.8398	34988.7829	.002894	2.5314	3.7648
V	71	.0076	23	517.7861	152683.9830	.000058	0.3850	16.3436
VI	74	.0080	12	478.7492	68168.3471	.000064	0.3636	7.3696
VII	38	.0041	5	270.2440	18089.0014	.000017	0.0615	1.9517
VIII	43	.0046	3	423.3967	27940.8958	.000021	0.1956	2.9890
IX	45	.0048	5	729.0820	729048.3721	.000023	3.3536	77.7652
	9294		207					134.1108

$\bar{X}$ (sample mean) = $\Sigma(W)\ (\bar{x})$

= 120.0757 man-hours and the standard error of the mean: $\sqrt{\Sigma\frac{(W^2)\ (s^2)}{(n)} - \Sigma\frac{(W)\ (s^2)}{(N)}}$

= 10.9468

The confidence limits at the .05 level: $\frac{2(10.9468)}{120.0757}$ = 18.2 percent

The computed visitor use: 120.0757 (9294) = 1,115,984 ± 18.2 percent

It was determined from analyses of postcard returns that 95.8 per cent of the total visitor-hours of use was for hunting purposes, or about 806,400 hunter-hours.

To estimate the hours of archery deer hunting taking place during the non-sampled October 1-12 period, I checked records on file at the Rose Lake Wildlife Research Station for three years prior to 1961-62, and found that an average of about 4 per cent of the total hunting effort took place during this period. If this proportion was average for all the Game and Recreation Areas, about 33,600 hunter-hours of archery use could be added to the 806,400 hunter-hour estimate.

In addition to the 51 Game and Recreation Areas systematically studied, hunting was also permitted on four other areas and was reported by their staffs as follows:

Area	Hours of Hunting
Rose Lake Wildlife Experiment Station	14,506.5
Swan Creek Wildlife Experiment Station (Highbanks)	34,768.0
Fennville State Game Area	49,745.5
Pte. Mouillee State Game Area	34,515.0
	133,535.0

Thus, the hunting use of state-owned areas in southern Michigan during the 1961-62 season totaled almost 1,000,000 hunter-hours.

Hunting information

As reported on postcards, about 75 per cent of the hunters hunted small game, while 25 per cent reported hunting deer, either with gun or bow and arrow. Small game hunters averaged 4.4 hours, and deer hunters 5.4 hours afield each day.

A kill of 2,881 pieces of small game and 15 deer was reported on the 3294 postcards. The kill of small game per 100 hours was 12.7. This kill included the following:

Species	Percentage
Waterfowl	30.8
Cottontail	19.2
Squirrel	16.9
Ruffed Grouse	13.3
Pheasant	12.0
Woodcock	6.1
Miscellaneous	1.7
	100.0

Successful hunters (those who bagged at least one piece of game) were no more or less apt to return postcards than were unsuccessful hunters. The reported game kill per 100 hours by hunters returning cards voluntarily was 12.5 compared to 12.9 and 12.6 for hunters who were sent one and two reminders respectively.

Comparison of 1961-62 and 1955-56 data for 27 Game Areas

By considering only the 27 Game Areas studied both hunting seasons, it was possible to note any changes which took place in hunting pressure, success of hunters, species composition and perhaps others.

The car-count method indicated that visitor use in 1961-62 was about 466,000 man-hours compared to 288,000 man-hours in 1955-56 (Table 8). This represents a 62 per cent increase despite the fact that the sale of small game, firearm deer, camp deer and archery deer licenses in 1961-62 was down about 11 per cent from 1955-56. An upsurge in deer hunting and longer length of visits apparently accounted for the increase (Table 9).

The percentage of hunters after small game dropped from about 67 per cent in 1955-56 to 60 per cent in 1961-62. During the 6-year

Table 8. Data and computed hunting season use of 27 State Game Areas, October 13, 1961-March 1, 1962 which were also studied in 1955-56.

Stratum	Number of ares-days (N)	Proportion of total area-days (W)	Number of check-days (n)	Stratum mean in man-hours ($\bar{x}$)	Variance of stratum means (s^2)	Square of (W) (W^2)	Weighted variance of stratum means $\frac{(W^2)(s^2)}{(n)}$	Finite population correction $\frac{(W)(s^2)}{(N)}$
I	3865	.61564	30	35.85	1615.5976	.379013	20.4111	0.2573
II	1288	.20516	30	71.98	8931.1636	.042091	12.5307	1.4226
III	568	.09047	9	171.05	48498.0394	.008185	44.1063	7.7247
IV	411	.06546	30	227.07	30201.5466	.004285	4.3138	4.8102
V	44	.00700	14	343.04	93347.0987	.000049	0.3267	14.8507
VI	43	.00684	7	299.85	50230.3859	.000047	0.3373	7.9901
VII	18	.00286	2	140.30	14278.8100	.000008	0.0571	2.2687
VIII	29	.00461	2	433.92	14463.6032	.000021	0.1519	2.2992
IX	12	.00191	1	87.69	960.0000	.000003	0.0029	0.1528
	6278		125				82.2378	41.7763

$\bar{X}$ (sample mean) = $\Sigma (W)(\bar{x})$
= 74.1984 and the standard error of the mean: $\sqrt{\Sigma \frac{(W^2)(s^2)}{(n)} - \Sigma \frac{(W)(s^2)}{(N)}} = 6.3609$

The confidence limits at the .05 level: $\frac{2(6.3609)}{74.1984}$ = 17.1 per cent

The computed use: 74.1984 (6278) =465,818 $\pm$ 17.1 per cent

Table 9. Data collected during two visitor use surveys conducted in hunting seasons of 1955-56 and 1961-62 on 27 southern Michigan State Game Areas.

	1955-56	1961-62
Estimated visitor use in man-hours (Confidence interval at the .05 level)	208,125 ± 26 per cent	465,818 ± 17 per cent
Number of postcards distributed on parked cars	3,352	2,276
Percentage of postcards returned	59	72
Total number of hunters	4,263	3,578
Proportion of small game hunters	.67	.60
Proportion of deer hunters	.33	.40
Reported number of small game hunting hours	10,776.50	8,944.67
Reported number of deer hunting hours	7,573.25	8,146.42
Average length of small game hunt in hours	3.8	4.2
Average length of deer hunt in hours	5.5	5.6
Average number of hunters per car	2.1	2.2
Computed small game kill	25,300	29,735
Small game kill per 100 hours	14.9	12.2
Small game kill per 100 acres	23.9	25.7

interval the computed small game kill increased 17 per cent, but the kill per 100 hours (12.2) and per 100 acres (25.7) showed no significant changes.

Species composition

Of considerable interest is the shift in small game species composition (Table 10). The proportion of pheasants and cottontails declined from almost half of the kill in 1955-56 to a third of the kill in 1961-62. On the other hand, such forest game as ruffed grouse and woodcock showed substantial gains. There are probably two reasons for this change. First, ruffed grouse and woodcock are products of the successional changes rapidly taking place in southern Michigan. As marginal farmlands go out of production they quickly revert to brushlands favored by these birds. That these changes are taking place is reflected in the steady rise in the kill. In 1961 the kill of grouse and woodcock in southern Michigan was more than 106,000 compared to about 55,000 in 1955. Second, more hunters are pursuing these two species. About 54,000 people reported hunting them in 1961, compared to about 35,000 in 1955.

Table 10. Percentages of 6 species of small game killed as reported by hunters on 27 Game Areas in 1955-56 and 1961-62.

Species	Hunting Season 1955-56	1961-62
Fox squirrel	34.2	23.1
Pheasant	18.5	12.1
Cottontail	26.4	22.6
Ducks	5.9	5.4
Ruffed grouse	10.1	27.3
Woodcock	4.9	9.5
	100.0	100.0

THE SPRING-SUMMER SURVEY PERIOD

A visitor use survey similar to that of hunting season was conducted from April 28 to September 30, 1962. Although all Game Areas in southern Michigan were included for study, and stratification was completed on this basis (Table 11), only the results of field checks made on 27 Game Areas studied in two previous hunting seasons are presented and compared with the previous surveys.

Stratification of areas and days by the expected daily car-hours of use as the sampling unit and allocating sample sizes by strata was carried out by using the same methods as for the hunting season. No data were available from previous spring and summer surveys to help reduce variability however, but L. A. Ryel suggested an alternative. The mid-point value of the range in each stratum was multiplied by a constant of 0.33 and then doubled. These values appear as column 5 in Table 11.

Cars were counted in the field three times each day and postcard forms were placed on windshields as during the hunting season. Again, car licenses were recorded in the field, and up to two reminder notices were sent to people who failed to mail postcards. A different postcard form was designed for this survey and appears in the Appendix.

Results

One-hundred eighty of the 229 field checks completed were made on the 27 Game Areas, and 2036 cars were tallied. The car-count method of computing visitor use indicated that 384,000 visitor-hours of recreational use (±3 per cent) occurred during the 156-day study period (Table 12). During the 140-day hunting season period on these areas, about 466,000 man-hours of visitor use were computed. Both estimates pertain to day-

Table 11. Data used to allocate the number of area-day field checks by strata for the southern Michigan spring-summer survey of State Game Areas.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Stratum	Expected range in car-hours	Area-days	Area-days expressed as a proportion	Variability between strata (see text)	Weighted variability	Weighted variability as a proportion	Allocation
I	0-15	3975	.4785	4.95	2.3686	.1509	38
II	16-30	2895	.3485	15.18	5.2902	.3370	84
III	31-50	850	.1023	26.73	2.7345	.1742	44
IV	51-100	433	.0521	49.83	2.5961	.1654	41
V	101-300	134	.0161	132.33	2.1305	.1357	34
VI	300+	21	.0025	231.33	0.5781	.0368	9
		8308	1.0000		15.6980	1.0000	250

Table 12. Data and computed visitor use of 27 southern Michigan State Game Areas, April 28 - September 30, 1962. Field data appear in Appendix V.

Stratum	Number of area-days (N)	Proportion of total area-days (W)	Stratum means in car-hours (x)	Variance of stratum means (s^2)	Square of (W) (W^2)	Weighted variance of stratum means $\frac{(W^2)(s^2)}{(n)}$	Finite population correction $\frac{(W)(s^2)}{(N)}$	Number of days checked (n)
I	2598	.4502	12.73	233.02	.20268	2.05	0.04	23
II	2069	.3585	21.71	772.37	.12852	1.74	0.13	57
III	628	.1023	45.26	2050.25	.01047	0.60	0.33	36
IV	356	.0521	58.07	3167.30	.00271	0.29	0.46	30
V	103	.0161	104.04	16216.99	.00026	0.17	2.53	25
VI	17	.0025	143.49	8788.88	.000006	0.06	1.29	9
	5771	1.0000				4.91	4.78	180

$\bar{X}$ (sample mean) = $\sum(W)(\bar{x})$
= 23.20 and the standard error of the mean: $\sqrt{\sum\frac{(W^2)(s^2)}{(n)} - \sum\frac{(W)(s^2)}{(N)}} = .3606$

The confidence limits at the .05 level: $\frac{2(.3606)}{23.20} = .031$ or 3 per cent

The computed visitor use: 5771(23.20) = 133,887 car-hours. There were 2.87 people per car or 2.87(133,887) = 384,256 visitor-hours.

night use only. The wide variety of activities in the summer include many which are not confined to periods of daylight, and these activities during the summer are definitely more popular than during the fall and winter. Therefore the above estimate is probably conservative for several reasons. If the night-time use could be added to the estimates of both study periods, undoubtedly the amount of visitor use during the spring and summer would exceed that of hunting season by a considerable amount.

Moreover, a larger proportion of the parked cars was undoubtedly missed during the spring and summer because foliage hampered visibility. And finally, the counts of cars made in mid-morning, mid-day and mid- to late afternoon sampled a smaller proportion of the total daylight period each day than during the fall and winter. This would increase sampling error.

Types of spring and summer use

Of the total of 2086 postcards distributed in the field, 1781 (85.4%) were returned.

