

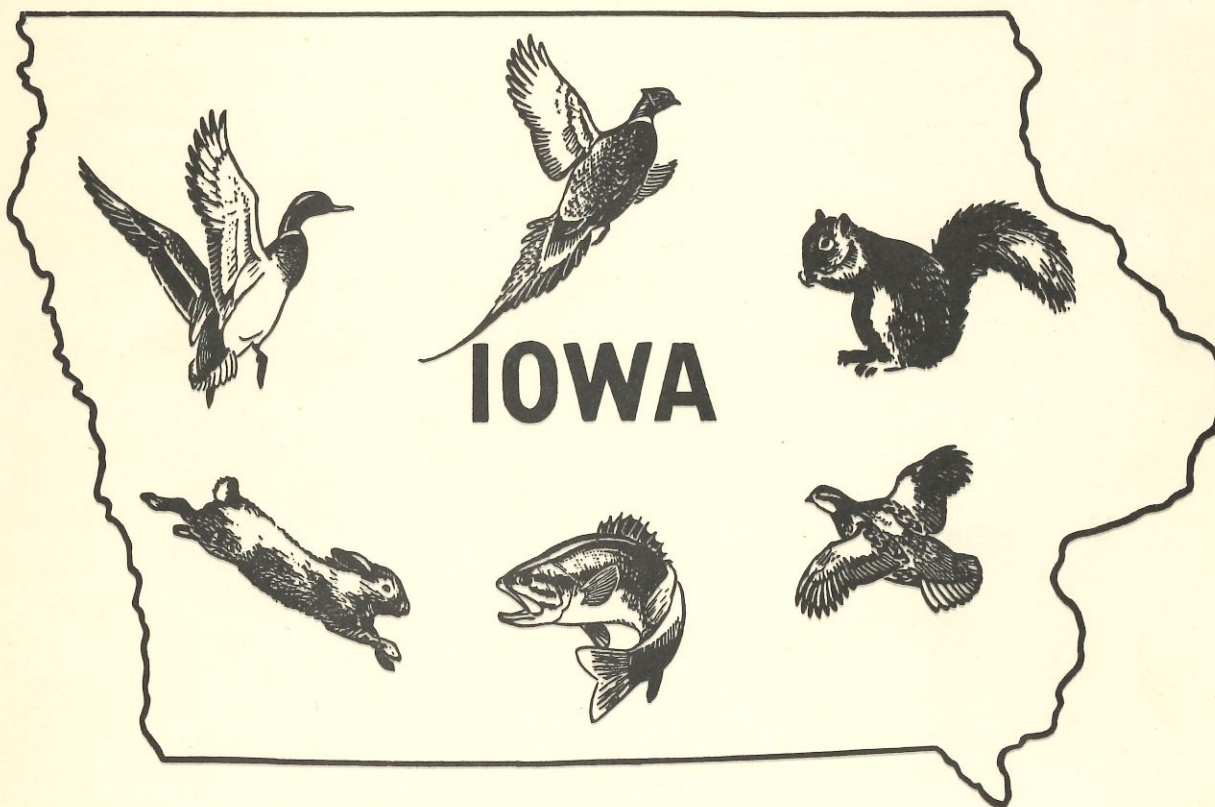
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# QUARTERLY BIOLOGY REPORTS

Jan-Mar 63



FISH AND GAME DIVISION — BIOLOGY SECTION  
STATE CONSERVATION COMMISSION



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## ABSTRACTS OF QUARTERLY BIOLOGY REPORTS

### THE 1962 ANGLER HARVEST AND SUCCESS IN IOWA MAN-MADE LAKES

Jim Mayhew  
Fisheries Biologist

Information on angler catch statistics was obtained by an Conservation Officer field contact census. The lakes were divided into separate groups according to primary purpose. A total of 4,213 people were contacted during the census. These anglers caught 8,253 fish after fishing 5,736 hours. The most contacts were made on state and county recreational lakes, followed by city reservoirs, farm ponds, strip mines and gravel pits. Bullheads were the most frequently caught fish comprising 36 per cent of the total catch. The catch rate varied with individual groups of lakes from 2.2 to 1.1 fish per hour. Mean catch rate for all lakes was 1.5 fish per hour.

### AGE AND GROWTH OF DECATUR LAKE WHITE CRAPPIE, 1962

Bill Welker  
Fisheries Biologist

One hundred and fifty white crappie from 1 through 4 years of age were collected from a Missouri River ox-bow lake during 1962 for an age and growth study. A straight line body-scale relationship with an intercept of 0.40 and a slope of 2.30 fit the data well. The rate of growth appears to be similar to that of white crappie in other Iowa lakes. The length-weight regression had an intercept of -1.544 and a slope of 3.267. The regression coefficient was not significantly different from the cube law. Condition factors varied as the fish increased in total length.

### TROUGH REARING OF YOUNG CHANNEL CATFISH

Ernest Thune and Tom Moen

Trough rearing of young channel catfish was initiated at the Humboldt, Iowa, hatchery in 1947. Routine rearing procedures, as practiced at the Humboldt station, are discussed, including notes on trough size, water flow, trough stocking rates, food and feeding techniques, growth rates, and sanitation. Fingerling production has increased from 4,200 fish in 1947 to 1,400,000 in 1962. A pilot project to evaluate clear water and dry factory prepared meal, as opposed to silt laden river water and a hatchery prepared food, was carried out in 1961. The success of this work prompted a complete change-over to clear water and dry meal as food in 1962.

(This is an abstract of a paper which has been submitted for publication in the Progressive Fish-Culturist.)

## CREEL CENSUS OF DES MOINES AND SKUNK RIVER DRAINAGES, 1962

Harry M. Harrison  
Fisheries Biologist

During 1962, fishermen were contacted on 23 streams in the Des Moines and Skunk River drainages. Three thousand twenty-six anglers were interviewed. They had fished 5,780 hours and caught 2,563 fish at the rate of 0.4+ fish/hour. Channel catfish was the most abundant species in the creel, followed by bullheads, carp, and walleye. A variety of suckers, minnows, sheepshead, flathead catfish, crappie and smallmouth bass were taken in smaller numbers.

## A PRELIMINARY INVESTIGATION INTO THE CAUSE OF THE DECLINE IN THE COMMERCIAL CATCH OF CATFISH IN THE IOWA WATERS OF THE MISSISSIPPI RIVER

Roger Schoumacher  
Fisheries Biologist

Commercial fishing statistics collected by the Iowa Conservation Commission have indicated that the catfish catch has declined since 1960. A letter and questionnaire concerning the catfish fishery were sent to the 390 Iowa fishermen on the river. One hundred twenty-one (31%) responded, most of them saying that they believe there has been a decline in catfish within the last four years. Most respondents said that there have been large numbers of small catfish in the river in the last few years. Pollution and overfishing were cited most often as the cause of the decline. Field investigations will be undertaken this year to collect information on the catfish population structure in various pools of the river.

## NOTES ON THE BIOLOGY OF THE JACKRABBIT IN IOWA \*

Paul D. Kline  
Game Biologist

White-tailed jackrabbits are found throughout Iowa with the exception of a few southeastern counties. Over much of their range they are relatively rare. They appear in greatest abundance on the recently glaciated soils in northern and central counties, and on the Missouri loess soils of the west-central counties. Dry growing seasons seem conducive to hare abundance; populations decline during wet seasons. Jackrabbits provide considerable hunting sport during winter. Their pelts are utilized in felt manufacture and their flesh as a staple food for ranch mink. They are known to eat sprouting corn and soybeans, and occasionally damage shrubs and trees. Probably their value for fur, flesh, and hunting far outweighs damage to agricultural interests. High populations of 114 and 90 jacks per square mile are recorded here. High populations of near 30 jacks per square mile are more common. Average populations over the more favorable portions of their range seem to fall between 5 and 15 per square mile. Average winter weights of 7.5 and 7.9 pounds for males and females, respectively, are recorded. These contrast with spring weights of 6.8 and 8.3. Sex ratios are essentially even. Breeding activity begins during late February during most years but may be delayed by deep snow and cold temperatures in March. Two and possibly three or four litters per year are produced per female. Litters average 3.6 young rabbits each, and range from one to five. Corpora lutea average 5.75 per pregnancy and range from three to eight. A considerable loss of ova is suggested by the data. Papillomas were found on one female jackrabbit. A large uterine tumor was found within another.

\* This paper was presented at the Iowa Academy of Science meeting which was held on April 19, 1963, and will be printed in total in Volume 70 of the Proceedings.

## SEX RATIOS OF PHEASANTS OBSERVED DURING WINTER COUNT - 1963

Richard C. Nomsen  
Game Biologist

Conservation Officers reported a total of 23,002 pheasants during the winter census. The observed sex ratio was 3.0 hens per cock which was equal to the previous 5-year average. Hunters harvested 61 percent of the cocks compared with 64 percent during the 1961 season. Sex ratios were lowest in the western third of Iowa, which indicated a low harvest in this area of the primary pheasant range. Shooting hours permitted each season have more than doubled since 1957 but sex ratios indicate that the percentage of roosters harvested remains about the same.

