

A SURVEY OF GEORGIA BOW HUNTERS¹

BY

ROBERT L. CROFT

Georgia Game and Fish Commission
Albany, Georgia

Presented at the
Seventeenth Annual Conference of the
Southeastern Association of Game and Fish Commissioners
Hot Springs, Arkansas
October, 1963

INTRODUCTION

This paper represents the activities of sport archery hunters during the 1962-63 hunting season. The data was obtained through a mailed questionnaire with the basic objective being to obtain information concerning the bowman's hunting activities, especially deer hunting in Georgia.

PROCEDURES

The bow and arrow license receipts were used to obtain the mailing list of archery hunters. The bowmen's addresses were typed on gum labels with carbon copies for one follow-up letter and a master mailing list.

The addresses on the mailing list were numbered to match the questionnaire an archer would receive.

Each letter mailed contained an appropriate covering message, a questionnaire (Appendix I), and a business reply envelope. The first letters were mailed one day before the deer season closed. Non-respondents were mailed a follow-up letter twelve days later.

RESULTS AND DISCUSSION

Response

The survey was intended to cover all licensed hunters. However, there were fifty-nine incomplete addresses and sixty-nine license receipts not available when the survey was conducted. This resulted in 532 letters being mailed. Seventy-four were returned by the Post Office, leaving an effective sample size of 458 out of 660 archers.

Cooperating sportsmen returned 95 per cent of the questionnaires after one follow-up letter. The response represents approximately two-thirds of the licensed bow hunters.

Distribution of Bow Hunters

A review of the bowmen's addresses indicated that sport archery hunting seemed to be more popular with persons living in cities, rather than those living in rural areas. Also, over 37 per cent of the licensed bow hunters were from greater metropolitan Atlanta.

Hunting Status

There were 94 per cent or an estimated 620 persons actively hunting one or more species and six per cent or 40 persons were not active during the past season.

Deer

In Table I, the per cent of the bowmen that hunted each species is shown. As anticipated, deer were by far the most popular species hunted, with 87.6 per cent participation.

Other Species

Three other species, while hunted much less, seemed important to archers. Their order of preference and per cent of participation were:

¹ A contribution of the Georgia Federal Aid in Wildlife Research. Project W-37-R.

rabbits, 42 per cent; squirrel, 30 per cent; and feral hogs, 22 per cent. With the exception of turkeys and raccoons, other species listed seem to be of special interest only to small groups of archers.

TABLE I
PER CENT OF THE BOW HUNTERS
THAT HUNTED EACH SPECIES

| Species | Per Cent |
|-----------|----------|
| Deer | 87.56 |
| Rabbit | 42.4 |
| Squirrel | 30.6 |
| Feral Hog | 22.4 |
| Turkey | 13.8 |
| Raccoon | 13.6 |
| Fox | 8.6 |
| Fish | 5.5 |
| Bobcat | 5.1 |
| Quail | 4.8 |
| Opposum | 3.0 |
| Frogs | 3.0 |
| Bear | 1.6 |
| Grouse | 1.6 |
| Crow | .9 |
| Beaver | .7 |
| Ducks | .5 |
| Goat | .2 |
| Skunk | .2 |
| Geese | .2 |
| Muskrat | .2 |
| Pigeon | .2 |
| Dove | .2 |
| Alligator | .2 |

DEER

Deer had been assumed to be the primary species hunted and most of the survey questions were concerned with the Bowmen's deer hunting activities.

Statistics: Since complete coverage was not achieved, it was necessary to estimate the number of persons, days hunted, and deer killed or wounded.

The statistical procedures used are given in Appendix 2, 3, and 4. Confidence intervals were calculated at the 95 per cent range.

There may be some bias in the estimates, since no statistical sampling procedures were followed. However, it is hoped that the high per cent of hunters surveyed would be representative of the total sportsmen. Also when possible, other data is used to substantiate the finds.

Days Hunted: An estimated 578 bow hunters spent approximately $2,839 \pm 146$ days hunting deer. The average number of days hunted was $4.91 \pm .25$ or five days per season.

Relative Distribution of Man-days: The relative distribution of the man-days hunted was classified under three general types: Federal, State, and Counties. There were three Federal and three State managed areas that had archery hunts. There was no special archery "pre-season" hunting in the counties having open deer season. The per cent of the days reported for each classification and area are shown in Table II.

