

MISSOURI CONSERVATION COMMISSION

MISSOURI

CANADA GOOSE STUDIES

Title: Canada Goose Kill Statistics
Swan Lake Public Hunting Area.

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ABSTRACT

The Missouri Conservation Commission met with Bureau of Sports Fisheries and Wildlife representatives to formulate recommendations for the operation of the Swan Lake Public Hunting Area during the 1961 hunting season.

Agreement was reached on a flexible kill formula that would allow a retrieved kill of 20% of a peak concentration of 80,000 or less, plus 40% of all geese over 80,000. With a peak population of 73,600 and using the recommended 20% quota system, our total allowed kill was established at approximately 15,000.

After the quota was established it was important to devise methods of acquiring kill figures as accurately as possible. The shot count method was the first to be tried. Figures on total shots fired and shots fired per goose killed were collected for three days. This method had little value in accurately measuring kill.

On November 6, after 5 days of hunting, state and federal personnel working on the project decided to try a different approach in acquiring kill information.

The Grand River in flood condition inundated many roads and presented us with an opportunity to use the road block system. Road blocks were operated for 7 days. Information was recorded concerning total number of hunters in the car, individual hunter success for the day, where they hunted (whether public or private area), if on private land, whose farm or commercial club did they hunt, whether they hunted from a pit, blind or field, the number of trips made during the season, and their season kill. By transposing this information into algebraic formulas for solving unknowns we were able to acquire reasonably accurate figures on total hunters using private lands and their daily kill.

Total kill for Swan Lake Public Hunting Area and adjacent private lands was 11,766. Adding 2,686 geese that were killed at Fountain Grove Public Use Area and adjacent private lands we arrived at a total kill on the Swan Lake flock of 14,452. This did not include any kill that occurred in the Wakenda and Dalton Cut-off areas in Carroll and Chariton Counties.

61.4% of all hunters on private lands were hunting from pits. 16.1% hunted from blinds and 22.5% hunted from fields. The average size hunting party was 2.4. Hunters using private lands killed an average of .55 geese for the 7-day road block period, while hunters using the public area killed 1.2. For every hunter using the public shooting area there were 3.65 hunters using private lands.

METHODS OF COLLECTING CANADA GOOSE KILL STATISTICS
AT SWAN LAKE PUBLIC HUNTING AREA DURING THE 1961 HUNTING SEASON

A planning meeting was held at Jefferson City with representatives of the Bureau of Sports Fisheries and Wildlife on April 4, 1961. Agreement was reached for operation of the Swan Lake Public Hunting Area, Sumner, Missouri, during the 1961 season.

Recommendations were as follows:

- (1) The kill of Canada geese at Swan Lake should be controlled according to a flexible formula, allowing a retrieved kill of 20% of a peak concentration of 80,000 or less, plus 40% of all geese over 80,000.
- (2) The season would be closed by the Conservation Commission, if necessary, to avoid exceeding the quota; otherwise it would run for the full 70 days.

Accurate estimates of peak populations and private kill became of utmost importance in order to follow the above recommendations. Population estimates depend primarily on aerial inventory of the Swan Lake flock and accurate inventory figures are sometimes difficult to acquire due to weather conditions, feeding activities of the flock, and ease of herding populations into water areas where counts can be taken.

To minimize errors in collecting population numbers, the same observer makes all counts. Thus, if there are errors, whether \pm , they tend to be the same from count to count and season to season.

Another method used to minimize error in counting is to make frequent aerial checks. Additional aerial inventories are made if ground observers indicate a large migration of birds into the area. The same is true if a

migration occurs from the area. Several counts over a short period of time, on the same concentration of birds, increases accuracy of the peak population figures.