PROGRESS REPORT ON JEFFERSON COUNTY (FAIRFIELD)  
1961 EXPERIMENTAL STOCKING OF PEN-RAISED RINGNECKED PHEASANTS

Eugene D. Klonglan  
Game Biologist

In late March of 1961, 680 pen-raised pheasants (277 cocks and 403 hens) were stocked at the rate of 100 birds per section in northwestern Jefferson County in southeastern Iowa, an

area practically devoid of pheasants. By March of 1963, 2 years later, this population had decreased to only 8 birds per section (4 cocks and 4 hens) over a 15-section area. Since the pheasant population present on the area before stocking averaged less than 4 birds per section, there is still some tangible evidence of the release. However, prospects for establishing a sizeable pheasant population from this particular stocking of birds certainly is not bright.

## 1962 QUAIL HUNTING SEASON

M. E. Stempel  
Game Biologist

Over much of the Iowa quail range, in 1962, hunters found more quail than in 1961; also the weather favored the gunners in 1962. Best hunting was in counties east of Chariton. Conservation Officers used field contact booklets to record hunting success for 273 average quail shooters who reported on 1,134 man-hours of hunting at the rate of 1.9 hunter-hours per quail compared to 2.1 in 1961. Hunting pressure was heaviest the first 10 days of the shooting season and 77 per cent of those who were contacted did their shooting on Saturday or Sunday. The biologist used field contact cards (of a type discontinued for general use in 1960) to record hunting success of 114 selected quail hunters who said that in 1962, they spent 1.3 party hours per covey flushed. In 1962 it required 1.0 man-hours to bag one quail whereas in 1961 it required 1.1 man-hours. This group continued to do considerable hunting throughout the quail hunting season. Both methods of checking quail hunting results showed that there was better quail hunting in 1962 than in 1961 or 1960. The average success for average hunters was 1.8 for the past 10 years.

## RESULTS OF THE 1962 IOWA GUN SEASON FOR DEER

Eddie W. Mustard  
Game Biologist

The tenth anniversary of our modern series of deer seasons was a record year, with a total deer kill of 5,703 deer. Gun hunters who were licensed accounted for 4,281 of these and had a hunter success ratio of 43.5 per cent: 404 deer were taken by bow permittees and 1,018 deer were harvested by non-permittees (landowners, tenants, etc.). A sex ratio of 113 males:100 females, and an age ratio of 22 fawns:100 adults was reported by the hunters. The age ratio data is thought to be heavily biased. Hunters saw an average of 7.0 deer during the season at the rate of 0.41 deer per hour. Iowa hunters apparently do a reasonably good job of distributing themselves according to the deer populations: correlation values, "r", for 1961 and 1962 were 0.747 and 0.760, using the number of hunters hunting a county and the estimated deer population as variables. Non-permit hunters form an important segment of our deer hunters during the open gun seasons and must be considered when setting the number of permits which will be allowed. In 1962 the non-permit hunters took 24 per cent as many deer as the licensed gun hunters and accounted for 18 per cent of the total hunter deer kill.



## THE 1962 ANGLER HARVEST AND SUCCESS IN IOWA MAN-MADE LAKES

Jim Mayhew  
Fisheries Biologist

Conservation Officers of the State Conservation Commission were supplied with fishermen contact cards for the third consecutive year. As a part of their routine duties the Officers were requested to obtain harvest and catch data from each angler they contacted. These data were used to obtain basic catch statistics on a state-wide basis, and were used primarily to supplement routine fishery inventories.

Since the number of contacts made, time of year, and time of day of contacting anglers is entirely up to the discretion of the individual Officer, these data were again analyzed in their simplest form. It would be impossible to attempt to expand such data into total catch statistics without a stratified sampling base. Catch per unit effort, number of contacts, hours fished, and fish caught are discussed in this paper. The catch of fish was also analyzed only on the major species inhabiting these waters. These were largemouth bass, bluegill, crappie, bullhead, and channel catfish. In a few impoundments green sunfish, flathead catfish, carp, white bass, yellow bass, bowfin, gar, walleye, northern pike, and drum may contribute significantly to the catch, but for the most part they were relatively unimportant to the total catch of fish and were listed in the tables as "others".

The man-made impoundments in southern Iowa can be separated into groups based on primary and secondary purpose. Many of these lakes were constructed principally for recreation; this group includes all state-owned impoundments, County Conservation Board lakes, and several privately owned ponds. Other impoundments are used primarily for municipal and commercial water supply, with recreation a secondary product. There are also countless agricultural ponds, some of which are used exclusively for recreation. Generally, however, they are for multiple purpose such as erosion control, livestock watering, and domestic water supply. The final group consists of abandoned strip mines, gravel pits, and industrial pits that have been stocked by a governmental agency or helpful anglers.

Preliminary analysis of the angler catch data was completed for each different group of impoundments. Further analysis of individual impoundments was also completed and is listed in Table 3, 4, and 5.

### Angler Catch and Harvest - 1962

During 1962, Conservation Officers obtained data from a total of 4,213 fishermen. These people caught 8,258 fish after fishing 5,736 hours (Table 1). The state-owned recreational impoundments were the most frequently visited group and contributed 2,909 contacts. City reservoirs, farm ponds, strip mines and gravel pits followed in importance. Bullheads were the most frequently caught fish comprising 36 per cent of the total catch. They were followed by bluegill (34 per cent), crappie (13 per cent), largemouth bass (8 per cent), channel catfish (1 per cent) and miscellaneous species (8 per cent).

TABLE 1. Angler Harvest and Success in Five Different Types of Iowa Man-made Lakes During 1962

Type of Lake	Total No. Contacts	Total Hours	Total Fish	Fish /Hr.	Bass	B'gill	Crappie	B'Head	C. Cat	Others
Recreational	2,909	4,063	5,656	1.4	363	1,834	883	2,041	29	506
City Reservoir	728	1,063	1,515	1.4	98	432	175	729	38	43
Farm Ponds	288	362	785	2.2	165	441	32	117	9	21
Strip Mines	152	106	113	1.1	12	62	1	6	2	30
Gravel Pits	136	142	189	1.4	29	39	9	104	-	8
Grand Totals	4,213	5,736	8,258	1.5*	667	2,808	1,100	2,997	78	608

\* Figure listed is mean fish per hour instead of a summation.

The rate at which anglers caught fish varied considerably with the different types of impoundments. Farm pond fishermen caught fish at a rate of 2.2 fish per hour. The lowest catch rate, 1.1 fish per hour, was in strip mines. Recreational lakes, municipal reservoirs, and gravel pits had the identical catch rate of 1.4 fish per hour. Mean catch rate for the five different types of impoundments was 1.5 fish per hour.

During 1962 the artificial lakes angler caught fish at a faster rate than the two previous years. The mean catch rate of all impoundments was 1.5 fish per hour in 1962, followed by 1.3 fish per hour in 1960 and 1.2 fish per hour in 1961 (Table 2).

In comparison to the other years that the census was conducted, the bullhead was the most sought after fish. However, in 1962 bluegill increased significantly in the creel and almost equalled the catch of bullheads. Previously the bullhead comprised in excess of 40 per cent of the total catch. Crappie, largemouth bass, and channel catfish remained far below the relative frequency of catch in comparison to the former species.

TABLE 2. A Comparison of Angler Catch and Success During the First 3 Years of Conservation Officer Angler Contacts in Iowa Man-made Lakes

Year	Total No. Contacts	Total Hours	Total Fish	Fish /Hr.	Bass	B'gill	Crappie	B'Head	C. Cat.	Others
1960	4,316	7,901	10,312	1.3	481	3,083	1,929	4,198	80	481
1961	3,836	7,642	8,909	1.2	812	2,325	1,299	3,932	87	459
1962	4,213	5,736	8,258	1.5	667	2,808	1,100	2,997	78	608

## DISCUSSION

The system of obtaining angler catch statistics through routine Conservation Officer contacts has proved to be highly successful during the first 3 years. This information is extremely valuable to the fisheries manager in that it is possible to obtain basic catch data on a large scale basis. This has never been available before.

Over the 3-year period information was received from more than 12,000 artificial lake anglers. Sampling effort has been extremely constant from year to year. The most contacts were made during the first year, but this has varied less than 500 contacts since that time.

It is also interesting to note that in the individual lakes the number of contacts made by Conservation Officers was also relatively constant. As an example, in 1960 a total of 248 contacts was made at Red Haw Lake in Lucas County. During the following two years 171 and 246 fishermen were contacted, respectively. In Thayer Lake in Union County the number of contacts was as follows: 1960, 33; 1961, 28; and 1962, 32. In general those lakes at which a small number of contacts was made the first year tended to remain small in the succeeding years. The only factors that seemed to affect this was a change of Officer or initiation of drastic fish management, such as population manipulation or eradication which undoubtedly would affect angling pressure directly.