The survey indicated that 1,885 days or 66.4 per cent of the hunting occurred on Federal managed areas. State managed archery hunts accounted for 511 days or 18 per cent of the hunting. A \$5.00 permit fee probably reduced the number of persons using the State areas. The total days hunted on the Federal and State managed areas represented 84.4 per cent of all reported days that deer were hunted.

TABLE II

THE DISTRIBUTION OF THE MAN-DAYS AND PER CENT OF THE HUNTING THAT OCCURRED ON FEDERAL, STATE, AND OTHER AREAS DURING THE 1962-63 DEER HUNTING SEASON

| Classification of Areas Hunted | Man-days Hunted | | Per Cent | |
|--------------------------------------|-----------------|--------------|--------------|--------------|
| | Area | Sub-total | Area | Sub-total |
| Federal: | | 1,885 | | 66.4 |
| Blackbeard Is. NWR | 1,005 | | 35.4 | |
| Piedmont NWR | 485 | | 17.1 | |
| Fort Stewart Mil. Res. | 395 | | 13.9 | |
| State: | | 511 | | 18.0 |
| Clark Hill GMA | 247 | | 8.7 | |
| Lake Russell GMA | 133 | | 4.7 | |
| Blue Ridge GMA | 131 | | 4.6 | |
| County: | | 443 | | 15.6 |
| Counties * | 443 | | 15.6 | |
| TOTALS | 2,839 | 2,839 | 100.0 | 100.0 |

* Too few to separate.

Sportsmen were not asked to specify game managed areas, if hunted, but could give either managed areas or counties. The archers indicated that 443 days or 15.6 per cent of the hunting occurred in the counties. However, there is a possibility that 200 of these days could have been on the managed areas. That is, respondents gave dates and/or counties that coincided with the dates and counties in which the managed hunts were conducted.

Deer Killed: Bow hunters killed an estimated 141 ± 18 deer. Of these, 58 per cent were bucks and 42 per cent were does. The average hunting success was 24.5 per cent, or roughly one deer for every four hunters.

Most hunting seemed to have been on the managed areas, so the total known deer taken during the managed hunts and in the counties would be near the estimated kill. In Table III the known deer killed is given.

Blackbeard Island, one of the most popular areas in the state, has only managed archery hunts. That is, no gun hunting is allowed. There were 125 deer taken during the two six-day seasons (1), which represents 88 per cent of the estimated deer killed by the bow hunters.

The hunting success on the other managed areas having special archery seasons was comparatively poor. Only thirteen deer were taken during these hunts.

Several archers remarked that they had practically no chance of taking a deer during the regular deer season, because of competition with the gun hunters. Only one deer was known to have been taken during the regular deer season.

The total known kill was 139 deer as compared with the estimated kill of 141. The evidence indicates that the estimated kill is probably very close to the actual number of deer killed by bow hunters. At any rate, I would not expect the kill to exceed the upper confidence range of 159 deer.

Deer Wounded: Bow hunters wounded an estimated 111 ± 14 deer. The number of deer wounded should not be taken as crippling losses, because some sportsmen indicated that the deer were only superficially wounded, while others were sure that the deer would die. The range of the deer hit but not recovered by the sportsman varied from one to four.

Effect of Experience: The sportsmen were asked to indicate if they had past experience in hunting deer with the bow and if so, how many of the past four seasons had they hunted deer. Table IV gives the number and per cent of bowmen, the number and per cent of deer killed,

TABLE III
THE KNOWN DEER KILL BY ARCHERY HUNTERS
DURING THE 1962-63 HUNTING SEASON FOR
FEDERAL, STATE AND OTHER AREAS

| Classification of Areas Hunted | Actual Kill | Sub-total |
|--------------------------------------|-------------|------------|
| Federal Managed: | | 182 |
| Blackbeard Is. (1) | 125 | |
| Piedmont (1) | 4 | |
| Fort Stewart (2) | 3 | |
| State Managed: | | 6 |
| Clark Hill | 6 | |
| Lake Russell | 0 | |
| Blue Ridge | 0 | |
| County * | 1 | 1 |
| TOTAL | 139 | 139 |

* Taken from Survey.

and the per cent hunting success of the archers, according to their years of experience.