Aerial inventory counts in 1961 at Swan Lake National Wildlife Refuge and Fountain Grove Public Use Area were as follows:

Date	Swan Lake Nat'l Wildlife Refuge	Fountain Grove	Totals
Oct. 3, 1961	23,700	1,050	24,750
Oct. 9, 1961	45,025	3,250	48,275
Oct. 16, 1961	64,100	9,500	73,600*
Oct. 20, 1961	67,155	3,800	70,955
Oct. 31, 1961	66,000	4,300	70,300
Nov. 27, 1961	38,000	16,400	54,400
Dec. 4, 1961	42,400	12,500	54,900

*Peak population

We were reasonably certain by October 31 that the peak population had been reached and our kill quota was thereby established. With a peak population of 73,600 and using the recommended 20% quota system, the total allowed kill would fall below 15,000 (14,720).

For the first time since 1955 we experienced a peak population before the season opened. It was now up to the Conservation Commission and Federal Refuge personnel to acquire, as accurately as possible, total kill figures in order to initiate action to close the season if necessary.

Observation stations were established on private shooting areas located to the north of the refuge with the aid of the Commission's Research Staff. Observers at some stations were to record only shots fired in a 3-4

section area. Other observers were posted in areas where high concentrations of hunters were located and were requested to record only number of shots fired to bag a goose.

Figures on total shots fired and shots fired per goose killed were collected for three days. From these we planned to convert total shots to an estimated total outside* kill.

The above method of calculating "private" kill was inadequate for a number of reasons. We found it impossible to acquire an accurate count of shots fired. At times the barrage was so rapid that a total count was little more than a guess. Weather also played havoc with shot counts. On rainy days with low overcast, shots could be heard at a maximum distance of only 1 mile. On clear days with moderate to strong winds shot sound carried 3-4 miles, which made it impossible to separate shots heard on private lands from those on the public shooting area.

It was the concensus of all individuals assisting in the project that this method had little, if any, value in accurately measuring kill. This left us with the alternative of trying another method.

At a meeting of state and federal personnel on November 6, it was decided to set up a road block system to obtain kill information. Beginning on November 8, road blocks were operated at Laclede Junction (Hwys 139 & 36) and at Mendon Junction (Hwys 11 & CC). (See map attached.) At this time the Grand River was in flood condition closing off all other exits. The bulk of all hunting traffic was, therefore, funneled through our road blocks.

*Swan Lake Public Hunting Area referred to as inside; Private lands - outside.

All vehicles carrying hunters were stopped. Information was recorded concerning total number of hunters in the car, individual hunter success for the day, where they hunted (whether public or private area), if on private land whose farm or commercial club did they hunt, whether they hunted from a pit, blind or field, the number of trips made during the season and their season's kill.

Road blocks were operated on November 8-9-10-11-14-16-19. Daily operation schedules were from 8:30 a.m. until 12:00 noon, and from 3:30 p.m. until it was too dark to operate safely. From data collected during the 7-day period we were able to calculate a reasonably accurate kill on private lands.

To understand the mathematics involved let's use the combined data of both the Mendon and Laclede road blocks collected on November 10 (see Table I). A total of 40 Swan Lake public hunters* checked through the road blocks. The total number of public area hunters for November 10 was 131 (Column 5). The total number of private area hunters checking through the road blocks was 117 (Column 2). In order to find the total number of private hunters for the day an algebraic formula in solving for an unknown is used: $40:131::117:X$. X would then equal the total number of private hunters in the sampled area, or 383. To arrive at total kill in the sampled area we need to know individual "private" hunter success. This figure was also obtained at the road blocks. 117 hunters killed 81 geese for a success ratio of .69 (Column 2). To calculate "private" kill we then multiply private hunter numbers by their success ($.69 \times 383 = 264$). The total kill then would be 264 for the sampled area.

*Public hunters - State managed lands. Private hunters - Private lands.

Road block data affords another method of calculating kill. Reported kill can be used instead of number of hunters checking through the road blocks. From totals of both the Mendon and Laclede stations for November 10 (Table I), we set up an algebraic equation similar to that using hunters: $50:153::81:X$. 50 equals total public area kill checked at road blocks; 153 equals total kill on the public area for the day; 81 equals total private kill checked at road blocks. X would then equal 249.