Mean catch rate varies only slightly from year to year. Farm ponds have averaged 1.7, 1.4, and 2.2 fish per hour for the three years. Fishing success in the other groups of lakes from the highest to the lowest catch rate was recreational lakes, municipal reservoirs, strip mines, and gravel pits. This catch rate ranged from 0.9 fish per hour to 1.7 fish per hour.

The species composition of the angler harvest has remained the same through the first 3 years of the Officer contact census. Bullheads have always been the most sought after fish in these lakes. Bluegill, crappie, largemouth bass, and channel catfish ranked next in order of importance. In 1962 the bluegill almost equalled the catch of bullhead, and may surpass the latter species in years to come because of their great abundance in Iowa artificial lakes.

Several other observations from the information are of generalized interest. They are as follows:

1. Angling success was better in 1962 in the man-made lakes than any previous year since the Officer contact census began.
2. The census has proved extremely valuable in interpreting fishery inventory results, in that year class abundance that is detected by sampling methods can later be evaluated to their importance in angler harvest.
3. The average fishermen in the Iowa man-made lakes took home about 2.3 fish after fishing 1.5 hours.

TABLE The 1962 Angler Catch and Harvest in Municipal Reservoirs

Lake	Total Contacts	Total Hours	Total Fish	Fish /Hr.	Bass	B'gill	Crappie	B'Head	C. Cat.	Others
Morris	15	27	48	1.7	1	14	27	5		1
Ellis	34	54	265	4.9	3	224	7	23		8
Cedar Lake	17	25	42	1.6	2	29	10	1		
Nodaway	1	2		0				1		1
McKinley	33	63	73	1.1			8	64	1	
Summit	44	72	49	0.7	1			25	12	10
Lions Pond	2	4		.0						
Mt. Ayr	5	10	11	1.1				11		
Lock Ayr	11	22	5	0.2					5	
Diamond	29	26	58	2.2	2	17	35	3		1
Cherry	1	1		.0						
West Lenox	8	15	31	2.0		5		26		
East Lenox	4	7	10	1.4				8	2	
Binder	16	24	24	1.0	2	1	13	8		
U. Albia	37	51	52	1.0		38	1	13		
L. Albia	27	73	52	0.7	2	27		23		
D. Maffit	151	212	58	0.2	9	16	13	8	3	9
Fairfield	8	10	68	6.8		7	38	20	3	
U. Centerville	15	9	23	2.6		15		8		
L. Centerville	6	4	13	3.2		6		4		3
E. Osceola	37	43	156	3.6	30	10	1	106		9
W. Osceola	37	309	477	1.5	46	23	22	373	12	1

TABLE The 1962 Angler Catch and Harvest in Man-Made Recreational Lakes

Lake	Total Contacts	Total Hours	Total Fish	Fish /Hr.	Bass	B'gill	Crappie	B'Head	C. Cat.	Others
Darling	21	23	46	2.0	4	8	6	28		
Williamson	7	4	5	1.4		3		2		
Red Haw	246	470	828	1.8	26	583	137	53	1	28
Allerton	11	6	3	0.5		2		1		
Colyn	12	25	28	1.1	12		11	5		
Keomah	124	104	504	4.8	25	31	44	396	8	
Odessa	37	87	74	0.8		20	29	24	1	
Wapello	110	93	203	2.1	12	68	86	38		1
McBride	17	26	35	1.3		8	7	14		16
Rock Creek	396	827	903	1.2	47	336	70	304	1	145
Pine Lake	261	316	283	0.8	24	29	119	108		7
Nobles Lake	2	4	1	0.2		1				
Bays Branch	316	562	530	0.9	31	38	1	443		17
Geode	120	138	271	1.9	4	80	171	15		1
Nine Eagles	65	55	123	2.4	2	104	12	5		
Lacey-Keo.	12	14	28	2.0	1	8	1	16		2
Fisher	59	34	37	1.0	1	5	1	27	1	2
Arrowhead	40	37	41	1.1	9	16	4	8	1	3
G. Valley	104	230	106	0.5	11	11	30	35	5	46
Thayer	32	49	44	0.9	8		2	5	2	
Walnut Cr.	2	4		0						
Mincer	13	9	26	2.8	1	25				
Peterson	4	3	7	2.3	4	3				
Manawa	104	117	87	0.7	1	31	14	31	1	8
Prairie R.	25	29	144	4.9		1		35		107
Dudgeon	2	1	15	15.0				15		
Union Grove	55	54	120	2.2	5	18	12	85		
Three Fires	41	60	66	1.1	14	2	1	49		
Weise Sl.	2	2	6	3.0				4		2
Muscotine Sl.	8	9	70	7.7				67	1	2
Cone Marsh	2	2	6	3.0				4		2
Willow Sl.	41	103	166	1.6	11			148		7
Sweet Marsh	27	28	43	1.5	2		2	31		8
Hannen	124	86	161	1.5	47	61	8			45
Ahquabi	448	441	615	1.8	61	342	115	45	6	46

TABLE The 1962 Angler Catch and Harvest in Farm Ponds, Strip Mines, and Gravel Pits

Lake	Total Contacts	Total Hours	Total Fish	Fish /Hr.	Bass	B'gill	Crappie	B'Head	C. Cat.	Others
Gravel Pits	136	142	189	1.3	29	39	9	104		8
Farm Ponds	288	236	785	2.1	165	441	32	117	9	21
Strip Mines	152	106	113	1.1	12	62	1	6	2	30

## AGE AND GROWTH OF DECATUR LAKE WHITE CRAPPIE, 1962

Bill Welker  
Fisheries Biologist

### INTRODUCTION

Decatur Lake is a Missouri River ox-bow lake of approximately 900 surface acres located 6 miles west of Onawa, Iowa. This lake was cut off from the Missouri River by a pervious rock and pile levee during 1950. During subsequent spring high water periods large areas of this levee were damaged, thus providing a free flow of water to and from the lake. Considerable siltation decreased the deep water area bordering the river.

Non-game fish compose the major part of the Decatur Lake fish population. Shad, carp, carpsuckers, buffalo and gar are the most numerous. Catfish, white and black crappie, northern pike, walleye and sauger are the most important game fish. During 1962, 150 white crappie were collected from the lake to study their age and growth.

### METHODS

Between May 8, and November 13, 1962, 150 white crappie were collected from the lake by gill net, trap net and electric shocker. After capture, all fish were weighed and measured and scale samples were taken for future study. The scale samples were placed in envelopes and later mounted dry between two glass slides before being read with a microprojector. Twenty-four young-of-the-year white crappie were also collected with a bag seine.

### BODY-SCALE RELATIONSHIP

The anterior scale radius of each scale was marked on a paper strip after it was placed on the microprojector. These strips were arranged in half-inch groups according to total body length and the mean total length of each group was plotted against the mean anterior scale radius for each group. A straight line relationship with an intercept of 0.40 and a slope of 2,300 seem to fit the data well (Figure 1).

### AGE AND GROWTH

A single white crappie taken on May 25 had not yet formed an annulus for 1962. Crappies collected on June 14 had formed an annulus for that year. Apparently annulus formation began prior to June 14 but no collections were made between May 25 and June 14, so a more precise date for the beginning of annulus formation could not be determined. Neal (1962) found the earliest annulus formation of Clear Lake white crappie occurred on June 9, 1960.

Most of the crappies were 1 year old although fish from 0 through 4 years were collected (Table 1). Apparently, the growth rate of the Decatur Lake white crappie (Table 2) is similar to the growth rate of white crappie in other Iowa lakes although none were reported from ox-bow lakes (Carlander, 1950). Hansen (1951) found the mean observed total lengths of white crappie from 1 through 4 years taken from five Illinois lakes to be 7.6, 9.2, 10.5 and 11.8 inches, respectively. These means are from white crappie populations which Hansen considered exhibiting rapid growth. Mean observed total lengths of Decatur Lake white crappie from 1