While there is probably a point where an archer reaches a certain degree of efficiency, the survey did show that with each year of experience, hunting success increased.

Approximately 35.3 per cent of the persons began their bow hunting during the 1962-63 hunting season. They had an average hunting success of 9.7 per cent. The persons reporting either two, three, or four years of experience possibly could have had more experience than indicated, since the survey covered only a limited number of past seasons. The number of hunters declined with each year of experience, while their hunting success increased for each year. The order of success was 23.5, 32 and 38.1 per cent. Persons who have hunted deer for five or more years represented 18.9 per cent of the hunters. They had an average hunting success of 41.7 per cent.

Three and seven-tenths per cent of the hunters indicated that they had past experience in bow hunting, but did not state in which seasons their experience occurred.

While obvious, it should be pointed out that the hunting success appears extremely high as a result of Blackbeard Island.

TABLE IV
THE PER CENT AND NUMBER OF BOWMEN, THE PER CENT
AND NUMBER OF DEER KILLED AND THE PER CENT HUNTING
SUCCESS OF ARCHERS, ACCORDING TO THEIR YEARS OF
EXPERIENCE

| Years of Experience | Hunters | | Kill | | Per Cent Hunting Success |
|---------------------------|------------|--------------|------------|--------------|--------------------------------|
| | Number | Per Cent | Number | Per Cent | |
| 1 | 204 | 35.3 | 20 | 14.2 | 9.7 |
| 2 | 104 | 17.9 | 24 | 17.0 | 23.5 |
| 3 | 76 | 13.2 | 24 | 17.0 | 32.0 |
| 4 | 64 | 11.0 | 24 | 17.0 | 38.1 |
| 5+ | 109 | 18.9 | 46 | 32.6 | 41.7 |
| Unk.* | 21 | 3.7 | 3 | 2.2 | 14.3 |
| TOTAL | 578 | 100.0 | 141 | 100.0 | |

* Indicated past years of bow hunting, but did not show past seasons.

SUMMARY

A mailed survey of archery hunters was conducted during the 1962-63 hunting season. Of the delivered questionnaires, 95 per cent were returned.

The survey showed that 94 per cent of the licensed bow hunters hunted one or more species. The species most important to archers are deer, rabbits, squirrels and feral hogs.

An estimated 578 bow hunters spent 2,839 days to take 141 deer with an average hunting success of 24.5 per cent. Blackbeard Island NWP accounted for 125 of the deer taken. There were 111 deer hit but not recovered by the sportsmen.

Nearly all archery hunting for deer occurred during special managed archery seasons.

As would be expected, the hunting success increased with the hunting experience.

REFERENCES CITED

- (1) Givens, L. S.—Sept. 4, 1963. Letter—Branch of Refuge, Bureau of Sport Fisheries and Wildlife, Atlanta, Georgia.
- (2) Charbonneau, D.—Sept. 9, 1963. Letter—Wildlife Management Unit, Fort Stewart, Georgia.
- (3) Snedecor, G. W. and Cockran, W. G.—1959. Statistical Methods, 5th Edition. The Iowa State College Press, Ames, Iowa. 534pp.

APPENDIX I

Questionnaire Used in Survey GEORGIA ARCHERY REPORT

1. Residence: _____
(county)
2. Did you hunt DEER with the BOW & ARROW?
..... Yes _____ No _____
3. List county(ies) or game management area(s) you hunted deer below. Give days hunted on each.

4. Did you kill a deer? Yes _____ No _____
How many? _____
5. Was it a Buck _____ Doe _____?
6. Did you wound any deer which could not be recovered? Yes _____ No _____ How many _____
7. Have you hunted deer with the BOW & ARROW in past hunting seasons? Yes _____ No _____
8. If Yes, CIRCLE past seasons and indicate kill below.
Season Deer Kill
1961-62 _____
1960-61 _____
1959-60 _____
1958-59 _____
9. Do you hunt other game with the BOW & ARROW?
Yes _____ No _____. If Yes, please list game animals hunted.

APPENDIX II

To estimate the total number of persons (\hat{T}_a) that hunted one or more species the formula:

$$\hat{T}_a = \frac{n_a}{n} \times N \text{ where,}$$

n_a = Number of respondents that hunted one or more species

n = Total number of respondents to questionnaire.