Respondents were asked to state what they were doing on the areas. On the 1781 postcards, 2313 references were made to many kinds of activities, (Table 13). Fishing was by far the most popular one, and represented about one-third of the total. Other popular activities, each representing about 10 per cent of the total were: berry-picking (12.6%), picnicking (11.4%) and swimming (8.4%).

Table 13. Percentages of the total number of times (2313) various recreational activities were mentioned on 1781 postcards from people contacted on 27 Game Areas during the spring and summer, 1962.

Fishing	33.8
Berry picking	12.6
Picnicking	11.4
Swimming	8.4
Camping	7.5
Sight seeing	7.2
Mushrooming	5.4
Hiking	3.3
Boating	2.2
Target shooting	1.0
Dog trials	.9
Loafing	.9
Visiting camping friends	.9
Bird watching and banding	.7
Archery practice	.5
Water skiing	.3
Dog training	.3
Photography	.3
Miscellaneous	2.4
	100.0

Methods

A mail questionnaire was sent to the 4,004 hunters whose cars had been tallied during the hunting season on one of the 51 Game and Recreation Areas studied.

Considerable time was devoted to selecting and wording questions and deciding upon a suitable overall format for the questionnaire. A preliminary copy was tested on a randomly selected group of 50 car owners, and an important question omission detected. The final questionnaire included 25 questions printed on both sides of a sheet of bond paper 17 x 11 inches folded to be 8½ x 11 inches in size and four pages long. The entire questionnaire package consisted of the questionnaire, a letter asking for cooperation, a stamped self-addressed return envelope and mailing envelope. The package weighed less than one ounce, keeping mailing costs minimal.

One or two reminder notices (Appendices VI and VII) were sent to non-respondents to ensure the highest possible rate of response. New questionnaires were sent with reminders. To determine whether non-respondents had different characteristics than respondents a sample of non-respondents was inter viewed by telephone.

Questionnaires (Appendix VIII) were identified with the owner's car license number in the upper right corner. First, second and third mailings to individuals were color coded with blue, red and red ink with a prefix letter R respectively. The individual's name did not appear anywhere, nor were signatures sought. This technique normally helps to boost response rates (Artis, personal conversation).

Mailings were made in Lansing on March 19, May 7 and July 7, 1962.

Coding of responses began about two months after the third mailing, a reasonable waiting period.

Questionnaires were examined to ascertain responses and a code book prepared (Appendix IX). Demographic data, wherever possible, were classified similarly to standards of the Census Bureau, U. S. Department of Commerce. Key punch operators coded some responses but I personally did all that required subjective judgment. Data were punched on IBM cards and two cards were required for each questionnaire. After punching, cards were verified to check for possible punching errors.

Results

Of the 4,004 sent out, 3350 (84%) were returned. Not all were usable. The unusables included: 133 from non-hunters who hadn't stated this earlier on their postcards returned; in 202 cases the addressee was deceased, had moved and left no forwarding address, or had improper addresses. Thirteen (13) completed questionnaires were not used because the responses were irrelevant or contained ridiculous responses. Thus, 3,002 usable questionnaires were returned by hunters, (75%). Of this total, 2,305 (76.8%) were from first mailings, 466 (15.5%) from the second mailing, and 231 (7.7%) from the third.

If the cumulative percentage of questionnaires received were plotted against the days after mailing from Lansing, a sigmoid curve would be produced. Very few questionnaires were received until the third day after mailing. They then came in at a very rapid rate for about two weeks, after which the rate declined somewhat, but returns continued to come in for several weeks. Almost half of the returns were received by the fifth day, 70 per cent by the 10th day and almost 90 per cent within a three-week period. The rate of return of second and third mailings for any

period of time was consistently less than first mailings.

Estimated number of people who hunted on state-owned lands

The use made of the state-owned areas expressed in hunter-hours becomes more meaningful in many respects if expressed in terms of people involved. To convert the number of hunter-hours to the number of hunters it was necessary to use data from the visitor use survey and from mail questionnaire returns. These computations indicated that 47,970 people hunted on State Game and Recreation Areas in 1961-62, (Table 14).

Since results of another statewide study conducted in 1961 indicated that 862,451 individuals purchased a hunting license that year, about 1 hunter in 18 hunted on a state-owned area in southern Michigan.

Sex of hunters

As judged by given names, 98 per cent of the hunters were males. Accordingly when comparisons are made later with population data, the data pertain to males.

Types of hunting licenses purchased

Separate licenses are required in Michigan to hunt small game, deer with gun, and with bow and arrow. This multiple license system has definite financial advantages, but one disadvantage is that it is almost impossible to determine the precise number of individual people who purchase these licenses. The proportion of this group of hunters purchasing various licenses and combinations of licenses was compared with the proportions who do so on a state-wide basis (Table 15).

Very few hunters in either group bought only an archery deer license or the combination of firearm and archery deer licenses. On the other hand, the two groups differed markedly in the purchase of a firearm deer license or firearm deer and small game licenses. Many more hunters

Table 14. Number of respondents to a mail questionnaire, average number of days reported hunting, computed number of hunter days, and the number of individuals who hunted at least one time on southern Michigan state lands in the 1961-62 hunting season.

Stratum	Respondents	Average number of days reported	Computed number of hunter days	Computed number of individuals
I	187	3.59	46048.51	12,827
II	481	3.52	43956.22	12,488
III	210	3.35	34370.48	10,260
IV	692	3.43	23293.02	6,791
V	734	3.51	6135.96	1,748
VI	369	3.65	3774.75	1,034
VII	139	3.27	2145.08	656
VIII	110	2.89	3334.96	1,154
IX	238	3.27	3309.11	1,012
Total	3160		166,368.09	47,970

Table 15. The proportion of two groups of hunters purchasing various types of hunting licenses: people who hunted on State Game and Recreation Areas in southern Michigan and hunters state-wide as determined by a postcard poll.

Type of hunting license	Southern Michigan hunters	Hunters state-wide
Small game	34.9	44.2
Firearm deer	5.0	23.1
Archery deer	1.4	1.4
Small game and archery deer	3.1	1.0
Small game and firearm deer	49.8	28.5
Small game, archery deer and firearm deer	5.0	1.4
Firearm deer and archery deer	0.8	0.4
	100.0	100.0
Number of individuals	47,970	862,451

studied here bought both a small game and a firearm deer license than did hunters on a state-wide basis. It appears that the person who hunted on state lands was more apt to hunt a variety of game rather than to specialize on one type.

Distribution of hunters by county

Every county in southern Michigan as well as several in the northern part of the state was represented. In general, there was a linear relationship between population by county and number of hunters. Wayne County was most often represented both by population and number of hunters using state-owned lands (Table 16).

Two factors apparently influenced the number of hunters by county: 1) the presence of state-owned land within a county and 2) the proportion of the residents in the county living in urbanized areas. Jackson and Tuscola Counties ranked second and third respectively according to the number of hunters, but neither ranked in the top 10 according to population. Both are predominantly rural. But other rural counties such as Branch, Van Buren, St. Joseph and Laton Counties are also rural but had few state-land hunters. They had little or no state-owned land. Counties with large urban centers, regardless of the presence of state land were well represented by state-land hunters.

Distribution of hunters by urban and rural residence

Since postal addresses alone could not differentiate people who lived in rural or urban areas, they were asked to specify whether they lived within or outside of a city, town or village. Hunters were classified as rural when they lived outside of a community. The results were compared with the urban-rural distribution of Southern Michigan males using 1960 Census Bureau data. However, the U. S. Census Bureau class-

Table 16. County of residence of people who hunted on southern Michigan state-owned lands in 1961-62.

County	Computed number of hunters	Percentage	Rank
Allegan	302	0.6	30
Barry	645	1.3	19
Berrien	521	1.1	23
Branch	23	0.1	34
Calhoun	1299	2.7	11
Cass	1357	2.8	10
Clinton	343	0.7	29
Eaton	116	0.2	32
Genesee	2606	5.4	6
Gratiot	272	0.6	31
Hillsdale	354	0.7	27
Huron	749	1.6	16
Ingham	1511	3.2	9
Ionia	1219	2.5	12
Jackson	3886	8.1	2
Kalamazoo	1164	2.4	13
Kent	3598	7.5	4
Lapeer	637	1.3	20
Lenawee	349	0.7	28
Livingston	470	1.0	25
Macomb	970	2.0	15
Montcalm	551	1.1	22
Monroe	493	1.0	24
Oakland	2970	6.2	5
Ottawa	666	1.4	18
Sanilac	697	1.5	17
Shiawassee	387	0.8	26
St. Clair	568	1.2	21
St. Joseph	5	0.1	36
Saginaw	2601	5.4	7
Tuscola	3712	7.7	3
Van Buren	30	0.1	33
Washtenaw	2325	4.8	8
Wayne	9423	19.6	1
Northern Lower Michigan	1139	2.4	14
Upper Michigan	12	0.1	35
Total	47,970	99.9	

ifies an urban resident as one who lives in an urbanized area or in places of 2,500 inhabitants or more outside urbanized areas. Thus the classification of residents was not identical but a comparison of data seemed justifiable.

Hunters were more apt to be residents of rural areas because about 40 per cent of them lived in rural areas while only 25 per cent of the male populace did so.

I suspected that the place of childhood residence might have influenced the hunters while young, and I expected a large proportion of them to have had a rural background. I asked them to specify the number of years during their first 18 years of life they lived in the following areas: 1) farm and country, 2) small and medium-sized city (less than 25,000), and 3) large city (more than 25,000).

About 60 per cent of them had lived some time on a farm or in the country. As expected however, more of the older hunters had come from rural areas. Almost three-fourths (72%) of the hunters older than 65 had lived on a farm or in the country, but this percentage decreased steadily through the younger classes until about half of the hunters less than 19 years of age had had a rural background.

It appears from these data that urbanization could in two ways reduce the popularity of hunting. First, increasing urbanization creates conditions such as traffic congestion and access problems which discourage the less avid hunters. These discouraged hunters turn to other recreational pastimes. Second, youth living in urbanized areas are probably less apt to develop interests in natural phenomena and hunting which stay with them throughout life. And even though these people try hunting perhaps later on, they might be the less avid hunter who becomes discouraged very easily.

Marital status

The percentage of married hunters was 80.3 per cent and did not differ significantly from the percentage of married males (78.8%) living in Southern Michigan.

I used the median test as described by Siegel (1956) to determine whether marital status had an influence on the number of days hunted. Chi-square values computed for each of the strata indicated there was no significant difference. (Table 17).

Moreover, no significant differences between married and single hunters were found in distances traveled to hunting lands (Table 18).

Income

Hunters were asked to select one of five income groups appropriate to them. About 10 per cent of them failed to respond to the question. Many must have felt the question was too personal.

Less than 10 per cent of the hunters earned less than $2,500 per year compared to more than 25 per cent of the males in Southern Michigan (Table 19). Somewhat fewer hunters than expected earned more than $10,000 per year, but this difference may not have been significant. Hunters definitely were middle class; more than 70 per cent earned between $2,500 and $7,500 per year compared to about 50 per cent of Southern Michigan males.

Occupations

The percentage of hunters occurring in each of seven occupation classes shows a distribution which one would expect after examining the income data. Occupations paying moderate incomes were very well represented. Almost three-fourths of the hunters were employed in some form of skilled, semi- or unskilled labor. The percentage of farmers, on the

Table 17. The number of individuals, married and single who hunted more or less than the median number of days by strata with values of chi-square.

Stratum	Total number of respondents	Median day	Married		Single		χ^2
			Fewer days	More days	Fewer days	More days	
I	177	6	76	59	23	17	1.7
II	451	5	192	164	40	55	3.7
III	197	5	92	78	19	8	1.9
IV	663	5	287	261	55	60	0.6
V	697	5	318	241	77	61	0.02
VI	359	5	166	124	31	38	2.9
VII	131	4	57	49	10	15	1.0
VIII	98	4	47	29	15	7	0.1
IX	213	6	96	85	27	25	0.7

Table 18. The relationship between marital status and distance traveled to hunt, with chi-square values by strata.