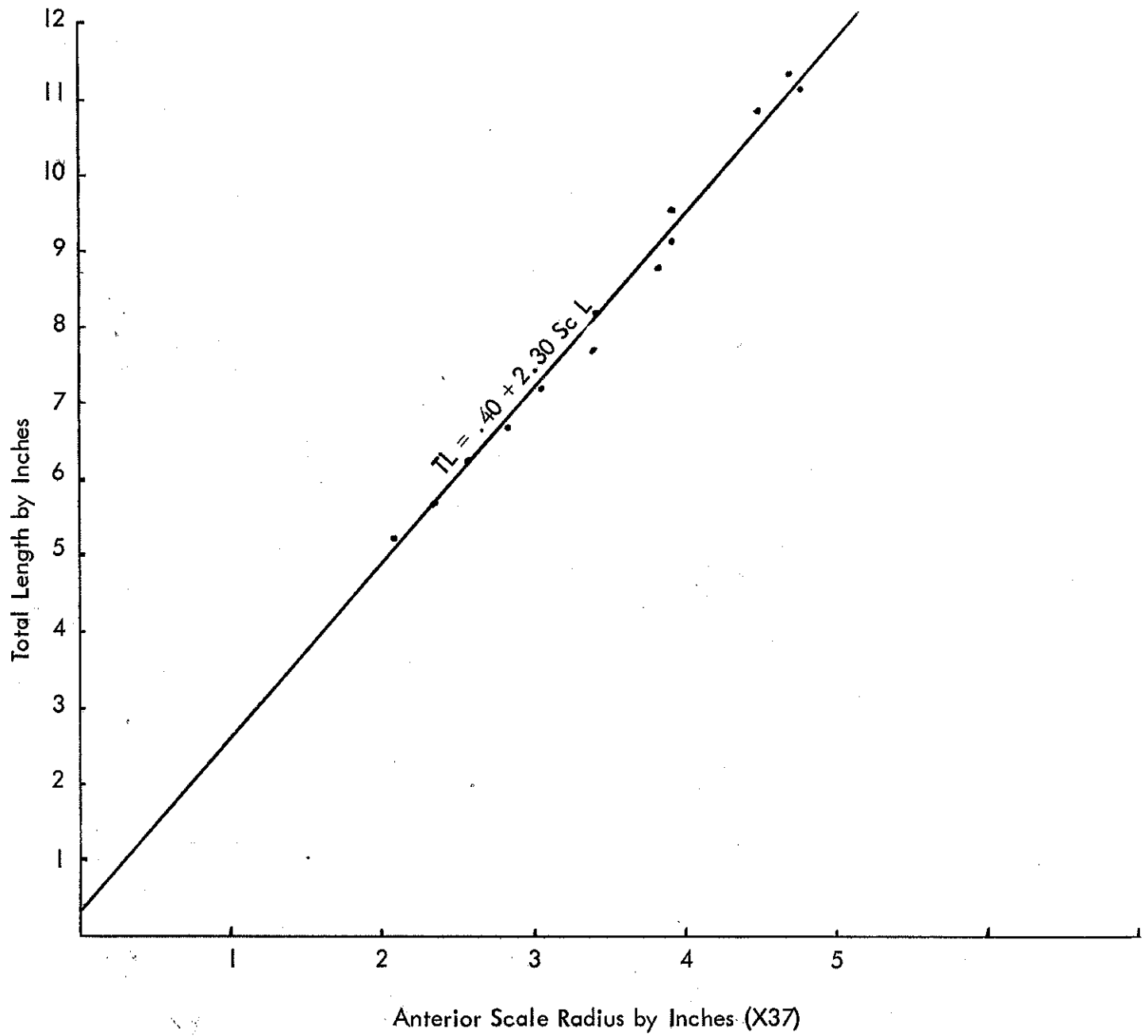


FIGURE 1. Body-scale Relationship of Decatur Lake White Crappie, 1962.



TABLE 1. Mean Observed Total Lengths in Inches and Mean Weights in Ounces by Age Group

Age Group	Number	Length		Weight	
		Mean	Range	Mean	Range
0	24	2.30	1.60 - 3.10		
I	78	5.37	4.70 - 8.10	1.16	0.50 - 4.00
II	61	7.96	5.70 - 9.70	4.75	1.50 - 8.00
III	7	11.27	10.30 - 12.20	10.64	5.50 - 18.00
IV	4	10.62	8.70 - 11.50	9.75	4.50 - 15.00

TABLE 2. Growth of White Crappie in Decatur Lake, 1962

Age Group	Number	Mean Calculated Total Lengths in Inches at Each Annulus			
		1	2	3	4
I	78	2.23			
II	61	2.29	4.48		
III	7	2.00	7.03	9.70	
IV	4	2.42	5.50	8.00	9.22
Mean		2.27	5.78	8.85	9.22
Mean Annual Increment		2.27	2.81	2.60	1.22

through 4 years are 5.3, 7.9, 11.2 and 10.6 inches, respectively (Table 1).

### LENGTH-WEIGHT RELATIONSHIP

The fish were placed into half-inch groups by body length and five were randomly selected from each group for the calculation of the length-weight relationship. All of the fish were used within a group if the group had less than five fish. Mean total lengths and weights in hundredths pounds were calculated for each group. These means were then changed to logarithms and regression of weight on length was computed. The length-weight relationship for the 150 Decatur Lake white crappie can be described by the following equation:

$$\text{Log } W = -1.545 - 3.267 (\text{Log } L)$$

where W = weight in hundredths pounds  
and L = total length in inches

A test made according to the procedures outlined by Snedecor (1956) showed that the regression coefficient, 3.267, was not significantly different from 3.0 at the 50 per cent level. The weight apparently does increase as the cube of the length. Mean condition factors were calculated for each half-inch group (Table 3) by using the reciprocal method described by Carlander (1950). Some bias exists in the computed condition factors since the original weight measurements were rounded to the nearest ounce and the number of fish in each half-inch group varied considerably. This bias is probably most responsible for the fluctuation among the mean condition factors when they are compared (Table 3).

TABLE 3. Condition Factors of Decatur Lake White Crappie, 1962

Total length range	5.0 5.4	5.5 5.9	6.0 6.4	6.5 6.9	7.0 7.4	7.5 7.9	8.0 8.4	8.5 8.9	9.0 9.4	9.5 9.9	10.0 10.5	10.4 10.9	11.0 11.4	11.5 11.9	12.0 12.5
C <sub>TL</sub>	25	20	32	26	26	30	33	31	30	31	34	26	30	34	37

### SUMMARY

1. One hundred and fifty white crappie were collected from Decatur Lake during 1962 for age and growth study. Fish from 0 through 4 years of age were collected although over 50 per cent were 1 year old. Decatur Lake white crappie apparently have a rate of growth similar to that of white crappie in other Iowa lakes.

2. A straight line body-scale relationship with an intercept of 0.40 and a slope of 2.30 fit the data well.

3. A logarithmic regression of body weight on length had an intercept of -1.544 and a slope of 3.267. A statistical test of the regression coefficient was not significant at the 50 per cent level of probability, indicating the weight does not increase significantly different from the cube of the length.

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## CREEL CENSUS OF DES MOINES AND SKUNK RIVER DRAINAGES, 1962

Harry M. Harrison  
Fisheries Biologist

Creel censuses in central Iowa streams have been conducted annually for the past ten years. For the period 1953 through 1959 this work was carried on wholly within the Biology Section of the Iowa Conservation Commission. In 1960, the Conservation Officers were charged with keeping certain records as they contacted sportsmen afield. This made it possible to get creel information comparable to, but much more extensive, than that collected previously. Consequently, field contacts by Biology Section personnel were discontinued, and for the past three years creel census data have been secured from the Conservation Officer field contact records.

In general, the information used comes from interviews at the stream with fishermen at frequent but irregular intervals during the open water months (April to November). The data secured from the angler include: the date, time and place of the interview; the length of time spent fishing up to the instant of contact; the number and kind of fish caught; and the species being fished for.

During 1962, Conservation Officers contacted fishermen on 23 streams in the Des Moines and Skunk River drainages. They interviewed 3,026 anglers who had fished 5,780 hours and caught 2,563 fish. Channel catfish, numbering 1,262, was the most abundant species in the creel. They were followed by bullheads (454), carp (387), and walleye pike (163). A variety of suckers, minnows, sheephead, flathead catfish, crappie and smallmouth bass were taken in smaller numbers. Quillback, buffalo, sunfish, stone cat, white bass, northern pike, eel, shad, and bluegill were present in the catch but quite insignificant. Table I shows by county the number of contacts made, hours fished, fish caught and the fish caught per hour for each stream censused.

Since the census covers such a large area and involves wide variations in the number of contacts made, as well as great differences in habitat, species composition, angler preference, etc., the matter of angler success is significant only in broad terms. With these things in mind and considering those streams where a substantial number of contacts were made, it can be stated that fishing success in the North Raccoon was poorer than for other streams. The South Skunk provided the best success. The Des Moines River fishing fell in between, with the lower reaches (Polk County downstream) furnishing a somewhat higher rate of catch than those upstream (Table I).

In appraising a sport fishery, the species composition of the catch may be equal to if not of greater importance than the rate at which fish are caught. In those streams being reported upon here, bullheads, sunfish and crappie are generally small or stunted and of limited worth. They are often caught quite rapidly in fair to large numbers which increases the rate of catch. Due to the poor quality of the fish, however, they add little to the fishery. At the other extreme, walleye, flathead catfish and smallmouth bass are species of excellent quality but are being caught in limited numbers, thereby decreasing the rate of catch. Due to their fine quality, however, they contribute much to the over-all fishery.