N = Total number of Bow and Arrow Hunting Licenses sold.

$$T_a = \frac{408}{434} \times 660$$

= 620 persons hunting one or more species.

The per cent of the persons ($P_1, P_2, \dots P_n$) that hunted the individual species ($n_1, n_2, n_3, \dots n_n$) was determined by the formula:

$$P_i = \frac{n_i}{n} \times 100 \text{ where,}$$

n_1 = Number of respondents that hunted deer.

$$P_1 = \frac{380}{434} \times 100$$

= 87.56 per cent that hunted deer.

To estimate the number of deer hunters (N_a):

$$N_a = \frac{n_1}{n} \times N$$

$$= \frac{380}{434} \times 660$$

= 578 deer hunters.

APPENDIX III

FREQUENCY DISTRIBUTION OF THE DAYS DEER WERE HUNTED BY ARCHERS. COMPUTATION OF MEAN, STANDARD DEVIATION, AND STANDARD ERROR OF THE MEAN (3)

CLASS INTERVAL, I = 1 DAY G = 5 DAYS

| Class Mark, days | Frequency f | Code Numbers X | Sum of Code Numbers fX | Squares fX ² |
|---------------------|----------------|-------------------|------------------------------|----------------------------|
| 1 | 35 | - 4 | -140 | 560 |
| 2 | 39 | - 3 | -117 | 351 |
| 3 | 54 | - 2 | -108 | 216 |
| 4 | 40 | - 1 | - 40 | 40 |
| 5 | 40 | 0 | 0 | 0 |
| 6 | 64 | 1 | 64 | 64 |
| 7 | 13 | 2 | 26 | 52 |
| 8 | 9 | 3 | 27 | 81 |
| 9 | 5 | 4 | 20 | 80 |
| 10 | 8 | 5 | 40 | 200 |
| 11 | 2 | 6 | 12 | 72 |
| 12 | 7 | 7 | 49 | 343 |
| 13 | 2 | 8 | 16 | 128 |
| 14 | 0 | 9 | 0 | 0 |
| 15 | 3 | 10 | 30 | 300 |
| 16 | 0 | 11 | 0 | 0 |
| 17 | 1 | 12 | 12 | 144 |
| 18 | 2 | 13 | 26 | 338 |
| 19 | 0 | 14 | 0 | 0 |
| 20 | 0 | 15 | 0 | 0 |
| 21 | 0 | 16 | 0 | 0 |
| 22 | 1 | 17 | 17 | 289 |
| 23 | 0 | 18 | 0 | 0 |
| 24 | 1 | 19 | 19 | 361 |
| 25 | 0 | 20 | 0 | 0 |
| 26 | 1 | 21 | 21 | 441 |

n = 327

-405ΣfX²=4,060
+379

ΣfX = -26

ΣfX² = 4,060

ΣfX = -26

I(ΣfX)/n=1 (-26/327)

(ΣfX)²/n = (-26)²/327 = 2.06727

= -.079 days

For code numbers, x² = 4,057.93273

$\bar{x} = G + I(\Sigma fX)/n$

$s^2 = I^2 (x^2)/(n - 1)$

= 5 + (-.079)

= (1)² (4057.93273) /326

= 4.911 days hunted

S s. = /s²/n = /12.44764/327 = .195

= 12.44764

x

s = 3.528

To estimated the total days (\hat{T}_d) deer were hunted:

$\hat{T}_d = (\bar{x}) (N_d)$

= 4.911 X 578

= 2,839 days deer were hunted.

Finite population correction (f.p.c.) for days hunted:

$\frac{n}{N}$ = greater than 10% use correction factor (3).

$$\frac{327}{578} = .565$$

$$\text{f.p.c.} = \sqrt{1 - \phi}$$

$$= \sqrt{1 - \frac{327}{578}}$$

$$= .658$$

Confidence Interval—Finite population:

$$\begin{aligned} \text{mean} \quad u &= \bar{x} \pm t_{.05} \frac{s_x}{x} \sqrt{1 - \phi} \\ &= 4.911 \pm (1.96) (.195) (.658) \\ &= 4.911 \pm .25 \text{ days per hunter} \end{aligned}$$

$$\begin{aligned} \text{Total} \quad T &= \hat{T} \pm t_{.05} \frac{s_x}{x} N \sqrt{1 - \phi} \\ &= 2,839 \pm (.25) (578) \\ &= 2,839 \pm 146 \text{ days hunted.} \end{aligned}$$