Both federal and state personnel working on the project agreed that approximately 75% of the total outside kill was occurring in the sampled area (see map). This being the case, we then add 25% additional kill for area not sampled ($256 + 85 = 341$). The average of the calculated kill found in Column 3 (Table I) is 256, and 341 is the total outside kill for November 10. Added to the known inside kill, the total kill for the day is 494 (Column 8).

To remove error created by any biases that might occur on a daily basis, data were combined for the 7-day period that road blocks were in operation. The reliability of this data depends on whether the hunter and kill samples taken at the road blocks were random. If the sample was large enough and randomly collected, then the success ratios of public hunters checking through the road blocks should be equivalent to the known success ratio of total hunters using the public hunting area during the same period. Success ratios of public hunters checked at road blocks was 1.2 birds killed per hunter. A known total of 856 public area hunters killed 955 geese for a success ratio of 1.12 birds per hunter during the same period. The difference between road block and actual known success ratios of only .08 ($1.2 - 1.12$) indicates that the sample was random.

When applying number of hunters checked through road blocks to solve for private kill, the results were consistently higher than when using

the kill reported at the road blocks (Column 3, Table I). The reason for this might be a bias that exists in hunter response when asked, "How many geese did you kill today?" A tendency for the hunter to report less geese than were actually killed would be bias enough to cause the difference.

We can set up a theoretical example as follows:

	Swan Lake		Private Areas	
	Public Hunting Area			
	<u>Hunters</u>	<u>Kill</u>	Hunters	Kill
Road block	20	24 (1.2/hunter)*	65	36 (.55/hunter)*
Actual total for day	62	69 (1.11/hunter)		

Ratio Using Hunters

$$20:62::65:X$$

$$X = 201 \text{ private hunters}$$

.55 success ratio for private hunters

$$.55 \times 201 = 110 \text{ total private kill}$$

Ratio Using Kill

$$24:69::36:X$$

$$X = 104 \text{ total private kill}$$

*Ratios taken from combined totals, Table I.

The total hunters checked at road blocks is an accurate figure. We are not certain whether reported kill by the same hunters is accurate. If answers from a few of the 65 private hunters (above example) tended to minimize their kill, then the final results using this method would be lower. Error tends to be lessened by using averages of both methods, but in the final analysis it could make a difference of ± 600 birds on a 15,000 quota.

The most important figures secured from road block data were the private to public kill ratios. Ratios varied from 1.9:1 on November 19,

to 2.6:1 on November 9, for an average of 2.1:1 (Column 7, Table I).

Applying this ratio the total kill at Swan Lake Public Hunting Area and surrounding private lands for 1961 is as follows:

Swan Lake Public Hunting Area kill (Table III)	3,473
Private kill 2.1 x 3,473	7,293
Local resident kill - not checked through road block	<u>1,000</u>
	11,766
Fountain Grove Public Use Area	1,168
Private kill - 1.3* x 1,168	<u>1,518</u>
	2,686
Total kill Swan Lake flock	14,452

This does not include kill that occurred in the Wakenda and Dalton Cut-off areas in southern Carroll and Chariton Counties.

Column 1 and 2, Table I, shows a 3.23 ratio of private to public hunters checking through the road blocks. Multiplying this ratio by the number of hunters using the Swan Lake shooting area we arrive at 2,739 private hunters in our sampled area. Add an additional 386 hunters for unsampled area brings the total private hunters during the road check period to 3,125, or a 3.65 ratio of private to public hunters.

*1.3 ratio private to public kill is an estimate.

The total actual number of public hunters for the 25-day season was 3,626 (Table III). Using the 3.65 ratio the total private hunter segment was 13,235. Success ratio per private hunter was .55. The success ratio times number of private hunters gives us a total private kill of 7,279. This is almost identical with the kill figure using ratio of 2.1 (Column 7, Table I) private to public kill ($2.1 \times 3,473$) or a total public kill of 7,293.