Stratum	Number of respondents	Marital status	Distance group in miles 1-19	20-39	40-99	X^2
I	175	Single	21	9	10	
		Married	67	41	27	1.1
II	454	Single	54	24	17	
		Married	194	95	70	2.5
III	198	Single	18	5	4	
		Married	88	33	50	2.8
IV	657	Single	48	30	36	
		Married	216	194	133	4.4
V	717	Single	63	44	35	
		Married	255	160	160	0.8
VI	358	Single	37	22	12	
		Married	110	122	55	4.6
VII	130	Single	12	10	3	
		Married	49	37	19	0.6
VIII	101	Single	7	6	10	
		Married	25	24	29	0.3
IX	214	Single	20	17	17	
		Married	68	56	36	1.7

Table 19. Percentages of southern Michigan state-land hunters and male residents occurring in five income groups.

Income group		Hunters	Southern Michigan males*
I	Earned less than $2500 per year	9.9	25.6
II	Earned $2500 to $4999 per year	25.4	24.3
III	Earned $5000 to $7499 per year	45.9	26.8
IV	Earned $7500 to $9999 per year	13.7	15.4
V	Earned $10,000 or more per year	5.1	7.9
		100.0	100.0

* 1960 U.S. Census data

other hand, was similar to the population at large. The professions, sales workers and managers were less represented than they existed in the population (Table 20).

About 6.4 per cent of the hunters were not gainfully employed, and included 2.9 per cent students and 3.5 per cent retirees.

Hunters were asked to report the number of hours worked per week on the average during the hunting season by checking one of the following responses: 1) more than 40 hours per week

2) between 31 and 40 hours

3) between 21 and 30 hours

4) 20 hours or less

5) did not work at all

If a hunter did not work he was asked to state whether he was retired, a student, unemployed or "other".

About 80 per cent of all hunters worked more than 31 hours per week and this group was almost equally divided between those who worked more and less than 40 hours. Less than 10 per cent of the employed worked less than 31 hours. The number of retirees, unemployed and students comprised the remaining 10 per cent of the hunters.

To ascertain whether a correlation might exist between the time worked per week and the number of days hunted I divided the work week into four classes: 1) more than 40 hours, 2) 31-40 hours, 3) 21-30 hours 4) 20 hours per week and less, and the number of days hunted per individual was then recorded by work classes. Using analysis of variance no significant difference was found between groups. Thus, the number of hours worked per week had no bearing on the number of days hunted.

Table 20. Percentages of southern Michigan state-land hunters and male residents occurring in seven occupation classes.*

Occupation class	Hunters	Southern Michigan males
Professional, proprietors	9.7	14.8
Skilled craftsmen	37.2	22.7
Semi-skilled laborers	35.6	32.9
Farmers	3.6	3.7
Sales workers	4.3	6.9
Managers, clerical	5.8	13.1
Service workers	3.8	5.9
	100.0	100.0

* Adapted from U.S. Census data, 1960.

Education

The success of a dynamic wildlife management program depends upon an enlightened public. And the amount of formal education is a measure of the capability of a society to become and remain enlightened.

Hunters were asked to check the highest grade of education they completed, and to specify any additional special schools or colleges attended. To reduce cheating they were asked to list the last school they had attended.

Education beyond high school graduation was given a value of 13. The mean level of education was determined by averaging the numerical values of the grades completed.

The mean grade level completed was 10.7. More than half of the hunters had completed high school, and almost 25 per cent had additional training of some kind. Smaller percentages of hunters than other Southern Michigan males completed only grades below 8 (Table 21). The percentage of males attending post-high school courses was not available in the census data.

Age distribution

The average age of these hunters was 39.3 years. This mean was probably biased because only car owners were sampled, and the younger hunters would not as likely appear. In comparing these hunters with state-wide hunters and with male residents occurring by age classes, larger percentages in both hunter groups occurred in the age classes between 20 and 54 years (Table 22). The percentages of hunters represented in the two older classes were somewhat less than existed among all male residents.

The relationship between age and hunting success is discussed later.

Table 21. Percentages of southern Michigan state-land hunters and male residents who completed various grades of formal education.

Grade	Hunters	Southern Michigan males*
1-4	1.5	5.0
5-6	1.5	6.4
7	3.1	6.5
8	18.7	20.0
9-11	24.9	22.5
12	27.9	22.5
13**	22.4	Unknown
	100.0	

* 1960 U.S. Census data

** Grade "13" represents some additional education in addition to high school graduation.

Racial status

This group of hunters was composed of 94.4 per cent whites, 2.3 per cent negro and 2.3 per cent "other". In Southern Michigan in 1960, 10.2 per cent of all males were non-white.

The apparent deficiency of non-whites may have been due to non-whites responding untruthfully by reporting themselves as whites, or perhaps disproportionate numbers of them disregarded the questionnaire and did not respond.

Hunting pressure compared between Game and Recreation Areas and by districts

The sample size (number of check-days) used to measure the intensity of visitor use on the Game and Recreation Areas was too small to permit area comparisons. But from the mail questionnaire I was able to supplement the data for individual areas by asking hunters to specify as many as three state-owned and three privately-owned areas on which they had hunted. These responses permitted a comparison of hunting pressure on the various areas and administrative districts.

Few people knew the names of the state-owned areas and were unable to tell precisely where they had hunted. They were asked to name a town or city near their hunting area and I judged where they had hunted. This was usually routine, but sometimes several areas were located near the city mentioned. Other information in the questionnaire often provided a clue which helped indicate the proper area. Otherwise it was necessary to code the areas arbitrarily.

The 20 most frequently mentioned Game and Recreation Areas are ranked in Table 23. The popularity of several out-state areas was surprising because some are located quite far from population centers. It appears

Table 22. Percentages of three groups of Michigan males occurring in various age classes.

Age class	Southern Michigan state-land hunters	State-wide hunters*	Southern Michigan male citizens**
19	2.4	13.9	10.8
20-24	8.5	11.3	8.1
25-34	25.7	23.5	19.4
35-44	28.4	21.2	20.4
45-54	20.0	16.6	16.8
55-64	9.6	9.4	12.8
65+	5.4	4.1	11.7

*Pooled 1961 small game and deer hunter postcard polls

**1960 U.S. Census data

that the southeastern Michigan Recreation Areas are very heavily hunted early in the season, but their popularity declines quickly after pheasant season. On the out-state areas, in contrast, pressure apparently was lower early in the season, but remained substantial over a longer period. The total use of many more remote areas surpassed that of the more accessible ones over the entire season.

When responses were grouped by counties and by Department management districts, it was revealed that almost one-third of the people hunted in District 11--the "Thumb" district (Table 24). Districts 10 and 13 were somewhat less popular, but each was hunted by about 20 per cent of the hunters.

The distribution of hunters by Districts when hunting on privately owned land was similar. Apparently people preferred to hunt in a particular area regardless of the type of land ownership.

Distances traveled to hunt

The air-line one way distance from the center of the respondent's home town to the center of the state-owned area hunted or to the city near the privately-owned land was measured to the nearest mile on an official Michigan highway map. When a respondent hunted near his home town an arbitrary minimum distance of five miles was used.

After pooling responses in which one, two and three areas were hunted, and considering hunting on both state-owned and privately-owned lands, the over-all average distance between the home and the area hunted was about 28 miles; about 29 miles to state-owned lands and 24 miles to privately-owned lands. The shorter distance to privately-owned land probably reflected its greater availability.

People listing more than one area, traveled further to the second

Table 23. The 20 most heavily hunted State Game and Recreation Areas in southern Michigan in 1961-62.

Rank	Area	County of location
1	Waterloo Recreation Area	Jackson, Washtenaw
2	Tuscola State Game Area	Tuscola
3	Lapeer State Game Area	Lapeer
4	Gratiot-Saginaw State Game Area	Gratiot, Saginaw
5	Barry State Game Area	Barry
6	Brighton Recreation Area	Livingston
7	Pinckney Recreation Area	Livingston, Washtenaw
8	Bald Mountain Recreation Area	Oakland
9	Fish Point State Game Area	Tuscola
10	Shiawassee State Game Area	Saginaw
11	Flat River State Game Area	Montcalm
12	Deford State Game Area	Tuscola
13	Allegan State Forest	Allegan
14	Highland Recreation Area	Oakland
15	Sharonville State Game Area	Jackson, Washtenaw
16	Holly Recreation Area	Oakland
17	Dansville State Game Area	Ingham
18	Wildfowl Bay State Game Area	Huron
19	Chelsea State Game Area	Washtenaw
20	Maple River State Game Area	Clinton

Table 24. The percentage of hunters on state-owned and privately-owned lands by Game Districts in 1961-62.

Game District	State-owned land	Privately-owned land
9	11.3	15.1
10	20.6	18.8
11	29.6	30.4
12	7.5	4.2
13	21.3	24.5
14	9.7	7.0
	100.0	100.0

area than the first and still further to the third. This was true for both types of land ownership (Table 25).

Residents of the densely-populated southeastern counties, particularly Wayne, Macomb and Oakland traveled further to hunt than did residents of other counties. Less than one-fifth of these residents hunted on privately-owned lands and only one-tenth of them hunted on state-owned areas within 20 miles of home. On the other hand, 60 and 65 per cent of the residents respectively of other counties hunted on privately owned and state-owned lands within 20 miles (Fig. 2). Whereas about 35 and 21 per cent of the Detroit area people drove more than 60 miles to hunt on privately-owned and state-owned areas respectively, less than five per cent of out-state residents drove this far to hunt.

Kill information

The game kill as reported by 3,141 respondents and the computed kill for the estimated 47,970 hunters are presented in Tables 26 and 27 respectively.

Species composition agreed closely with state-wide data (Table 28). The cottontail was the leading game species reported. Hunters who used state-owned lands had better hunting success than did hunters state-wide. They averaged 8.4 days afield which was probably more than the average.

Hunter success by age classes

To determine whether hunting success was related to age, the percentage of the small game bagged by species was plotted against the percentage of hunters occurring by age classes (Fig. 3). The several resulting curve patterns were similar, i.e. the percentage of the total kill taken by hunters in an age class was similar to the percentage of total

Table 25. The average distance in miles travelled to hunt on state-owned and privately-owned lands.

	State	Private
One area specified	28.1	23.3
Two areas specified; average of second	32.4	25.3
Three areas specified; average of third	34.5	26.2
Average	29.4	24.2