APPENDIX IV

Formulae used to estimate the total deer killed (\hat{T}_k) and wounded (\hat{T}_w):

$\hat{T}_k = (\bar{x}) (N_d)$ where,

$$\bar{x} = \frac{\sum_{i=1}^n x_i}{n}$$

\bar{x} = mean deer killed or wounded.

x_i = deer killed or wounded by respondents.

n = number of respondents that hunted deer.

Mean deer killed

$$\bar{x} = 93/380$$

= .2447 deer killed/hunter

Total deer killed

$$\hat{T}_k = (.2447) (578)$$

= 141 deer killed

Mean deer wounded

$$\bar{x} = 73/380$$

= .192 deer wounded/hunter

Total deer wounded

$$\hat{T}_w = (.192) (578)$$

= 111 deer wounded

Formulae used to compute the confidence intervals for the mean and total deer killed or wounded (3):

$$\text{mean} \quad u = \bar{x} \pm t_{.05} \frac{s_x}{x} \sqrt{1 - \phi}$$

$$\text{Total} \quad T = \hat{T} \pm t_{.05} \frac{s_x}{x} N \sqrt{1 - \phi}$$

DATA

| Sample of deer killed | | Sample of deer wounded | |
|---|----------------|---|----------------|
| Number Killed | Number Persons | Number Wounded | Number Persons |
| 1 | 55 | 1 | 57 |
| 2 | 19 | 2 | 6 |
| | | 3 | — |
| | | 4 | 1 |
| Confidence intervals—mean deer killed with finite population correction: | | Confidence intervals—mean deer wounded with finite population correction: | |
| u=.2447 ± (1.96) (.027398) (.585) | | u= ± (1.96) (.0221) (.585) | |
| =.2447 ± .031 deer killed | | =.192 ± .025 deer wounded. | |
| Confidence intervals—total deer killed with finite population correction: | | Confidence interval—total deer wounded with finite population correction: | |
| T=141 ± (.031) (578) | | T=111 ± (.025) (578) | |
| =141 ± 18 deer killed. | | =111 ± 14 deer wounded. | |

OTTER POPULATION STUDY ¹

JIMMIE C. MCDANIEL, *Biologist*
Florida Game and Fresh Water Fish Commission
 Tallahassee, Florida

17TH ANNUAL CONFERENCE
 SOUTHEASTERN ASSOCIATION OF
 GAME AND FISH COMMISSIONERS

Hot Springs, Arkansas
 September 30, October 1-2, 1963

Trapping is one of the oldest occupations found in North America. Otter trapping has always been a profitable phase of business. During the period 1821 to 1906, the Hudson Bay Company collected 890,901 skins of otters, an average of 10,481 for each year. Studies on fur resources in British Columbia showed that the annual income of trappers (skilled) during a six months' period was \$3,000,000, the average trapper \$2,000,-\$10,000. One trapper whose line ran 147.5 miles of stream had an income of \$10,000 in 1943. Otter fur brings a higher price than any other fur in Florida.

Since this business is thriving and is profitable, this study was made to determine whether the statewide otter population is increasing or decreasing, to determine the factors contributing to the population fluctuations, to try to estimate the numbers of animals harvested annually, and to analyze biological data collected. The Florida otter (*Lutra canadensis vaga*) ranges from north Florida as far south as the Everglades.

The Florida Game and Fresh Water Fish Commission has set up regulations for fur dealers. There are four types of licenses that can be purchased. The four categories and the numbers of licenses sold are as follows:

Resident State Fur Dealers or Buyers License \$100.00.
 May advertise, solicit by mail, travel to buy or have agents or buyers.
 Number sold in 1961-62: 10
 Number sold in 1962-63: 5

Resident Local Fur Dealers or Buyers License \$10.00.
 May not advertise, solicit by mail, travel to buy or have agents or buyers.

¹ Credit is given Jim B. Whelan, formerly of the Florida Game and Fresh Water Fish Commission, for the compilation of some of these data.