TABLE I

STATISTICS CONCERNING PRIVATE AND PUBLIC HUNTER SUCCESS AT SWAN LA
(Collected at Road Block During the 1961 Se

Road Block & Date	1 Swan Lake Public Hunting Area			2 Private			3 Kill By Ratios	
	Number Hunters	Kill	Per Hunter	Number Hunters	Kill	Per Hunter	A	B
							Using Hunters	Using Kill
Mendon Junc. Nov. 8				103	33	.32		
Laclede Junc. " "	18	29	1.5	92	45	.48		
TOTAL	18	29	1.5	195	78	.40	351	216
Mendon Junc. " 9	30	33	1.1	100	78	.78		
Laclede Junc. " "	13	23	1.7	30	25	.78		
TOTAL	43	56	1.3	130	103	.79	334	320
Mendon Junc. " 10	32	34	1.1	76	42	.55		
Laclede Junc. " "	8	16	2.0	41	39	.95		
TOTAL	40	50	1.2	117	81	.69	264	249
Mendon Junc. " 11	47	43	.9	93	63	.68		
Laclede Junc. " "	9	12	1.3	60	28	.47		
TOTAL	56	55	.9	153	90	.59	287	352
Mendon Junc. " 14	9	18	2.0	29	20	.69		
Laclede Junc. " "	15	21	1.4	65	35	.54		
Hale Junc. " "	19	38	2.0	65	26	.40		
TOTAL	43	77	1.8	159	81	.51	300	205
Laclede Junc. " 16	40	53	1.3	127	69	.54		
TOTAL	40	53	1.3	127	69	.54	180	131
Mendon Junc. " 19	39	27	.7	136	31	.23		
Laclede Junc. " "	18	25	1.4	80	41	.51		
TOTAL	57	52	.9	216	72	.33	179	162
COMBINED TOTALS (Excluding Nov. 8 lack of data)	279	343	1.2	902	496	.55	1544	1419