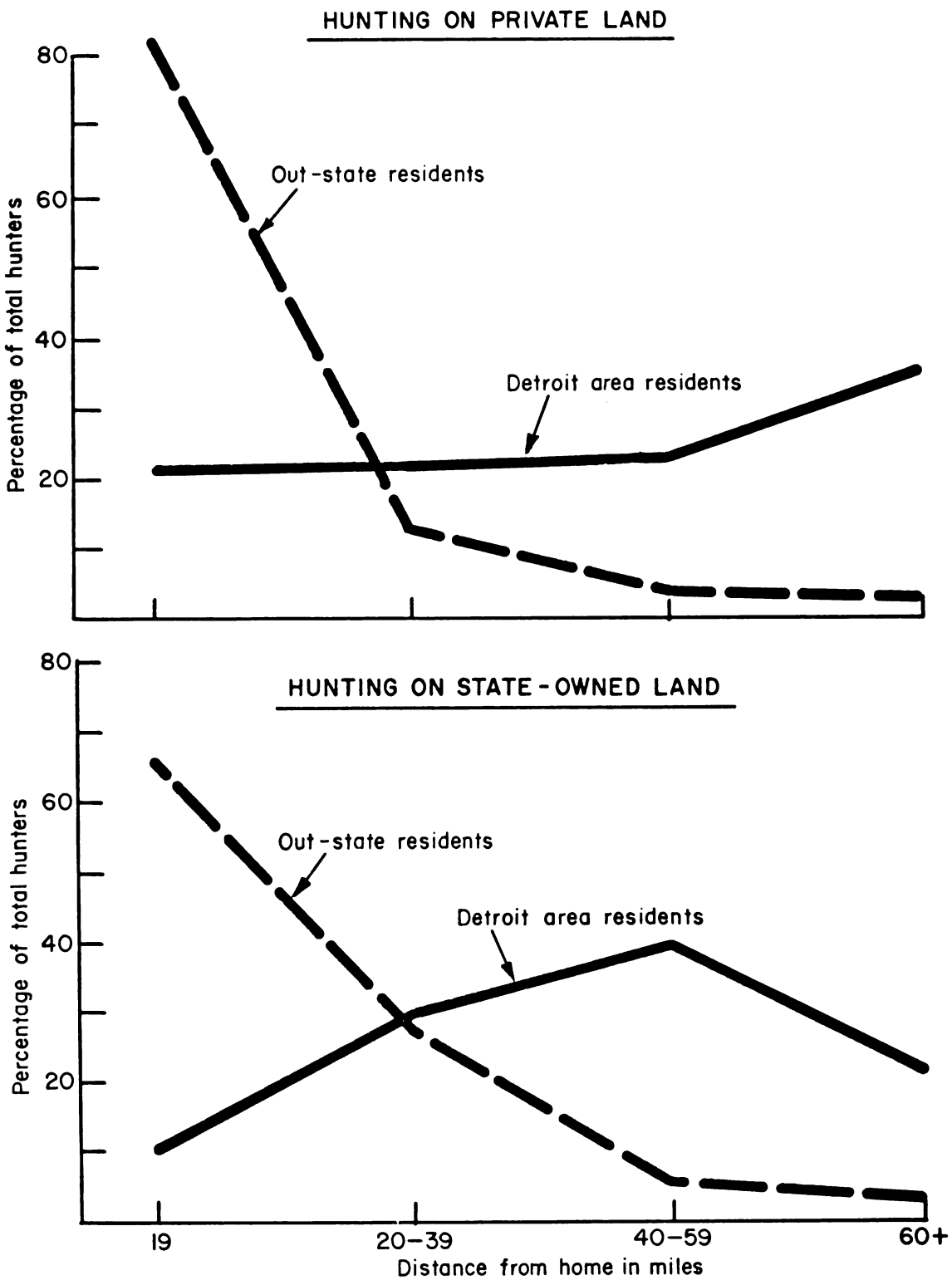


Figure 2. Percentage of residents of the Detroit area and out-state areas who reported hunting four distance categories from their homes while hunting on private and state-owned land.

hunters in that class. But exceptions occurred. Hunters in the 25-34 and 35-44 age classes killed more ducks and pheasants, and hunters in the 45-54 class bagged more ruffed grouse than hunters in other age classes. Hunters over 65 were less successful in bagging all species.

Leisure time interests

The 40-hour work week is standard today. Leisure is more available than ever to a mushrooming human population. It is possible that free time will increase.

Types of leisure-time activities favored by the public are of concern because shifts in interests affect management of recreation facilities and planning.

Hunters were asked how they preferred to spend leisure time. Responses were expected to be biased toward hunting, fishing and other types of outdoor recreation because of the people sampled. Responses were grouped into three categories:

1) "Field and stream" types of activities like hunting, fishing, hiking, camping and related interests.
2) Commercial, spectator or organized sports interests like golfing, baseball, football and bowling.
3) Domestic or non-sporting interests like carpentry, cabinet-making, cooking, loafing, reading, painting, photography, movies and television.

About 98 per cent of the respondents listed activities in the first category, while slightly less than one per cent listed activities in categories 2 and 3. Of respondents who listed activities in more than one category, about 65 per cent were in categories 1 and 2 and about 23 per cent in categories 1 and 3. About 12 per cent listed activities in

Table 26. The reported kill in 1961-62 by strata by 3,141 respondents to a mail questionnaire who had been contacted on state-owned lands in southern Michigan.

Stratum	Number of respondents	Number of unsuccessful hunters	Cottontail	Pheasant	Ruffed Grouse	Woodcock	Duck	Geese	Squirrel	Snipe	Hare	Deer
I	186	22	1127	374	180	53	182	17	369	6	11	12
II	482	74	2462	1215	606	215	774	61	856	38	54	37
III	209	24	1092	554	211	70	265	12	376	0	39	11
IV	691	151	2246	1389	1079	425	446	34	1222	47	117	43
V	722	112	3029	1819	935	335	1039	75	1148	71	93	63
VI	365	77	1321	655	314	131	347	11	812	1	23	21
VII	140	38	463	185	105	62	37	8	201	2	13	9
VIII	110	21	232	219	114	34	134	5	154	2	10	8
IX	236	12	905	693	244	152	1444	61	258	70	26	27

Table 27. The computed kill by an estimated 47,970 individuals who hunted on southern Michigan state-owned lands in 1961-62. Data are based on Table 26.

Stratum	Computed hunters	Unsuccessful hunters	Computed kill by species: Cottontail	Pheasant	Ruffed Grouse	Woodcock	Ducks	Geese	Squirrel	Snipe	Hare	Deer
I	12827	1517	77721	25792	12413	3655	12551	1172	25447	414	759	828
II	12488	1917	63787	31479	15701	5570	20053	1580	22178	984	1399	959
III	10260	1178	53607	27196	10358	3436	13009	589	18458	0	1915	540
IV	6791	1484	22073	13651	10604	4177	4383	334	12010	462	1150	423
V	1748	271	7334	4404	2264	956	2494	182	2779	172	225	153
VI	1034	218	3742	1856	890	371	983	31	2300	3	65	59
VII	656	178	2169	867	492	384	173	37	942	9	84	42
VIII	1154	220	2434	2298	1196	357	1406	52	1616	21	105	84
IX	1012	51	3881	2972	1046	652	6192	262	1106	300	111	116
Total	47,970	7,034	236,748	110,515	54,964	19,558	61,244	4,239	86,836	2,365	5,813	3,204

Table 28. Game kill data for hunters checked on state-lands compared to hunters state-wide, 1961-62.

Species	Southern Michigan state-land hunters			State-wide hunters		
	Kill	Kill/hunter	Proportion	Kill	Kill/hunter*	Proportion
Cottontail	236,748	4.94	0.41	1,159,860	2.79	0.33
Pheasant	110,515	2.30	0.19	846,470	2.03	0.24
Squirrel	86,836	1.81	0.15	679,800	1.63	0.19
Ruffed grouse	54,964	1.15	0.10	469,150	1.13	0.13
Waterfowl	65,483	1.37	0.12	279,940	0.67	0.08
Woodcock	19,558	0.41	0.03	102,920	0.25	0.03
			1.00			1.00

*Since the precise number of hunters was not known, the number of pheasant hunters was used for these computations.

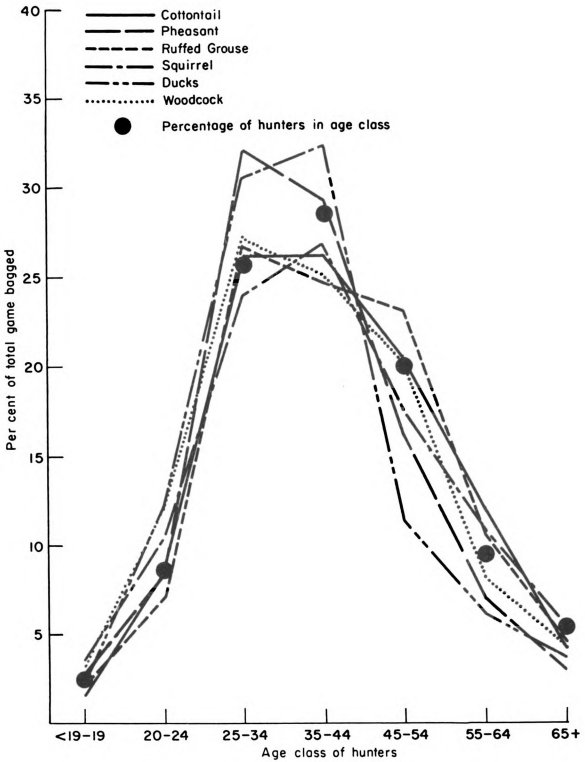


Figure 3. Distribution of small game kill by age class of hunters

all three categories.

A place to hunt

When a landowner refuses to grant a person permission to hunt, he usually gives a reason. A question asked of the hunter was: "If a landowner would not let you hunt, and he gave a reason, what reason did he give?" The responses probably represented a summation of all of the individual's previous experience, not merely that of the 1961-62 season.

About three-fourths of all farmers reported by hunters refused permission because they saved the right for their friends and relatives or they were fearful of crop or other property damage. Ten per cent of the hunters said the farmer gave no reason; he merely said no when permission was sought. About 6 per cent of the hunters indicated that they seldom or never were refused permission to hunt (Table 29).

Evidently a sizeable reduction could be made in the number of refusals by farmers if hunters would learn to respect the property rights of the farmer. About 40 per cent of the refusals were based on fears of property damage. Much of the property damage may be due to ignorance on behalf of hunters rather than being purposeful, malicious destruction. As I have previously discussed, fewer hunters today have a rural background than was true in the past. Education might be helpful in making hunters more aware of farm problems.

In some localities landowners seem to have banded together and strangers are not permitted to hunt. Zorb (1959) reported that the hunter access problem was most severe in southeastern counties. To determine whether other problem localities existed and their location, a question was asked: "How easy or hard was it for you to find a place to hunt?" Respondents selected one of the following:

Table 29. Percentages of various types of refusals reported by hunters when farmers were asked permission to hunt.

Type of refusal	Percentage
Was fearful of crop or other property damage	39.8
Didn't let strangers hunt, saved rights for relatives and friends	34.6
No reason given, farmer merely refused	9.8
Too many hunters out already, come back later	5.8
Tenant couldn't give permission	3.7
No game to hunt	3.5
Crops in field yet, come back later	2.7
Wanted fee to hunt	0.1
	100.0

1) I never asked for permission to hunt.

2) I found it very easy to get permission to hunt.

3) I usually found it easy to get permission to hunt.

4) I sometimes found it hard to get permission to hunt.

5) I almost always found it hard to get permission to hunt.

6) I never got permission to hunt.

Almost two-thirds of the hunters said it was very easy (response number 2) or easy (response number 3) for them to obtain permission, while slightly more than one-fourth of the hunters had trouble obtaining permission or never got it (response 4, 5 and 6). The other hunters did not respond to the question.

More than half the hunters who had trouble finding a place to hunt lived in the Detroit area (Wayne, Macomb or Oakland Counties).

In testing the independence of responses for Detroit area and out-state residents against the access responses grouped into "easy" and "hard" categories, a Chi-square value of 145.4 was computed, which for one degree of freedom indicated that there was a significant difference in the ability to obtain permission to hunt between residents of the two areas. Detroit area hunters had more trouble finding hunting places (Appendix X-A).

In a similar manner, to ascertain whether a difference existed between white and negro hunters' chances of obtaining permission to hunt, I tested the independence of race and responses to the access question. A Chi-square value of 44.6 was obtained which for one degree of freedom indicated there was a significant difference between races in the ability to find a place to hunt. Negroes had more difficulty than did whites (Appendix X-B).

Since negroes tend to live in urban areas I removed them from the sample, and again tested the independence of "easy" and "hard" responses against the place of residence. Still, the Detroit area hunters had more difficulty obtaining permission. (Appendix X-C).

Next, I hypothesized that all residents of cities over 100,000 would differ in ability to obtain permission to hunt than did other residents. A chi-square value of 15.1 indicated that the residents of cities of over 100,000 population did have more difficulty in obtaining permission than residents of other areas. (Appendix X-D).

Finally, I again removed the negroes from the sample and then compared the abilities in finding places to hunt between residents of cities over 100,000 with residents of other areas. In this case the value of chi-square was no longer significant (3.7). (Appendix X-E).

The results of these various tests indicate that:

1) Residents of the Detroit area, regardless of race, had more difficulty finding a place to hunt than did residents of other areas.
2) Residents of the five other large cities with populations over 100,000 had more trouble finding a place to hunt than did other residents, only when negroes were included in the sample.

Apparently two types of Southern Michigan residents have considerable difficulty finding a place to hunt on privately-owned land--the resident of the Detroit area and the negro.

Distribution of Detroit area hunters

It was pointed out earlier that residents of the three counties near Detroit traveled further to hunt than did other residents. Plotting the distribution of Detroit hunters by county indicated that these residents

tended to hunt in the "Thumb" counties. Probably the good pheasant populations in that area influenced this distribution. When these thousands of hunters invade the "Thumb" on opening day and weekend of pheasant season, it is understandable that access is a problem. If some of these hunters could be induced to hunt in other areas to the northwest, west or southwest of Detroit the access problem for them at least could be eased. And with less competition, their hunting would be as good or perhaps even better than in the "Thumb".