Table 2 gives the species composition of the catch by county and by stream. Channel

catfish are the dominant species caught. The species is well adapted to Iowa streams and are fish of good quality. Bullheads, principally the black bullhead, rank second from the standpoint of numbers caught. This species is abundant in both the skunk and Des Moines drainages and reaches its greatest population and size in the upper reaches of the smaller prairie streams. In those areas frequented by anglers, however, bullheads are small. Because of this, they provide little in the way of good fishing. By numbers taken, carp are third in abundance. In the census area they are numerous and generally of good condition; they are sought by many fishermen and furnish good angling. Despite their limited distribution, walleye pike are the fourth in abundance in the catch. In 1962, they were of exceptionally fine quality with most individuals weighing in excess of 3 pounds. Current population studies in the area of walleye distribution in the Des Moines and upper Raccoon Rivers reveal that the species failed to reproduce in 1961 and 1962. Consequently, poorer walleye fishing may occur in the future. Other fish (19 species or varieties) made up less than 7 per cent of the total catch. Except for the flathead catfish, these miscellaneous fishes were in all probability caught incidental to fishing for other kinds.

Flatheads are fished by specialists, and since these fish are usually caught late at night the recorded catch is minimal. The flathead fishery is important in the lower Skunk River, in the lower reaches of the Raccoon system, and in the Des Moines River from the vicinity of Dolliver State Park in Webster County downstream to its confluence with the Mississippi.

The catch by stream or reach of stream for the years 1960 through 1962 is compared in Table 3. This table also gives the total number of contacts made but includes only those streams where enough contacts were made to give meaningful results. A review of the Table shows that the pole and line catch decreased in the Des Moines River. It has remained constant in the North Raccoon and South Skunk Rivers. Rate of catch in the Boone River improved. With respect to the Boone River fishery, it should be mentioned that the majority of fish caught were creek chubs taken for bait. In fact, the fishery resource of the Boone River is quite largely restricted to a short reach of stream in the vicinity of a low-head dam near Webster City. Catfish are at times taken in good numbers at that place, but the rest of the river is populated by rough fish to such an extent that game fish populations are depressed to a degree that the stream gets little angling pressure each year.

TABLE I. Number fishermen contacted, total hours fished, total fish caught and fish caught per hour by streams and county, 1962

STREAM	COUNTY	NO. CONTACTS	NO. HRS. FISHED	TOTAL FISH CAUGHT	FISH PER HR.
West Des Moines	Emmet	1	1	0	0
	Palo Alto	19	25	44	1.8
Main stem of Des Moines	Humboldt	594	1,116	634	.57
	Webster	182	306	129	.42
	Boone	387	844	205	.24
	Polk	144	251	59	.23
	Dallas	30	186	18	.09
	Warren	8	3	2	.66
	Marion	134	246	102	.41
	Mahaska	69	121	78	.64
	Van Buren	107	143	67	.47
	Lee	42	29	37	1.3
East Des Moines	Kossuth	15	18	16	.89
	Humboldt	23	28	6	.21
Boone	Wright	15	15	50	3.33
	Hamilton	41	74	26	.35
North Raccoon	Sac	110	193	101	.52
	Calhoun	8	12	3	.25
	Greene	127	239	56	.23
	Dallas	256	689	117	.17
	Polk	34	43	3	.07
Middle Raccoon	Dallas	24	46	35	.76
South Raccoon	Dallas	46	99	41	.40
Beaver Creek	Dallas	10	44	20	.46
	Polk	14	19	7	.36
North River	Madison	15	21	30	1.43
	Warren	8	8	3	.38
	Polk	2	4	10	2.50
Middle River	Madison	18	42	33	.79
	Warren	61	89	22	.25
South River	Warren	10	16	14	.88

(CONTINUED NEXT PAGE)

TABLE I (CONTINUED)

STREAM	COUNTY	NO. CONTACTS	NO. HRS. FISHED	TOTAL FISH CAUGHT	FISH PER HR.
Whitebreast	Marion	15	13	22	1.70
Cedar Creek	Madison	15	73	64	.88
Cedar Creek	Marion	4	19	27	1.42
	Mahaska	9	13	5	.39
	Story	58	104	52	.50
	Polk				
	Jasper	3	2	10	5.00
	Mahaska	11	24	16	.67
South Skunk	Keokuk				
	Washington	72	108	57	.53
	Jefferson				
	Henry	153	217	192	.89
	Lee & Des Moines	57	116	60	.51
	Jasper	5	6	12	2.00
North Skunk	Mahaska	36	72	45	.62
	Keokuk				
	Jefferson	1	2	0	0
Cedar Creek	Van Buren	2	3	3	1
	Henry	10	13	10	.77
Flint River	Des Moines	6	10	7	.70
Misc. creeks trib. to Des Moines River					
Buffalo	Emmet	1	1	5	5.00
Lizzard	Webster	6	2	0	0
Misc. creeks trib. to North Raccoon					
Pureatory	Carroll	1	2	0	0
Cedar	Greene	2	4	2	.50
Hardin	Greene	5	6	5	.83

TABLE 2. Species Composition of fish caught by streams and by county, 1962

STREAM	COUNTY	Channel Catfish	Carp	Bullhead	Walleye	Suckers	Sheepshead	Chubs	Flathead	Crappie	Smallmouth	Misc.
West Des Moines	Palo Alto	11		11	22							
	Humboldt	340	55	105	99	8				21	2	4
	Webster	61	31	4	13	7	1			2		10
	Boone	112	31	11	22	5			5	15	3	1
	Polk	43	8	3	1				7			1
	Dallas	18										
	Warren		2									
	Marion	69	13	12			2				1	5
	Mahaska	55	7	14			1		1			
	Van Buren	27	17	1		1	18		1			2
East Des Moines	Lee	21	4	1			9					2
	Kossuth		3	12		1						
Boone	Humboldt	5		1								
	Wright	1		10				39				
North Raccoon	Hamilton	8	13	2		2					1	
	Sac	32	21	18		7		9		2	9	3
	Calhoun	3										
	Greene	45	3		6				1		1	1
Middle Raccoon	Dallas	82	11	15		1	1		1		1	5
	Polk	3										
South Raccoon	Dallas	9	8	8		2						
Beaver Creek	Dallas	39				1						
North River	Polk		4	13						4		3
	Dallas			1								2
	Madison		1	16		1		9				3
	Warren			3								
	Polk		1	9								



TABLE 2 (CONTINUED)

STREAM	COUNTY	Channel Catfish	Carp	Bullhead	Walleye	Suckers	Sheepshead	Chubs	Flathead	Crappie	Smallmouth	Misc.
Middle River	Madison	14	1	6								12
	Warren	5	4	8			1			1		3
South River	Warren	10	2	1			1					
Whitebreast Creek	Marion	12		7								3
Cedar Creek	Madison		7	45				3				9
Cedar Creek	Marion	19	1	6		1						
	Mahaska		1	4								
	Story	5	3	36		3						5
	Jasper			10								
	Mahaska	15	1									
South Skunk	Keokuk											
	Washington	45	7	4		1						
	Henry	73	98	16			2					3
	Lee & Des Moines	53	5				1		1			
North Skunk	Jasper			12								
	Mahaska	16	10	19								
Cedar Creek	Van Buren	3										
	Henry	5	5									
Flint River	Des Moines			5								2

TABLE 2 (CONTINUED)

[illegible]

TABLE 3. Rate of catch by stream, 1960 Through 1962

STREAM	REACH		1960		1961		1962	
	From	To	No. Fishermen	Fish/ Hr.	No. Fishermen	Fish/ Hr.	No. Fishermen	Fish/ Hr.
Des Moines	Iowa-Minn. line	City of Des Moines	1229	.61	2483	.47	2729	.39
Des Moines	City of Des Moines	Mouth	875	1.04	833	.81	542	.53
East Des Moines	Source	Mouth	12	1.00	30	3.86	46	.48
Boone	Redfield Dam	Mouth	47	.37	9	1.22	56	.85
North Raccoon	Source	Mouth	1289	.36	1609	.24	1176	.24
Middle Raccoon	Source	Mouth	-	-	93	.27	46	.76
South Raccoon	Source	Mouth	-	-	100	.33	99	.40
North River	Source	Mouth	-	-	-	-	33	1.33
Middle River	Source	Mouth	-	-	-	-	131	.42
South River	Source	Mouth	-	-	-	-	16	.88
South Skunk	Ham. Co. line	Mouth	455	.50	819	.57	571	.68
North Skunk	Poweskiek	Mouth	-	-	6	3.33	78	.73

## A PRELIMINARY INVESTIGATION INTO THE CAUSE OF THE DECLINE IN THE COMMERCIAL CATCH OF CATFISH IN THE IOWA WATERS OF THE MISSISSIPPI RIVER

Roger Schoumacher  
Fisheries Biologist

For the past two or three years complaints have been registered by some commercial fishermen who claimed that the catfish catch has been declining on the Mississippi River. Commercial fishing statistics gathered by the Biology Section of the Iowa Conservation Commission have also indicated that the catch, especially in some pools, has fallen off appreciably since 1960. These two factors prompted me to prepare a letter and questionnaire to be sent to all of Iowa's commercial fishermen on the Mississippi River, and their response to the questionnaire, as well as our commercial fishing statistics, comprise the bulk of this paper.