TABLE II

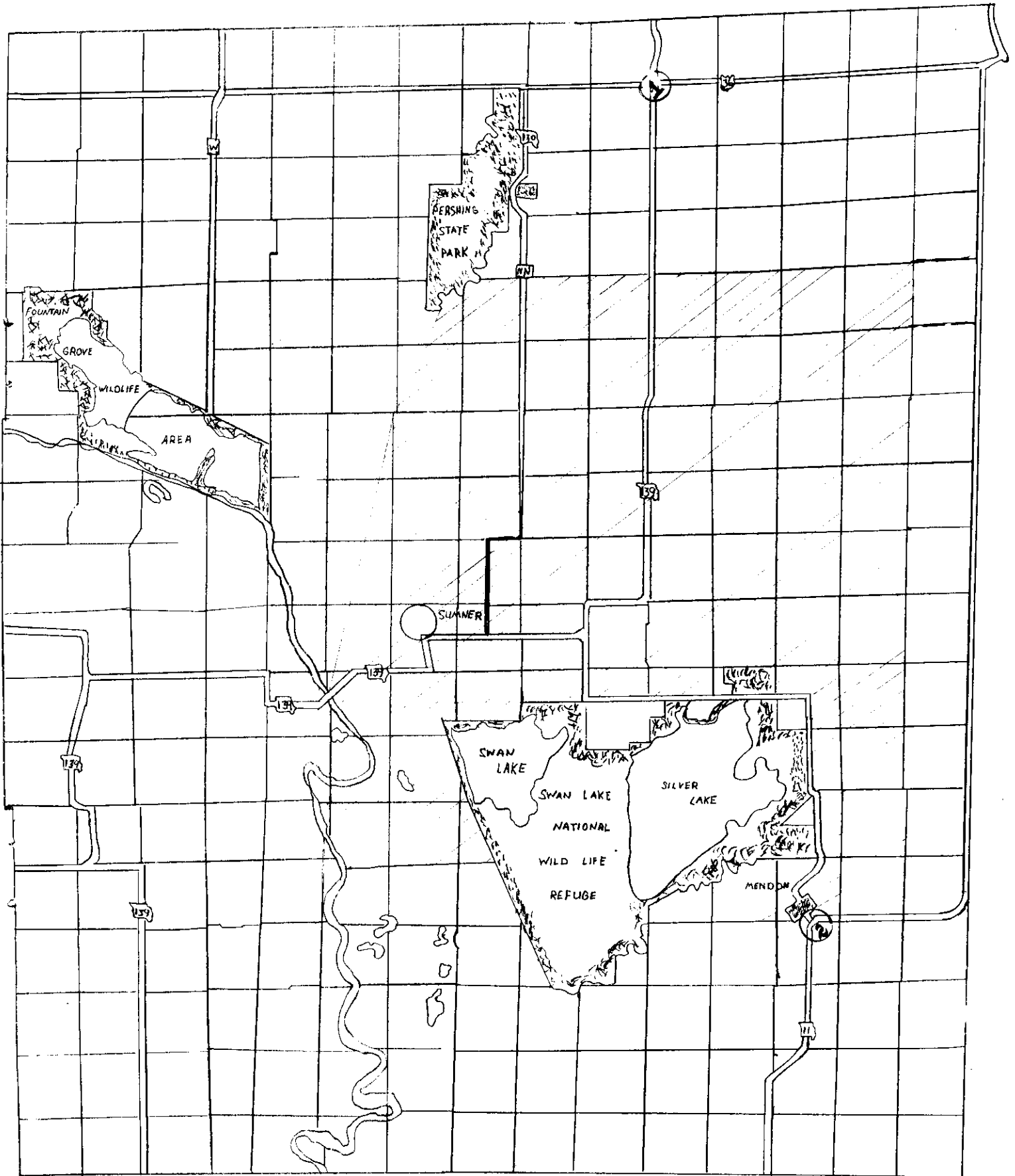
HUNTING STATISTICS COLLECTED AT ROAD BLOCKS
OPERATING AT SWAN LAKE DURING THE 1961 SEASON

Date and Road Block	Private or Public Hunters	Hunted From			Ave. Size Party
		Pit	Blind	Field	
Nov. 8 Mendon	103	23	7	13	2.4
Laclede	110	36	7	10	2.1
Nov. 9 Mendon	130	40	6	7	2.4
Laclede	43	12	3	4	2.0
Nov. 10 Mendon	108	38	4	1	2.5
Laclede	49	10	4	9	2.1
Nov. 11 Mendon	140	33	10	9	2.7
Laclede	69	12	9	10	2.2
Nov. 14 Mendon	38	11	2	3	2.4
Laclede	80	17	5	12	2.3
Nov. 16 Laclede	119	23	10	15	2.5
Totals	989	255	67	93	
Percent hunting from pits				61.4	
" " " blinds				16.1	
" " " fields				22.5	
Average size of hunting party				2.4	

TABLE III
HUNTERS AND KILL AT SWAN LAKE PUBLIC HUNTING AREA
November 1-25, 1961

Date	No. Hunters	Canada Goose Kill
Nov. 1	165	128
2	186	263
3	145	135
4	177	152
5	154	79
6	129	98
7	122	99
8	143	139
9	140	174
10	131	153
11	178	215
12	190	262
13	151	251
14	155	191
15	164	218
16	105	100
17	93	71
18	145	148
19	143	117
20	108	48
21	116	70
22	105	112
23	105	39
24	106	52
25	127	42
TOTALS	3626	3473

SWAN LAKE AREA SHOWING ROAD BLOCK STATIONS AND AREA SAMPLED



① Laclede Junction 139 & 36 Hwys.

② Mendon Junction CC & 11 Hwys.