Ownership of private lands

Hunters listed the number of days they hunted on each of the following types of land:

a) Land owned by self

b) Land owned by friends, relatives and/or neighbors

c) Land owned by strangers

Almost two-thirds of the respondents (63%) hunted on lands of only one type of ownership; 33 per cent hunted on two types of ownership, and only 4 per cent hunted on all three types.

Of the individuals who hunted on lands of only one type of ownership, 60 per cent hunted on lands owned by friends, relatives or neighbors and about 33 per cent did so on strangers' land. About 7 per cent hunted only on their own land.

When respondents had hunted on lands of two types of ownership, 76 per cent said they hunted on friends, relatives and/or neighbors' land and strangers' land. Twenty per cent hunted on their own land that owned by friends, relatives and/or neighbors. And finally, 4 per cent hunted on their own land and a stranger's land.

The number of days hunted according to types of land ownership was

examined. People who knew the landowner, i.e. responses a and b above, hunted more than did people who asked a stranger's permission. Respondents hunting on their own land averaged 8.2 days afield, while those hunting on friends, relatives and/or neighbors' land averaged 7.3 days. hunters who only asked at a stranger's farm averaged 6.6 days afield.

Hunter opinions of state-owned areas

Hunters were asked to give their opinions of state lands in Southern Michigan as a place to hunt by selecting one of the following: Excellent, Good, Fair, Poor, Very Poor.

About five per cent of them did not respond. About seventy per cent rated the areas as fair, good or excellent. Almost equal numbers thought the areas were either poor or very poor compared to good or excellent (Fig. 4).

I attempted to learn why the hunters ranked the areas as they did by following up the question on their opinions with an open-ended one which asked: "What reasons do you have for your answer above?" The responses were grouped into several categories (Table 30), and also classified as complimentary and uncomplimentary. The complimentary responses included:

1) Areas had good cover and food, variety of game.
2) Areas offered freedom, did not need permission to hunt, they were nearby.
3) Game was abundant and had good luck.

The uncomplimentary responses were:

1) Areas lacked game, had poor food and cover.
2) Areas were over-crowded, too much hunting pressure.
3) Predators were too abundant, need more control.

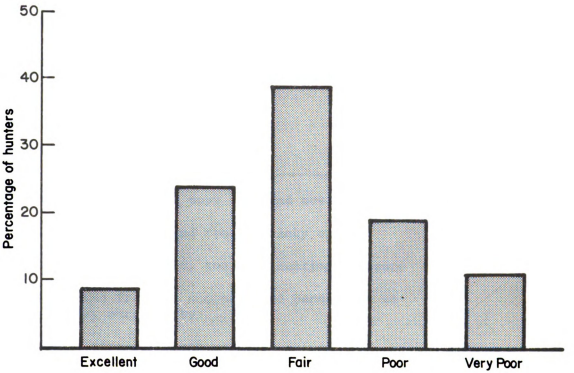


Figure 4. Percentages of 5 responses regarding hunter opinions of state-owned lands in southern Michigan as a place to hunt. About 5 per cent of the hunters did not respond to the question.

Table 30. Percentages of hunters' reasons for their opinions of state-owned lands as places to hunt.

Response	Percentage
Areas lacked game, had poor food and cover	34.8
Areas had good cover and food, variety of game	27.7
Areas were over-crowded, too much hunting pressure	15.7
Areas offered freedom, did not need permission to hunt, they were nearby	9.0
Some areas were good, others poor	5.0
Irrelevant responses	2.2
Respondent did not feel qualified to judge areas	1.1
Predators too abundant	0.8
Miscellaneous responses	3.7
	100.0

About 36 per cent of the hunters gave complimentary responses, 52 per cent uncomplimentary, while 12 per cent could not be so classified. Only one per cent of the hunters felt they were unqualified to judge the areas because of limited experience.

Hunters who had had any kind of a pleasant experience on the areas were prone to offer compliments. Being a successful hunter was seldom the most important criterion for giving favorable responses. About 22 per cent of the hunters who thought the areas were excellent, and 19 per cent who thought they were good gave complimentary responses because they enjoyed the freedom of hunting where permission from the landowner was not required. When the habitat looked "gamey" or where it had been improved with food patches, brush piles, or bulldozed strips, hunters were apt to feel lack of success was due to their poor luck, to bad weather, or some other factor beyond the state's or their control.

Voluntary letters received

At the end of the questionnaire a statement invited the respondent to make additional comments. Several hundred of them jotted a few words along the margins, and 265 took the time to write separate letters. Comments covered a multitude of subjects. The contents of 121 letters had responses which could be classified as "for" or "against" various conservation issues (Table 31). The remaining 144 could not be so classified, and contained a variety of comments.

Telephone survey of non-respondents

In a mail survey it is hoped that all questionnaire will be returned. This rarely happens when sample size is large. But the higher the rate of return, the less the chance of making erroneous assumptions

Table 31. Conservation issues discussed in 121 voluntary letters received from hunters who had responded to a mail questionnaire.

Issue	For	Against
Shooting of antlerless deer	9	21
More predator control (but no mention of bounty)	13	0
Longer small game season	7	6
Increase hunting and fishing fees	5	7
Improve habitat on state-owned lands	9	2
More law enforcement	11	0
Introduce new game species; live-trap and move game	8	0
Fox bounty	3	2
Allow Sunday hunting in all counties	3	0
Longer archery deer season	3	0
Artificial feeding of deer	3	0
Miscellaneous	9	0

due to bias between respondents and non-respondents.

I decided to contact a portion of the 654 non-respondents by telephone, and by asking 6 socio-economic questions I hoped to ascertain whether they differed from the respondents in one or more ways. The questions pertained to income, race, education, marital status, occupation and whether or not the person was a rural or urban resident.

I arbitrarily decided to try to complete 100 interviews. The number of names and numbers needed was not known. With no previous data, I decided to draw 225 names at random. Using directories filed in the Lansing Public Library, 109 listings were found.

Station-to-station calls were placed between 7 and 9 p.m. It was felt that this was the best time to reach most hunters, and reduced rates were in effect then too. Information was obtained from relatives or friends who could answer the questions when the hunter himself could not be reached. When an interview could not be completed on the first call, one later attempt was made. An interviewing schedule and recording form was used and appears as Appendix XI. Following are basic data obtained:

Telephone listings located (interviews attempted) 109

Contacts made..... 70

Interviews completed 53

The 56 calls attempted in which interviews were not completed included the following:

No contact made even after two tries (included 12 busy signals.. 23

Correct person reached but was not a hunter 13

Contact made but to wrong person (number changes, etc.) 16

Telephone had been disconnected 4

In three characteristics there appeared to be differences between respondents and non-respondents. About 70 per cent of the non-respondents contacted by telephone lived in urban areas, compared to about 40 per cent of the respondents, (Appendix XII-A). Urban residents apparently were less apt to respond to the mail questionnaire.

Married hunters seemed to disregard the mail questionnaire more also. They represented almost 90 per cent of the non-respondents compared to 80 per cent of the respondents, (Appendix XII-B).

And finally, negroes were better represented among the non-respondents (7.8%) than they were among the respondents (2.8%), (Appendix XII-C).

There did not appear to be significant differences between the two groups in average education levels, incomes and occupation classes, (Appendices XII-D, and XIII-A,B).

Surveys

A survey of the public use of state-owned lands should be made periodically. Changes in the intensity of use or other distribution patterns would be readily recognized. If possible, sample size should be increased however, justifying area to area comparisons. Also, better hunting statistics would be obtained.

New methods should be tried during the spring and summer. Perhaps by adding one more count of cars during the evening twilight hours (making a total of four counts) the car-count method would be more satisfactory at this season. The use of traffic counters placed at strategic or random locations should be explored, as should the use of aircraft in searching for parked cars on pre-selected transects.

Characteristics of hunters

Because of the population explosion in recent years state-lands have been and will continue to be increasingly used. It will be necessary to purchase additional lands whenever and whereever they are available. Information presented in this report indicate that most hunting is done relatively close to the hunter's home. Thus, top priority for land purchases should be given areas near population centers. The most critical need, quite obviously, is in the southeast where about half of the southern Michigan people live. However, Game Areas are managed primarily for hunters and are kept undeveloped as much as possible. Near large cities conflicts between hunters and other day-users arise. It is necessary to establish Game Areas near population centers, but yet distant enough to reduce pressure from other intensive-type users. In other words compromise

is needed. Possibly the central "Thumb" area is the best area in which to establish or enlarge Game Areas for several reasons. Detroit-area residents already tend to hunt there, and the area is also very accessible to Flint and Saginaw. Also the geographic position of the "Thumb" in relation to other parts of Michigan and Ontario is such that there is probably little likelihood that land use changes resulting from population will develop there in the near future. Thus, new Game Area lands purchased in the "Thumb", particularly in Lapeer, Tuscola and Sanilac counties would be subjected to less competition from other intensive-type users than other areas in the region. The hunter would be getting maximum benefit from his investment.

Finally, additional surveys of public opinion, attitudes and motivation are needed. Data presented here are largely and admittedly descriptive. And they describe one important group of hunters only--those people who hunted on southern Michigan state land. Information of this nature for all Michigan hunters would be more applicable and would give more meaning to the data in this report.

SUMMARY

1. During the 1961-62 hunting season the total visitor-use of southern Michigan State Game and Recreation Areas furnished about one million man-hours of daytime use. About 96 per cent was for hunting purposes.
2. Hunting pressure in 1961-62 was about 60 per cent greater than in 1955-56 as measured on a sub-group of 27 Game Areas.
3. Visitor-use during daylight hours in hunting season was almost 20 per cent greater than during spring and summer 1962 but if after dark activities were included the spring and summer use would probably greatly exceed the other.
4. Between 1955-56 and 1961-62 the game kill increased 17 per cent, but the kill per 100 hours and per 100 acres did not change significantly.
5. Species composition has shown a decided shift toward forest game.
6. An estimated 47,970 people hunted on southern Michigan state-owned lands in 1961-62 and averaged 8.4 days afield--probably more than average.
7. These hunters were characterized by being 98 per cent males; averaged 39.3 years of age. About 80 per cent were married and 94.4 were white although evidence indicated this percentage, as reported on mail questionnaires may have been low. Most hunters earned middle class incomes. The professions and managers occupation class was relatively poorly represented. Eighty per cent of the gainfully employed worked more than 31 hours per week. The average level of formal education was just below grade 11.
8. Two types of southern Michigan residents had considerable difficulty

gaining permission to hunt on private land; the Detroit resident and the negro.

9. The percentage of total game harvested by age classes of hunters was similar to the percentage of hunters in that age class except for hunters in age classes 25-34 and 35-44 who seemed to harvest more ducks and pheasants and age class 45-54 who took proportionately more ruffed grouse. Hunters older than 65 years took less than their share of all game.
10. The most heavily hunted game and recreation areas, season-long, were not necessarily located near population centers.
11. Hunters tended to hunt relatively close to home--an average of 28 airline miles, one way. Detroit area hunters traveled significantly greater distances than did out-state residents.
12. The presence of state lands and also the proportion of urban-dwelling people within a county both influenced the distribution of hunters by county.
13. About 40 per cent of the hunters lived in rural areas compared to about 25 per cent of male residents of southern Michigan.
14. Sixty per cent of all hunters had lived some of their first 18 years on a farm or in the country. The percentage was highest among the oldest hunters (72%) and lowest among the youngest (50%).
15. Types of refusals given by farmers when asked permission to hunt were listed. Almost 40 per cent of them involved crop or property damage. Slightly fewer farmers (34.6%) said they did not let strangers hunt, but saved the right for friends and relatives.
16. Hunters' opinions of state-owned areas were summarized. Most hunters thought they were "fair" for hunting. Almost equal numbers thought

they were good and excellent as poor and very poor.