Although commercial fishing statistics have been collected by the Commission for many years, only since 1954 has any special effort been made to get reliable data. At that time Robert Cleary, the fishery biologist in northeast Iowa, instituted a system whereby the large operators were contacted periodically by letter, and in person by the local Conservation Officers, and urged to complete their reports. Because of this additional effort, the reported catch jumped from 333,055 pounds in 1953 to 2,452,205 pounds in 1954, and has remained in the magnitude of 2 1/2 to 3 million pounds annually since then. Even so, it must be remembered that these are voluntary reports, and the actual catch is undoubtedly greater than is reported for numerous reasons. However, we hope that the figures do give us some ideas as to trends in the river fishery from year to year.

The reported catch of catfish reached a record high of nearly 850,000 pounds in 1958 (Table I). Decreases occurred in 1959 and 1960, but the catches still remained near the average of former years. In 1961, however, the catch dropped to about 367,000 pounds and, although statistics are not yet complete for 1962, it looks as though the catch will be even smaller.

The decrease has not occurred in all pools. Pools 9, 18, and 19 have been the hardest hit, whereas pools 10, 11, 12, and 15 have remained about the same, and the catch in pool 13 has increased. It is questionable whether the catch has decreased or remained the same in pools 14, 16, and 17. Pools 9, 18, and 19, however, in which there has been a decline, are the three pools which usually produce 75 per cent of the catfish catch, so a big drop in these three pools influences the total river catch tremendously.

In late February, 1963, a letter and questionnaire (Figures 1 and 2) were sent to the 390 licensed commercial fishermen on the Mississippi River in Iowa. The purpose was to let the fishermen know that the Commission was aware of the catfish situation and planned to investigate it, and to get the fishermen's ideas and opinions on the subject. One hundred twenty-one, or 31 per cent of the fishermen, returned the questionnaire in some stage of completion, and numerous fishermen attached letters and notes with additional comments. A capsule summation of the reports for each pool in the river follows:

Pool 9: Of 13 respondents, 8 felt that there has been a decline in the catfish fishery, whereas 5 did not. Most that felt there had been a decline believed that it began within the last 4 years. Four reported a very serious decline (at least a 50 per cent reduction). Eleven of the respondents said that there

IOWA CONSERVATION COMMISSION

BIOLOGY STATION

BOX 406

INDEPENDENCE, IOWA

February 25, 1963

Dear \_\_\_\_\_:

During the past few years the catfish catch in the Iowa portion of the Mississippi River has been declining, according to the reports furnished to the Conservation Commission by you and your fellow fishermen. Your reports indicate that the catch has decreased in some pools, increased in other pools, and remained about the same in others. For the river as a whole, however, there has been a reduction.

As fisheries biologist in charge of investigations on the Mississippi River in Iowa, I plan to begin a study this year concerning the catfish. I will be especially concerned with factors which affect this abundance. I would appreciate your cooperation in providing me with some information as to your personal experiences and opinions in fishing for catfish in recent years. Please fill out the attached questionnaire and return it to me at your earliest convenience. If there isn't room on the questionnaire for all of your comments, please enclose as many sheets as are necessary. The information you provide will be of valuable assistance to me in evaluating the present catfish situation and suggesting avenues of approach in the upcoming study.

I shall look forward to hearing from you in the near future.

Sincerely,

Roger Schoumacker  
Fisheries Biologist

RS/lf

FIGURE 1. Letter sent to commercial fishermen on the Mississippi River.

QUESTIONNAIRE

Please confine your answers to those areas in which you actually fish.

1. What pool(s) do you fish?
2. Have you noticed a decline in the catfish catch? If so, when did it begin, and how serious a reduction has it been?
3. Have you noticed any change in the size of the catfish that you have been catching in recent years? If so, what change have you noticed and when did it begin?
4. If you have noticed a decline in the catfish catch, or a change in the size of the catfish you have been catching in recent years, what do you think is the reason for it and what do you recommend be done about it, if anything?
5. Would you be willing to cooperate with the Conservation Commission in investigations into the reasons for a decline in the catfish fishery by allowing us to examine your catch if we felt this was necessary in our study?
6. Please sign your name here: \_\_\_\_\_

THANK YOU.

PLEASE RETURN THIS FORM TO: ROGER SCHOUMACHER, BIOLOGY STATION,  
BOX 406, INDEPENDENCE, IOWA.

FIGURE 2. Questionnaire sent to commercial fishermen on the Mississippi River.

TABLE I. Total Reported Catch of Catfish in Iowa Waters of the Mississippi River, 1954-1961

<u>Pool No.</u>	<u>1954</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>	<u>1958</u>	<u>1959</u>	<u>1960</u>	<u>1961</u>
9	139,745	188,476	107,750	164,934	146,043	141,914	129,399	66,528
10	56,100	78,187	42,761	35,044	54,532	53,527	57,095	63,730
11	36,049	35,513	35,355	33,412	56,717	44,222	49,549	42,166
12	5,494	2,793	7,563	3,492	29,090	3,802	2,986	5,760
13	17,320	42,718	18,692	16,267	12,104	19,100	22,901	51,562
14	20,041	27,611	35,393	52,025	59,387	68,426	49,688	24,557
15	529	1,335	7,826	11,558	10,527	2,107	3,138	1,769
16	7,515	8,142	5,536	9,630	9,461	6,038	15,558	4,006
17	21,796	27,961	20,344	26,041	28,147	71,297	61,475	22,097
18	100,736	142,755	137,324	189,720	193,823	146,266	103,338	34,042
19	165,261	153,061	125,777	103,794	240,843	119,889	54,462	47,723
20	<u>1,835</u>	<u>834</u>	<u>2,891</u>	<u>4,947</u>	<u>5,470</u>	<u>4,169</u>	<u>6,422</u>	<u>2,872</u>
	572,421	709,386	547,212	650,864	846,144	680,757	556,011	366,812

had been an unusually large number of small fish in the river during the last 3 or 4 years. Five fishermen attributed the decline to overfishing, especially at spawning time, whereas one man suggested the reason was pollution. Several fishermen suggested stricter regulations, especially during the spawning season.

Pool 10: Of 14 fishermen reporting, 12 said there had been a decrease, with 9 saying it had been serious. Most felt it began in 1960 or 1961. Nine fishermen reported the presence of great numbers of small fish in the river. A variety of causes for the decline were mentioned: poor fishing conditions, pollution, poor catfish hatches in former years, northern pike predation, and "sport fishing" with basket traps.

Pool 11: Five of the seven respondents felt there was a decline, but only one thought it was serious. Six reported an abundance of small fish in the river. Reasons for the decline were given as poor hatches in former years, fish killed in unattended basket traps, pollution, and poor fishing conditions. One fishermen suggested outlawing basket traps.

Pool 12: Five of seven respondents reported a decline, with two of them reporting a serious decline of from 30 to 50 per cent. Five reported an abundance of small fish. Overfishing, a change in the feeding habits of the fish, too much food, and siltation were reasons given for the decline.

Pool 13: Of 12 respondents, 9 felt there had been a reduction which, in most cases, began within the last 4 years. Five reported a serious decline. Of the 11 fishermen commenting on the size of the fish, 7 said that there weren't many smaller ones, 3 said there were many smaller ones, and 1 fisherman said there was no change. Reasons given for the decline were overfishing, fish being killed in unattended "sport fishermen's" traps, removal of catfish by the Conservation Commission, water fluctuations during the spawning season in former years, and pollution. Two fishermen suggesting outlawing basket traps and one recommended a closed season for 1 or 2 years.

Pool 14: Of nine respondents, five felt there had been a decline, beginning about 1960. Five reported many smaller fish taken, two reported no change in the size of the fish, and one reported larger fish. Pollution, overfishing, fluctuating water levels, and dredging were cited as possible causes for decline.

Pool 15: Two of the four respondents felt there had been no decline, one felt there had been an "average" decline, and one reported a 75 per cent decline. One man reported few small fish, two reported many small fish, and one man reported no change in the size of fish present. Pollution was cited by one man as a cause of the decline.

Pool 16: Twelve fishermen reported a decline beginning in 1959, 1960, or 1961, whereas four reported no decline. Seven of the 12 that reported a decline felt that it was serious. As far as size of fish is concerned, five reported no change, nine reported smaller fish, and one reported no small fish. Reasons cited for the decline were pollution, siltation, fluctuating water levels, a normal fluctuation



in the catfish population, movement of catfish into tributaries, and dredging. One fisherman suggested stocking catfish and one suggested removing the size limit.