17. Various opinions of state lands are summarized.

18. The most popular conservation issues as discussed in voluntary letters accompanying questionnaires returned are listed.

19. Results of sampling a segment of the non-respondents by telephone interviewing suggested that people in certain socio-economic and ethnic groups responded differently to mail questionnaires than they did by telephone.

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Appendix I-A. Form used to record information while conducting field checks.

GAME AREA USE SURVEY

Date__________________ Weather____________________________________ Checker______________

Game or Recreation Area____

Trip #1 Starting time________ Ending time________		Trip #2 Starting time________ Ending time________		Trip #3 Starting time________ Ending time________	
Card Number	Car License	Card Number	Car License	Card Number	Car License
Tally of Moving Cars		Tally of Moving Cars		Tally of Moving Cars	
Remarks:		Remarks:		Remarks:	

TO: Assigned Game Division Personnel

FROM: Walter L. Palmer, Game Biologist

SUBJECT: Instructions for Conducting Game Area Use Survey

This survey is based on a random selection of areas by day of the seaon and each area or part of areas was previously stratified into one of nine strata of estimated use. Therefore, it is absolutely essential that the areas chosen for checking must be checked on the assigned day despite what you might expect in the way of use.

Please mail your material immediately after the checks (that evening or the following morning at the latest) to:

Rose Lake Wildlife Research Center
Route 1, East Lansing, Michigan

INSTRUCTIONS

1. Make three trips around your area or portion of the area assigned for the day. These trips should be made during mid-morning, mid-day, and late afternoon. Do your best to "cover" all possible parking places on the area, but we don't want you to spend a lot of needless time searching out each last trail and thereby miss hot spots such as lakes, etc.

2. Place one of the self-addressed post cards under the windshield wiper of each parked car on your area. Write the car license number in the upper right corner of the post card.

3. Record the post card number and the car license number in the appropriate trip column. On second and third trips be sure to record all cars on the area even though you tallied them before. This is the only way we can compute car-hours of use.

4. At the botton of each trip column keep a tally by trips of the number of cars you see "cruising" the area which you feel are using the area for recreation (sight-seers, etc.). Don't bother to record license number of these moving cars, however.

5. We suspect there will be alot of use this spring and summer which won't be from parked cars -- such users as a large group of boy scouts, horseback riding, etc. Try to estimate this use each day you run a check and include such a statement along with your data sheets.

6. Notice that we don't need a mid-point time now. Just note the starting and ending time of each "Trip."

7. Write plainly!

Thanks.

Appendix I-B. Reverse side of form, including instructions.

TO: Assigned Game Division Personnel

FROM: Walter L. Palmer, Game Biologist

SUBJECT: Instructions for Conducting Game Area Use Survey

This survey is based on a random selection of areas by day of the seaon and each area or part of areas was previously stratified into one of nine strata of estimated use. Therefore, it is absolutely essential that the areas chosen for checking must be checked on the assigned day despite what you might expect in the way of use.

Please mail your material immediately after the checks (that evening or the following morning at the latest) to:

Rose Lake Wildlife Research Center
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INSTRUCTIONS

1. Make three trips around your area or portion of the area assigned for the day. These trips should be made during mid-morning, mid-day, and late afternoon. Do your best to "cover" all possible parking places on the area, but we don't want you to spend a lot of needless time searching out each last trail and thereby miss hot spots such as lakes, etc.

2. Place one of the self-addressed post cards under the windshield wiper of each parked car on your area. Write the car license number in the upper right corner of the post card.

3. Record the post card number and the car license number in the appropriate trip column. On second and third trips be sure to record all cars on the area even though you tallied them before. This is the only way we can compute car-hours of use.

4. At the botton of each trip column keep a tally by trips of the number of cars you see "cruising" the area which you feel are using the area for recreation (sight-seers, etc.). Don't bother to record license number of these moving cars, however.

5. We suspect there will be alot of use this spring and summer which won't be from parked cars -- such users as a large group of boy scouts, horseback riding, etc. Try to estimate this use each day you run a check and include such a statement along with your data sheets.

6. Notice that we don't need a mid-point time now. Just note the starting and ending time of each "Trip."

7. Write plainly!

Thanks.

GAME AREA USE SURVEY

Date____________ Weather____________ Checker____________

Game or Recreation Area____________

Trip #1 Starting time______ Ending time______		Trip #2 Starting time______ Ending time______		Trip #3 Starting time______ Ending time______	
Card Number	Car License	Card Number	Car License	Card Number	Car License
Tally of Moving Cars		Tally of Moving Cars		Tally of Moving Cars	
Remarks:		Remarks:		Remarks:	

Appendix II. Letter placed on car windshields asking hunters' cooperation.

Dear Mr. Hunter:

This letter and self-addressed post card has been left on your car by a field representative. We would like you to fill out the post card and drop it in a mail box on your way home.

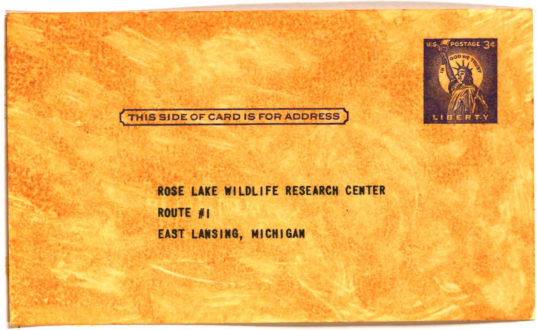
We spot check all of the game areas in southern Michigan and information received from several thousand hunters helps us evaluate the many game management practices that are being carried on.

For this survey to work we need your help. Please fill in and mail the card, EVEN IF YOU DIDN'T BAG ANY GAME.

Very truly yours,

GAME DIVISION
Department of Conservation

Appendix III. Pre-addressed postcard forms distributed on parked cars used during hunting season and spring and summer.



Number of hunters in party _____

Length of hunt in hours (to the nearest ½ hour) _____

What game were you hunting? Upland Game_____ Waterfowl_____ Deer_____

Number of animals bagged by the party:

Pheasant_____ Woodcock_____

Ruffed Grouse____ Ducks_____

Fox Squirrel_____ Geese_____

Rabbit_____ Deer_____

Other(Write in)_____

2967

Thank you

Appendix IV. Daily estimates of visitor use in man-hours as determined from car-counts and postcard returns by strata, with stratum means and variances for the hunting season survey, 1961-62.

Daily estimates of visitor use in man-hours as determined from car-counts and the number of occupants per car by strata, with stratum means and variances.

STRATUM

I	II	III	IV	V	VI	VII	VIII	IX
21.88	52.88	247.76	29.85	194.70	651.15	55.80	518.96	87.69
2.25	23.87	150.36	75.19	133.85	204.74	224.79	348.88	204.00
17.72	31.13	260.61	52.97	378.23	421.79	328.24	176.50	218.39
15.10	47.76	697.21	247.81	433.27	491.83	479.30		914.82
91.95	72.25	104.41	400.99	409.30	93.95	154.79		895.59
8.42	55.08	141.20	319.27	364.64	104.10			
52.73	148.11	372.81	417.23	256.38	120.49			
40.40	66.15	595.00	816.86	281.60	373.52			
15.75	95.56	4.75	264.39	91.41	296.07			
65.25	72.76	11.88	345.17	55.53	671.64			
2.42	32.38	22.00	422.73	52.00	818.62			
56.55	39.20	39.98	86.21	177.32	181.72			
26.46	92.46		157.73	1168.96				
51.50	148.06		351.90	776.30				
2.00	324.21		147.22	47.63				
0	35.34		259.70	758.07				
43.13	100.25		211.97	539.48				
54.16	95.00		217.07	744.42				
40.88	57.63		23.50	203.70				
0	11.45		398.98	346.48				
13.76	100.78		148.05	213.65				
112.50	117.77		103.86	802.70				
20.00	70.49		438.25	762.43				
189.74	60.53		272.29					
27.97	149.09		142.59					
69.75	21.28		104.86					
15.75	602.18		296.68					
9.38	158.24		102.56					

STRATUM (Continued)

I	II	III	IV	V	VI	VII	VIII	IX
8.06	63.82		286.56					
10.00	95.44		276.14					
96.96	24.38		222.06					
47.47	496.40		149.85					
25.75	304.83		73.31					
1.50	73.24		29.59					
5.67	193.50		32.33					
5.25	113.43		112.49					
20.00	121.58							
4.50	688.39							
0	232.93							
217.15	1.50							
114.15	17.50							
0	4.88							
0	85.72							
30.62	0							
13.50	6.46							
14.58	0							
0	0							
0	6.13							
4.75	20.25							
32.50	9.50							
5.79	434.80							
47.92								
0								
0								
9.25								
10.69								

	n	$\bar{x}$	Σx	Σx^2	s^2
I	56	32.03	1793.75	164874.1475	1589.4198
II	51	115.32	5881.57	1810724.9595	22648.6696
III	12	220.71	2648.47	1164260.3949	52702.5109
IV	40	209.25	8369.93	2761873.2685	25909.7452
V	23	400.89	9220.55	5715894.1777	91792.5172
VI	12	369.14	4429.62	2301335.3834	66564.3277
VII	5	248.58	1242.92	415074.1158	26526.0226
VIII	3	348.11	1044.34	422188.9960	29320.1537
IX	5	464.10	2320.49	1735976.8087	164760.5102

Appendix V. Daily estimates of visitor use in car-hours from car-counts by strata with stratum means and variances. Spring and summer, 1962.

Daily estimates of visitor use in car-hours as determined from car counts, spring and summer, 1962 survey of 27 Game Areas.

Stratum

I	II	II(Cont.)	III	IV	V	VI
17.50	90.13	58.63	5.37	28.00	85.50	84.25
5.63	34.03	8.38	78.66	4.13	152.25	341.25
37.63	31.83	12.00	37.00	30.67	88.96	90.25
19.50	33.57	2.92	59.29	90.92	103.50	62.25
21.25	10.46	0	49.58	101.67	50.00	229.25
0	15.00	129.38	2.71	119.44	56.77	26.92
0	0	13.50	4.67	2.25	80.37	114.27
0	7.58	18.76	6.00	79.00	6.76	120.54
4.00	19.63	3.00	2.75	29.81	313.25	78.83
37.34	0	44.07	10.64	95.80	105.67	25.38
0	16.50	24.62	61.75	38.57	7.75	118.21
57.04	0	57.67	7.50	58.63	35.84	
18.25	3.37	3.13	11.08	14.75	18.54	
25.25	0	55.23	7.79	7.08	63.00	
16.34	6.58	17.23	26.88	79.34	151.16	
0	29.70	6.42	62.00	0	28.92	
0	0	12.12	32.46	22.70	24.50	
12.00	0		18.59	149.04	468.09	
0	9.00		147.71	43.29	0	
10.21	41.83		39.00	2.00	448.63	
0	0		30.00	161.25	119.96	
0	11.50		0	24.38	33.42	
10.75	7.00		16.50	64.00	0	
	86.50		125.17	22.96	5.46	
	19.00		80.25	7.00	152.75	
	47.75		101.50	7.00		
	14.33		32.16	6.54	I	
	7.25		90.51	34.81		
	107.43		17.59	167.50		
	12.50		9.88	199.50		
	3.42		39.98			
	27.04		171.88			
	8.00		121.50			
	0		25.38			
	32.67		2.71			
	7.75		92.90			
	10.25					
	3.50					
	10.59					
	3.00					

	n	$\bar{x}$	x	x^2	s^2
I	23	12.73	292.69	8851.0407	233.02
II	57	21.71	1237.48	70118.4568	772.37
III	36	45.26	1629.42	145509.0700	2050.25
IV	30	58.07	1742.11	193016.6800	3167.30
V	25	104.04	2601.05	659826.0800	16216.99
VI	9	143.49	1291.40	255612.6000	8788.88

Appendix VI. Letter sent with mail questionnaire containing a brief explanation of the study and an appeal for cooperation

STATE OF MICHIGAN

DEPARTMENT OF CONSERVATION

LANSING 26

GERALD E. EDDY, DIRECTOR

GAYLORD A. WALKER, CHIEF DEPUTY DIRECTOR

Rose Lake Wildlife Research Center
Route 1, East Lansing, Michigan

Dear Sir:

Since your car was counted this hunting season on one of our southern Michigan Game or Recreation Areas, we would like you to cooperate with us by filling in the accompanying questionnaire. If someone used your car on the day or days it was tallied (and a post card form was placed on the car), would you please have that person complete the questionnaire.