Pool 17: Eleven of 13 respondents have noticed a decline in catfish, mostly within the last 3 or 4 years. All fishermen answering the query concerning the size of catfish reported many smaller fish. The primary reason given for the decline was pollution.

Pool 18: All 12 fishermen who reported felt there has been a decline, with seven saying it has been serious. Most felt that the decline began in 1959 or later. Nine of 11 fishermen reporting said that the fish ran small since 1960. Again, pollution was considered the cause of the decline by most respondents. One man thought there was overfishing, and suggested outlawing traps during June (spawning season). Another reported that illegal and "Sunday" basket trap fishermen should be stopped.

Pool 19: Sixteen of 17 fishermen felt that there has been a decline. Most felt it began in 1959 or later, and many felt it was serious. Six reported that the fishing picked up some in 1962. Fourteen reported smaller fish and three saw no change in size. Pollution was the most frequently mentioned cause of the decline. Two fishermen felt that there was overfishing.

Pool 20: No usable data was collected for this pool.

All of the respondents indicated that they would be willing to cooperate with the Conservation Commission if we wished to inspect their catch in order to gather biological data.

I believe that the most likely explanation for the smaller catch is poor year classes of catfish somewhere about 1957 to 1959. These are the fish that should have been caught in 1960 and 1961. The large numbers of small fish reported in the river suggests that the population of larger fish is building up, and that the commercial catch will soon reflect this build-up. However, this is only a theory, and I think that some field information should be collected this year in case some other factors are responsible for the decline. In any case, some information on the catfish population structure will be valuable in the future when other increases or decreases in the catch occur.

During the coming year, then, field investigations will be conducted on selected pools of the river. Data will be gathered on the age and size composition of the catfish populations, both by Commission netting surveys and in cooperation with commercial fishermen. I hope that this information will shed some light on the past, present, and future catfish picture in the Mississippi River.

## SEX RATIOS OF PHEASANTS OBSERVED DURING WINTER COUNT - 1963

Richard C. Nomsen  
Game Biologist

The annual winter pheasant count was conducted by Conservation Officers and Biologists during January and February to determine the sex ratio of Iowa's post-season pheasant population. The results were used to calculate the percentage of cocks harvested in 1962. Sex ratio figures also are needed to complete the 1963 spring population survey.

Forms and instructions were mailed to all Officers in time to begin the count January 1, 1963. They were instructed to count birds only during the presence of a complete snow cover.

The winter of 1963 was very cold but precipitation was somewhat below normal. Winds generally kept the fields clear of snow, which restricted the total count of pheasants. December was dry with normal temperatures. The weather was quite mild during the first 10 days of January but record low temperatures prevailed during the rest of the month. Mild weather returned to Iowa early in March.

Conservation Officers reported a total of 23,002 pheasants during the census (Table I). The observed sex ratio was 3.0 hens per cock which was equal to the previous 5-year average. The total number of birds reported this year does not approach the 60,373 total checked during the severe winter of 1962 but was equal to the total reported in 1961. There were 23,091 birds recorded during the mild winter of 1961.

TABLE I. Observed sex ratios of pheasants reported for agricultural districts, 1963

District	Hens	Cocks	Sex Ratio
1 Northwest	5,278	2,302	2.3
2 North central	4,460	1,416	3.1
3 Northeast	2,762	698	4.0
4 West Central	3,374	1,302	2.6
5 Central	5,021	1,521	3.3
6 East central	1,548	345	4.5
Southern 3 districts	559	203	2.8
Total for State	23,002	7,787	3.0

The post-season sex ratio of 3.0 hens per cock indicated that 61 per cent of the cocks were shot last fall compared with 64 per cent during the 1961 season. Hunting conditions were very favorable for the hunter during the past season. Nearly all crops were harvested by opening weekend and fall plowing continued rapidly which further limited field cover. Weather conditions would normally produce a higher than average harvest. However, hunting pressure appeared to be lower than normal which no doubt explains the lower harvest last fall.

Sex ratios were lowest in the western third of Iowa, which indicated a low harvest in this area of the primary pheasant range. The harvest was most favorable in northeast and east central Iowa (Table 2).

TABLE 2. Comparison of observed sex ratios by agricultural districts, 1959-1963

District	Observed Sex Ratios					5-yr. Avg.
	1959	1960	1961	1962	1963	
1 Northwest	2.5	2.9	2.4	2.5	2.3	2.5
2 North central	3.0	2.6	2.9	3.5	3.1	3.0
3 Northeast	4.9	3.6	4.7	5.1	4.0	4.5
4 West central	3.0	3.1	2.4	2.9	2.6	2.8
5 Central	3.0	2.8	4.2	3.9	3.3	3.4
6 East central	3.3	3.3	2.0	2.3	4.5	3.1
Southern 3 districts	3.6	3.0	2.6	3.1	2.8	3.0
State Average	3.1	3.0	2.8	3.1	3.0	3.0

Sex ratios obtained during the annual winter count continued to show a high proportion of cocks in most of Iowa's primary pheasant range. Shooting hours permitted each season have more than doubled since 1957 but sex ratios indicate that the percentage of roosters harvested remains about the same. It must be noted, however, that during this period, Iowa's pheasant population has been unable to recover completely from the very poor production in 1959. A high pheasant population, such as we had in 1955 or 1958, could attract more hunters and increase the hunting pressure over the extended season and thus increase the harvest of birds.

## PROGRESS REPORT ON JEFFERSON COUNTY (FAIRFIELD) 1961 EXPERIMENTAL STOCKING OF PEN-RAISED RINGNECKED PHEASANTS

Eugene D. Klonglan  
Game Biologist

### INTRODUCTION

An experimental pheasant stocking program has been initiated in southeastern Iowa in an attempt to establish a self-supporting pheasant population capable of providing reasonably good pheasant hunting in this part of the state. The major part of this program involves the stocking of birds, either wild-trapped or raised from wild-trapped parents, from stock obtained in Union and Adair Counties - a southwestern Iowa area with an exceptionally high pheasant population. A progress report on this phase of the project will be forthcoming this fall.

However, a preliminary phase in the over-all program resulted from the necessity of disposing of the "old" brood stock being held over at the Wildlife Research Station near Boone in the spring of 1961. These 680 birds were of mixed lineage - primarily from northern Iowa stock - and for the most part had been pen-raised for many generations. They were obviously much "tamer" than the wild birds trapped the preceding winter in southwestern Iowa. This difference was also evident in the chicks raised from the two groups. Rather than distribute these birds in haphazard fashion in small releases, a mass stocking was made in northwestern Jefferson County in southeastern Iowa - an area which appears physically to have good pheasant habitat. This release could then be compared with the releases to be made later of southwestern Iowa stock in an area selected in northeastern Henry County, and perhaps give some evidence on the theory of different strains of pheasants in relation to their ability to survive in southern Iowa and on the differences in survival ability between birds pen-raised for many generations and wild birds.

Thus on March 29, 1961 a mass release of the 680 adult pheasants, 277 cocks, and 403 hens, was made in the northwest part of Polk Twp. in the extreme northwest corner of Jefferson County (about 13 miles northwest of the county seat town of Fairfield). An average of 100 birds per section was stocked over about a 7-section area. Observations made on these stocked birds during four periods - immediately after release in late March, early nesting season in mid-May, mid-nesting season in last half of June, and post-nesting season in early August - were reported in detail in the July-September 1961 Quarterly Biology Reports. This report will summarize all information on this particular stocking effort through the end of March 1963, a period of 2 years since the initial release.

### RESULTS THROUGH MARCH 1963

#### Spring Crowing and Roadside Counts

Cock crowing counts have been made in Jefferson County by the local Conservation Officer since 1950, providing the only quantitative spring population data for the years just prior to the stocking of the 680 pheasants. Thus a cock crowing count route was laid out to include the stocked area and a similar non-stocked area southeast of the village of Packwood (release site is about 3 miles west of Packwood). This route is run twice each spring, once from each direction to compensate for the time of day effect on crowing intensity and allow for direct

comparison of results at each individual stop.

In 1961, two crowing counts made in mid-May, about 6 weeks after the birds were liberated, resulted in a mean of 6.0 calls per stop on the stocked area and 1.0 on the area not stocked (Table I). This 1.0 on the non-stocked area compares closely with the mean of 0.9 calls per stop reported on the Officer routes in this part of the county during the 4-year period (1957-1960) preceding the release. However, in 1962 the mean cock calls per stop on the stocked area dropped to 2.6, while the non-stocked area held steady at 1.0. This indicated the population on the stocked area in the spring of 1962 was less than half that of 1961.

TABLE I. Results of spring pheasant crowing and roadside counts in northwestern Jefferson County during 2 years following mass release of 680 adult pheasants in late March 1961.