As our population grows, we will need to plan more and more for future recreation needs. For example, it is becoming more difficult for hunters to find a place to hunt. From some of the answers here we hope to learn more about this problem and ways to solve it. Your answers will be put together with answers from thousands of other hunters that we are sampling.

Some of the questions in the questionnaire may not seem important to you, but because people's needs, habits, and opinions are different depending on age, occupation, and other factors, we need to know a few facts of this kind about you.

Please notice that this questionnaire does not call for your signature. Your answers are strictly confidential, and we never mention the names of people questioned.

Your car license number appears on the first page, and will be used to determine whether or not you have returned your questionnaire, so that follow-up notices can be sent if necessary.

Please fill in the questionnaire promptly, place it in the stamped addressed envelope, and mail it.

If you have any comments, please write them on a separate sheet and enclose with the questionnaire.

Thank you

Walter L. Palmer, Game Biologist
Rose Lake Wildlife Research Center

WLP:dew

Appendix VII. Reminder letter sent with second and third mailing of the questionnaire.

STATE OF MICHIGAN
JOHN B. SWAINSON, GOVERNOR

DEPARTMENT OF CONSERVATION
LANSING 26
GERALD E. EDDY, DIRECTOR
GAYLORD A. WALKER, CHIEF DEPUTY DIRECTOR

Rose Lake Wildlife Research Center
Route 1, East Lansing, Michigan

Dear Sir:

A short time ago we sent you a questionnaire which we wanted you to fill out and send back to us. Perhaps you mislaid it or forgot to complete it.

At any rate, we have not received your questionnaire as yet and would like to remind you of the importance of sending this in.

We are trying to gather information about people who have used our public lands in southern Michigan so we can adapt our land buying and management programs to better fit your desires and needs. It is, of course, impossible to contact all of you people, so we must use a random sample. Because this questionnaire can be sent to only a portion of the total people we tallied on state lands this year, it is very important that we get a completed questionnaire back from each of you.

We are enclosing another questionnaire in case you lost the first one. Would you please fill this one in and return it to us as soon as possible?

Thank you

Walter Palmer, Game Biologist
Rose Lake Wildlife Research Center

WP:bjm

Appendix VIII. Southern Michigan hunter opinion questionnaire.

SOUTHERN MICHIGAN HUNTER
OPINION QUESTIONNAIRE

1. What do you consider to be the most satisfying ways to use your leisure time?

_____

_____

_____

2. How many years have you hunted? _____ years.

3. Did you hunt a year ago? (The 1960-1961 season) _____ Yes _____ No

ALL OF THE REMAINING QUESTIONS PERTAINING TO YOUR HUNTING IN THIS QUESTIONNAIRE ARE ABOUT YOUR HUNTING THIS PAST HUNTING SEASON ONLY (FROM OCT. 1961 TO MAR. 1962)

4. Please place a check in front of the hunting, fishing, and trapping licenses you purchased for the 1961-1962 season.

____ Small Game Hunting License	____ Fishing License	____ Firearm Deer License	____ Bow and Arrow Deer License	
____ Waterfowl Stamp	____ Trout Stamp	____ Bear Stamp	____ Beaver and Otter Trapping License	____ General Trapping

5. On how many days did you hunt this season for the following types of game?

a. I hunted waterfowl (ducks and geese) on _____ days.

b. I hunted deer on _____ days.

c. I hunted upland small game on (pheasant, rabbit, grouse, etc.) _____ days.

Total days hunted _____ days.

6. How many of each kind of game did you bag this hunting season?

_____ Deer	_____ Woodcock
_____ Bear	_____ Ducks
_____ Cottontail Rabbit	_____ Geese
_____ Snowshoe Hare	_____ Snipe
_____ Pheasant	_____ Squirrel (Fox, Gray, Black)
_____ Ruffed Grouse (Patridge)	_____ _____ Other (write in)

7. Of the total number of days you hunted this year, on how many different days did you hunt on a State Game or Recreation Area in Southern Michigan? By southern Michigan we mean south of Highway M 20 which extends from Muskegon to Bay City. You can tell these state lands in this part of the state because they are posted with signs which read "State Game Area - Open to Hunting" or "State Lands - Open to Hunting" or something similar.

   I hunted on state lands in southern Michigan on _____ different days.

8. Please write in the Game or Recreation Areas you hunted on, and the number of days hunted on each. If you don't know the names of these areas, describe where they are located.

   (Sample: I hunted on state lands near Lapeer on 3 days.)

   a. I hunted on state lands near _____ on _____ days.

   b. I hunted on state lands near _____ on _____ days.

   c. I hunted on state lands near _____ on _____ days.

9. Speaking yet only of these state lands in southern Michigan, what do you think of them as a place to hunt? (Check one))

   _____ Excellent _____ Good _____ Fair _____ Poor _____ Very Poor

10. What reasons do you have for your answer in Number 9 above?

SOUTHERN MICHIGAN HUNTER OPINION QUESTIONNAIRE

IN THE FOLLOWING FOUR QUESTIONS WE ARE INTERESTED IN YOUR HUNTING ON PRIVATE LANDS SOUTH OF HIGHWAY M 20 ONLY.

11. If you hunted on private land in this part of the state, in which area or areas did you hunt? Please give the name of the city or town and the number of days hunted at each location.

(Sample: I hunted on private land near Caro on 5 days.)

a. I hunted on private land near _____ on _____ days.

b. I hunted on private land near _____ on _____ days.

c. I hunted on private land near _____ on _____ days.

12. Some people hunt on their own land or land owned by friends or relatives. Others ask permission to hunt on a stranger's land. How many days did you hunt on each type?

a. I hunted on my own land on _____ days.

b. I hunted on relatives, friends, and neighbor's land on _____ days.

c. I hunted on stranger's land on _____ days.

13. How easy or hard was it for you to find a place to hunt? (Check one)

a. I never asked for permission to hunt ☐

b. I found it very easy to get permission to hunt ☐

c. I usually found it easy to get permission to hunt ☐

d. I sometimes found it hard to get permission to hunt ☐

e. I almost always found it hard to get permission to hunt ☐

f. I never got permission to hunt ☐

14. If a landowner would not let you hunt, and he gave a reason, what reasons did he give?

_____

_____

_____

15. What was your date of birth? Month _____ Day _____ Year _____

16. Are you: (Check one) ____ Married ____ Single ____ Divorced ____ Widowed

17. How many dependents do you have at home who are less than 18 years old? _____

18. Check one: a. I live outside the limits of a city, town, or village _____.

b. I live within the limits of a city, town, or village _____.

19. Are You: _____ Negro _____ White _____ Other (Specify) _____

20. What is your occupation? What sort of work do you do? _____

_____

21. About how many hours did you work each week on the average during the past hunting season? (Check one)

____ More than 40 hours per week ____ Between 31 and 40 hours per week ____ Between 21 and 30 hours per week

____ 20 hours per week or less ____ Did not work at all

If you did not work at all, check one: _____ Retired _____ Student

_____ Unemployed _____ Other (write in)

22. Please cross out the highest grade you completed in school.

(none) (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12)

College or other special school in addition to the above. /__/

23. What was the last school you attended? _____

24. Would you please check your approximate income before taxes.

____ Less than $2500 ____ Between $2500-$4999 ____ Between $5000-$7499

____ Between $7500-$9999 ____ More than $10,000

25. Where did you live until you were 18 years old? (Notice that the total should add up to 18 years. We are only interested in your first 18 years.)

a. I lived on a farm or in the country for ____ Years

b. I lived in a small city (less than 5,000 population) for ____ Years

c. I lived in a medium-sized city (5,000-25,000) for ____ Years

d. I lived in a large city (more than 25,000) for ____ Years

Total 18 Years

IF YOU HAVE ANY COMMENTS TO MAKE, PLEASE FEEL FREE TO DO SO.

PLEASE PLACE THIS COMPLETED QUESTIONNAIRE IN THE STAMPED ENVELOPE AND MAIL.

THANK YOU

Appendix IX. Code book prepared for responses.

SOUTHERN MICHIGAN STATE LAND
HUNTER QUESTIONNAIRE
CODE BOOK

Card No. 1

Column Number	Question Number	Punching Instructions
1-4	----	Questionnaires numbered serially in upper right corner.
5	----	Number 1, 2 or 3 below questionnaire number is number of mailing.
6	1 and 3	Questions 1 and 3 combined as follows: 0- No response to questions 1 and 3. 1- Hunting, fishing and related interests, and also a "yes" to question 3. 2- Hunting, fishing and related interests, and a "no" to question 3. 3- No response to question 1 and a "yes" to question 3. 4- No response to question 1 and a "no" to question 3. 5- Hunting, fishing and related interests, and no response whatever to question 3.
7	1 and 3	0- No response to questions 1 and 3. 1- Boating, swimming, travel, water sports, spectator sports.(Outdoor-type activities other than hunting, fishing, etc.) and a "yes" to question 3. 2- Same interests as above but a "no" to question 3.
8	1 and 3	0- No response to questions 1 and 3. 1- "Indoor" or "home-type" interests like carpentry, painting, reading, loafing and a "yes" to question 3 2- Same interests as above plus a "no" to question 3.
9-10	2 (years hunted)	Number of years reported hunting.
11	4 (license data)	Small game license data: 0- No small game license purchased. 1- Small game license. 2- Small game license plus waterfowl stamp.
12	4 (license data)	Fishing license data: 0- No fishing license. 1-Fishing license purchased. 2- Fishing license plus trout stamp. 3- Trout stamp only.

Column Number	Question Number	Punching Instructions
13	4 (License data)	Deer and bear license data: 0-No firearm deer, archery deer or bear stamp purchased. 1-Firearm deer license. 2-Archery deer license. 3-Bear stamp. 4-Firearm deer and archery deer licenses. 5-Firearm deer license and bear stamp. 6-Archery deer license and bear stamp. 7-Firearm deer license, archery deer and bear stamp.
14	4 (License data)	Trapping license data: 0-No trapping licenses purchased. 1-Beaver and otter trapping license. 2-General trapping. 3-Beaver and otter and general trapping.
15-16	5	Number of days reported hunting waterfowl.
17-18	5	Number of days reported hunting deer.
19-20	5	Number of days reported hunting upland small game.
21	6 (Hunting) (success)	0-Failed to bag deer or bear. 1-Bagged deer. 2-Bagged bear. 3-Bagged deer and bear.
22	6	0-Bagged no small game. 1-Bagged at least 1 piece of small game.
23-24	7 (Days hunted)	Punch number of days hunted in southern Michigan.
25-26	8a (State land)	Areas will be coded 1-57; punch number
27-28	8b	Punch code number
29-30	8c	" " "
31-32	8a	Distance traveled from respondents home town (arbitrary geographic center) to area as stated in question 8a.
33-34	8b	Distance as stated in 8b.
35-36	8c	Distance as stated in 8c.
37-38	8a	Number of days reported in question 8a.
39-40	8b	" " " " " " 8b.
41-42	8c	" " " " " " 8c.
43	9 (Opinion of Game or Recreation Areas)	0-No response to question. 1-Excellent. 2-Good. 3-Fair. 4-Poor. 5-Very poor.
44	10 (Reason for opinion)	0-No response to question. 1-No game; had poor luck; poor cover, food, no water. 2-Enjoys freedom; don't need to ask for permission; keep up the good work.

Column Number	Question Number	Punching Instructions
		3-Good cover; had good luck; variety of habitat or game available. 4-Too many hunters; over hunted. 5-Irrelevant response. 6-Poor accessibility; no roads. 7-Some areas good, others poor or good one day, bad another. 8-Not qualified to judge.
45-46	11a (Private land)	Distance as stated in 11a
47-48	11b	" " " " 11b
49-50	11c	" " " " 11c
51-52	11a	Days as stated in 11a.
53-54	11b	" " " " 11b.
55-56	11c	" " " " 11c.
57-58	12a	" " " " 12a.
59-60	12b	" " " " 12b
61-62	12c	" " " " 12c.
63	13 (Hunter access)	0-No response to question. 1-Never asked for permission to hunt. 2-Found it very easy to get permission to hunt. 3-Usually found it easy to get permission to hunt. 4-Sometimes found it hard to get permission to hunt. 5-Almost always found it hard to get permission to hunt. 6-Never got permission to hunt.
64	14 (Hunter access) (Farmer's reasons for refusing permission)	0-No response to question. 1-Farmer doesn't let strangers hunt; saves rights for friends or relatives. 2-Fears or has had crop damage. 3-Come back later; too many hunters out already. 4-No game to hunt. 5-Just said "no," no reason given. 6-Crops in field yet. 7-Respondent did not answer question; he volunteered a response regarding how easy it is for him to get permission. 8-Farmer or land owner wanted fee. 9-Farmer or land owner not located or miscellaneous reasons for refusals given.
65-66	15	Age in years.
67	16 and 17 (Marital status)	0-No response to question. 1-Married with 1 dependent less than 18 yrs. 2-Married with 2 dependent less than 18 yrs.

Column Number	Question Number	Punching Instructions
		3-Married with 3 dependent less than 18 yrs. 4-Married with 4 dependent less than 18 yrs. 5-Married with 5 dependents less than 18 yrs. 6-Single. 7-Divorced. 8-Widowed. 9-Married with no dependents less than 18 yrs.
68	18	0-No response to question. 1-Lives outside the limits of a city, town or village. 2-Lives within the limits of a city, town or village.
69	19 (Racial status)	0-No response to question. 1-Negro. 2-White. 3-Other.
70	20 (Occupation)	0-No response to question. 1-Professional, business proprietor. 2-Skilled labor. 3-Semi-or unskilled labor. 4-Farmer. 5-Student. 6-Sales. 7-Miscellaneous office, white collar. 8-Municipal, state or Federal service. 9-Retired.
71	21 (Work week during hunting season)	0-No response. 1-Worked over 40 hours per week. 2- " 31-40 " " " 3- " 21-30 " " " 4-Worked 20 " " " or less. 5-Retired. 6-Student. 7-Unemployed. 8-On vacation all or part of hunting season.
72-73	22 (Education completed)	Punch grade number 1-12. Punch 13 only when schooling listed is by a high school graduate.
74	24 (Income)	0-No response. 1-Earned less than $2500. 2-Earned $2500-$4999. 3-Earned $5000-$7499. 4-Earned $7500-$9999. 5-Earned $10,000 or more.
75-76	25a (Childhood residence)	Punch number of years lived on farm and country.

Column Number	Question Number	Punching Instructions
77-78	25b and 25c (Childhood residence)	Number of years lived in small and medium sized cities.
79-80	25d (Childhood residence)	Number of years lived in large city.

Code for State Game and Recreation Areas in Region 3.

1-Barry
2-Cannonsburg
3-Chelsea
4-Crane Pone
5-Dansville
6-Deford
7-Edmore
8-Erie
9-Fennville
10-Fish Point
11-Flat River
12-Fulton
13-Gourdneck
14-Grand Haven
15-Gratiot-Saginaw
16-Gregory
17-Langston
18-Lapeer
19-Lowell
20-Maple River
21-Middleville
22-Minden City
23-Murphy Lake
24-Oak Grove
25-Onsted
26-Petersburg
27-Pittsford
28-Point Mouillee
29-Port Huron
30-Portland
31-Quanicassee
32-Rogue River
33-St. Clair Flats
34-Sharonville
35-Shiawassee River
36-Stanton
37-Three Rivers
38-Tuscola
39-Vassar
40-Wildfowl Bay
41-Rose Lake
42-Swan Creek
43-Allegan Forest
44-Bald Mountain
45-Brighton
46-Fort Custer
47-Highland
48-Holly
49-Island Lake
50-Metamora
51-Ortonville
52-Pinckney
53-Pontiac Lake
54-Waterloo
55-Proud Lake
56-Rochester-Utica
57-Big Rapids-White Cloud Area

Card Number 2 Column Number	Question	Punching Instructions
1-4	----	Serial number of questionnaire
5		Stratum number
6-7	6 (Game kill)	Number of cottontails bagged
8-9		" " snowshoe hares "
10		" " pheasants "
11-12		" " ruffed grouse "
13-14		" " woodcock "
15-16		" " ducks "
17		" " geese "
18-19		" " snipe "
20-21		" " squirrel "
22-23		County of residence coded as follows: Punch county or region number

1. Berrien	10. Jackson	19. Oakland	28. Ottawa
2. Cass	11. Calhoun	20. Macomb	29. Montcalm
3. St. Joseph	12. Kalamazoo	21. St. Clair	30. Gratiot
4. Branch	13. Van Buren	22. Lapeer	31. Saginaw
5. Hillsdale	14. Allegan	23. Genesee	32. Tuscola
6. Lenawee	15. Barry	24. Shiawassee	33. Sanilac
7. Monroe	16. Eaton	25. Clinton	34. Huron
8. Wayne	17. Ingham	26. Ionia	35. Region 2
9. Washtenaw	18. Livingston	27. Kent	36. Region 1

24	(Home town size)	Size of respondent's home city (1960) 1-More than 100,000 population 2-25,000 to 100,000 " 3-Less than 25,000 "
25-26	11a	County of private land hunting, coded as above 1-36
27-28	11b	County as reported in 11b
29-30	11c	County as reported in 11c

Hypothesis: Hunters from the Detroit area (Wayne, Oakland and Macomb counties) differ from out-state hunters in their reported ability in gaining access to private land.

Response to a question regarding access to private land

		Easy	Hard	Total
Place of residence	Detroit area	391	351	742
	Other area	1171	336	1507
	Total	1562	687	2249

$$\chi^2 = \frac{2249\left(\left|(391)(336) - (1171)(351)\right| - \frac{2249}{2}\right)^2}{(1562)(687)(1507)(742)}$$

$= 145.4 > 6.6$ for 1 d.f. $\therefore$ hypothesis is accepted

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Hypothesis: Negroes and white hunters differ in their reported ability to gain access to private land.

		Race		
		Negro	White	Total
Response to a question regarding access to private land	Easy	24	1459	1483
	Hard	49	615	664
	Total	73	2074	2147

$$\chi^2 = \frac{2147\left(\left|(24)(615) - (49)(1459)\right| - \frac{2147}{2}\right)^2}{(73)(2074)(1483)(664)}$$

$= 44.6 > 6.6$ for 1 d.f. $\therefore$ hypothesis is accepted

Hypothesis: Detroit area white hunters differ from out-state white hunters in their reported ability in gaining access to private lands.

		Responses to a question regarding access to private lands		
		Easy	Hard	Total
Place of residence	Detroit area	377	316	693
	Other area	1162	324	1486
	Total	1539	640	2179

$$X^2 = \frac{2179 \left(\left| (377)(324) - (316)(1162) \right| - \frac{(2179)^2}{2} \right)}{(1539)(640)(1486)(693)}$$

$= 127.9$ which for 1 d.f. > 6.6 $\therefore$ accept hypothesis

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Hypothesis: Residents of cities exceeding 100,000 except Detroit, differ from residents of other areas in their reported ability in gaining access to private lands.

		Responses to a question regarding access to private lands		
		Easy	Hard	Total
Place of residence	Cities 100,000	287	177	464
	Other areas	1262	507	1769
	Total	1549	684	2233

$$X^2 = \frac{2233 \left(\left| (287)(507) - (177)(1262) \right| - \frac{(2233)^2}{2} \right)}{(1549)(684)(1769)(464)}$$

$= 15.1$ which for 1 d.f. > 6.6 $\therefore$ accept hypothesis

Appendix X-E. Data and computations to test the independence between the ability of white hunters from cities over 100,000 except Detroit, and white hunters from other areas in gaining access to private lands.

Hypothesis: No difference existed in the reported ability of white hunters from cities over 100,000 except Detroit and hunters from other areas in gaining access to private lands.

Responses to a question regarding access to private lands

	Easy	Hard	Total
Cities over 100,000	279	140	419
Other areas	1247	497	1744
Total	1526	637	2163

$$X^2 = \frac{\left(\left| (279)(497) - (140)(1247) \right| - \frac{(2163)^2}{2} \right)}{(1526)(637)(1744)(419)}$$

= 3.7 which for 1 d.f. < 6.6 $\therefore$ accept hypothesis

Appendix XI. Form used to conduct telephone interviews

Hunter Motivation Survey
Telephone Interviews Date_____

Interviewer_____

Car License No._____

Did you contact person to whom the original questionnaire was sent? Yes No
If no but the person to whom you talked was able to answer, what was the relationship of this person to the "respondent"?_____

If you are satisfied that the person to whom you are talking can respond, begin the questioning.

1. Did you hunt last hunting season? Yes No

2. (Ask this question only if you got a "yes" to No. 1 above.)
What do you consider to be the most satisfying ways to use your leisure time? (Write in responses as given.)

_____

_____

3. How old are you?_____

4. Are you married or single?_____. If single, have you been divorced or widowed?_____.

5. Do you live inside the limits of a city, town or village or outside the limits of a city, town or village?

6. What is your race? White_____ Negro_____ Other_____

7. What is your occupation? What sort of work do you do?

_____

8. About how many hours, on the average, did you work each week during last hunting season?_____

9. What is the highest grade you completed in school?_____

10. We are interested in where you lived as a child until you were 18 years old.
    a) Were any of your first 18 years spent living on a farm or in the country? If yes, probe for number of years._____years.
    b) Did you spend any of these 18 years living in a city or town less than 25,000 population? If yes, probe for number of years._____years.
    c) Did you live any of this time in a city larger than 25,000 population? If yes, probe for number of years._____years.

11. Thank you Mr. (Mrs.)_____for your cooperation so far. The last question is quite personal and you might not want to answer it. If so, we understand. The information, however, is considered confidential. It has to do with your income. What was your 1962 income before taxes?_____?

Many of the questions we've asked here may seem unrelated to hunting. We believe, however, that information such as this, if compiled from hundreds of people like you, will help us carry on programs better aimed to satisfy you. Thanks for your time and cooperation.

Good-bye.

Appendix XII-A. Percentage of respondents (mail) and non-respondents (telephone) living in urban and rural areas.

	Mail responses	Telephone interviews
Urban	38.8	70.6
Rural	61.2	29.4
	100.0	100.0

Appendix XII-B. Percentage of married and single respondents (mail) and non-respondents (telephone)

	Mail responses	Telephone interviews
Married	80.3	88.5
Single	19.7	11.5
	100.0	100.0

Appendix XII-C Percentage of respondents (mail) and non-respondents (telephone) occurring in three racial classes.

	Mail responses	Telephone interviews
White	94.4	92.2
Negro	2.8	7.8
Other	2.8	0.0
	100.0	100.0

Appendix XII-D Percentage of respondents (mail) and non-respondents (telephone) completing various levels of education.

	Mail responses	Telephone interviews
Grade 6 or less	3.0	4.8
Grade 7-8	21.8	14.3
Grades 9-11	24.9	35.7
Grade 12	27.9	35.7
Education beyond high school	22.4	9.5
	100.0	100.0

Appendix XIII-A. Percentage of respondents (mail) and non-respondents (telephone) occurring in five income groups.

	Respondents	Non-respondents
Less than $2500 per year	9.9	9.4
$2500- $4999	25.4	21.9
$5000- $7499	45.9	46.9
$7500- $9999	13.7	15.6
$10,000 +	5.1	6.3

Appendix XIII-B. Percentage of respondents (mail) and non-respondents (telephone) gainfully employed occurring in 7 occupation classes. Figures in parentheses are numbers of individuals.

Occupation class	Respondents	Non-respondents
Semi-skilled	35.6	36.0 (18)
Skilled	37.2	34.0 (17)
Professional, proprietors	9.7	8.0 (4)
Farmers	3.6	0.0 (0)
Sales workers	4.3	10.0 (5)
Managers, clerical	5.8	2.0 (1)
Service workers	3.8	8.0 (4)