Crowing Cock Counts						
Date	Stocked Area			Area Not Stocked		
	No. Stops	No. Cock Calls	Calls Per Stop	No. Stops	No. Cock Calls	Calls Per Stop
5/12/61	7	49	7.0	8	10	1.2
5/17/61	7	35	5.0	8	6	0.8
Totals	14	84	6.0*	16	16	1.0*
4/27/62	7	19	2.7	8	11	1.4
5/22/62	7	18	2.6	8	5	0.6
Totals	14	37	2.6	16	16	1.0

Roadside Sight Counts										
Date	Stocked Area					Area Not Stocked				
	No. Miles	Cocks Seen	Hens Seen	Total Birds	Per Mile	No. Miles	Cocks Seen	Hens Seen	Total Birds	Per Mile
5/12/61	10	3	2	5	0.50	10	0	0	0	0.00
5/17/61	10	4	3	7	0.70	10	0	0	0	0.00
Totals	20	7	5	12	0.60	20	0	0	0	0.00
4/27/62	10	1	0	1	0.10	10	0	0	0	0.00
5/22/62	10	1	0	1	0.10	10	0	0	0	0.00
Totals	20	2	0	2	0.10	10	0	0	0	0.00

\*Conservation Officer crowing counts in this part of county averaged 0.9 calls per stop during the preceding 4-year period (1957-60), with a range of 0.4 to 1.4 for the 4 years.

Roadside sight counts were made each morning along the 20-mile route over which the crowing count had just been run. Half of the route was in the stocked area, half outside this area. In 1961 an average of 0.6 birds per mile was sighted within the stocked portion, none outside (Table 1). However, in 1962 only 0.1 birds per mile was sighted within the stocked area, and again none outside. This was a further indication that the population had declined considerably during the intervening year.

#### Summer Roadside Counts

A 30-mile route was laid out to incorporate the stocked area and adjacent non-stocked area to the east, about half the route being in each area. The route was run four times in 1961, with a mean of 0.32 birds per mile being sighted (Table 2). Six broods were seen on the four mornings. Conservation Officers have taken similar counts in August on a route in northern Jefferson County since 1954. These seven counts (1954-60) have averaged 0.06 birds per mile, with 13 birds sighted in 210 miles. All were adults, no broods having been seen on the route during the 7 years. The increase to 0.32 from 0.06 indicates the stocking did measurably increase the 1961 fall population.

In 1962, two counts were made over the route - one from each direction to compensate for the time of day effect on the rate at which birds are seen. (In 1961, two runs were made each way on the route, the first two listed in the table having been run from the stocked end of the route first and the last two from the other end; the lesser number of birds was seen on the latter two, as was the pattern with the 1962 counts). These counts averaged 0.32 birds per mile, the same as in 1961, indicating little change in the fall population between the 2 years. All of the birds sighted in both years were seen within the stocked portion of the route.

#### Winter Counts

A group of 4 sections that appeared to be typical of the area in which the pheasants were stocked was searched intensively on February 26, 27, 28, 1962 in an attempt to determine the average number of birds wintering per section in the vicinity. Only 59 birds would be located on the 4 sections, an average of about 15 on each. Of the 59 birds, 14 were cocks, 16 were hens, and 29 were not positively identified as to sex - indicating an almost equal sex ratio. Checks of specific cover areas on a few surrounding sections also turned up only small numbers of birds - fewer than expected on the basis of a breeding population of 10 cocks and 15 hens and a production of 30 chicks per section.

During the winter of 1963 it was not possible to make a similar direct count with the same degree of accuracy. Snow conditions were never severe enough to concentrate the birds in heavy cover to allow them to be easily counted, as was possible the previous winter. Roadside observations, aided by binoculars, and checks of several cover areas and fields in late January when a good "tracking" snow was present revealed that a small population of pheasants was present, apparently slightly fewer in number than in the winter of 1962. Another field survey was made in late March, again indicating a smaller number of birds.

#### Summary of Seasonal Population Fluctuations

The approximate picture on a birds per section basis of what has happened to the pheasant population on this stocked area in Jefferson County during the 2 years since the release was made is presented in Table 3. Since it was not possible to conduct an intensive on-the-spot

field study throughout the year but instead was necessary to make intensive field surveys at certain key periods, it was necessary to make some assumptions at particular points while constructing the table. Knowledge gained from several years of intensive studies on the Union-Adair Pheasant Research Area in southwest Iowa and the Winnebago Pheasant Research Area in north central Iowa proved invaluable in this respect.

TABLE 2. Results of summer roadside counts in northwestern Jefferson County during 2 years following mass release of 680 adult pheasants in late March 1961.

Date	Miles Driven	Cocks Seen	Hens Seen	Young Seen	Total Birds	Birds Seen Per Mile	Broods Seen
7/26/61	30	2	3	14	19	0.63	2
8/3/61	30	1	1	14	16	0.53	4
8/7/61	30	1	0	0	1	0.03	0
8/8/61	30	1	1	0	2	0.07	0
Totals	120	5	5	28	38	0.32*	6
8/8/62	30	0	1	5	6	0.20	1
8/9/62	30	1	1	11	13	0.43	1
Totals	60	1	2	16	19	0.32	2

\* Conservation Officer counts in this part of county averaged 0.06 birds per mile during the 7-year period (1954-60) preceding, totaling 13 adult birds in 210 miles of route driven; no broods were sighted.

The 680 birds released were very tame, having been pen-raised for several generations, and suffered considerable mortality within a short period after release. The population remaining in mid-May (about 6 weeks after the release) on the 13 sections centering around the release sites was estimated at 10 cocks and 15 hens per section - about a 50 per cent loss of birds in this short span. An average of five broods per section was raised on this 13-section area in 1961. This meant that one hen out of three present in mid-May was successful in hatching her clutch of eggs. However, these 15 hens per section represent only half of the hens originally stocked. If some allowance is made for a few hens wandering outside of the 13 sections, only about 15 to 20 per cent of the 403 hens released hatched a brood - even though stocked in apparently prime condition just before the nesting season. This is much lower than normally found in wild pheasant populations where 50 per cent (more in good years) of the hens present in the spring may bring off broods.

By the fall of 1961 and prior to the hunting season there were an estimated 44 pheasants per section present. However, this number decreased to only 15 per section by late February, and the decline continued until only 11 birds per section (5 cocks and 6 hens) were present in late April over an approximately 15 per section area including and surrounding the release sites. The winter of 1962 was one of the worst on record and certainly the worst since 1936. Temperatures were well below normal for a 4 1/2-month period - from early December till mid-April.

Snowfall was quite heavy, particularly in January and February when Fairfield recorded 11 and 19 inches, respectively.

These severe winter conditions obviously had a marked depressive effect on the pheasant population. The fact that the adults were pen-raised stock and the chicks only one generation away from the wild (and chicks pen-raised from the same type of stock the previous year were much "tamer" than chicks pen-raised from wild stock) may have been a major factor in the high rate of loss observed. The rate of loss of wild pheasant populations elsewhere in the state - including areas where the winter was even worse - and quail populations in the same southeastern Iowa region was not unduly excessive. Considerable corn and soybeans remained in the field over much of southern Iowa, and consequently wild birds weathered the severe winter quite well. There were many unharvested fields in the area stocked, but few pheasants could be found in them. Regardless of the cause, the fact remains that 3/4 of the birds present in the fall were lost before the next breeding season - an unusually high rate of loss.

Field studies indicated only about two broods per section were raised during 1962, compared to five per section in 1961. As a result, there were only 20 pheasants per section in the fall of 1962, less than half the preceding year (in spite of the roadside counts indicating little change - which points up to the danger of relying on a limited number of such counts for specific data for small areas). The winter following was a very mild one with little snow - quite a contrast from the previous year. Surveys made in late January revealed a population of about 12 birds per section. The last field survey just completed indicated the population will enter the 1963 breeding season with only 8 birds per section - 4 cocks and 4 hens - over the 15-section area. This is a 60 per cent decline from the 20 per section present in the fall. This is a lower rate of loss than found the preceding year, which might be expected because of the milder winter, but still seems rather high.

It should be emphasized that these figures are averages for an area of about 15 sections. Within this area there are a few "pockets" where small "concentrations" of birds can be located, while some areas appear practically devoid of birds. Farmers in the area still say they are seeing more pheasants than before the birds were stocked. It should also be pointed out that Jefferson County is in the closed season zone for pheasant hunting. Hence the sex ratios observed have remained almost equal. Local farmers have complained at length about poaching of pheasants by rabbit and quail hunters, particularly the first year after the release. It is likely the stocked birds were more vulnerable to this potential source of loss, but little concrete evidence of such loss could be found. The most common references were to road hunters shooting birds from the car and absconding before a license number could be obtained and to "city" hunters working the two railroad tracks that criss-cross the area and "shooting everything in sight." Many of these reports were second-hand or merely opinions and must of necessity be treated with some reservations.

## CONCLUSIONS

It is obvious that to date this experimental mass stocking of pen-raised pheasants has not been an outstanding success. After 2 years the population of 100 birds per section originally stocked has dwindled to only 8 per section, and perhaps more significantly, from 59 hens to 4 per section. Since the pre-stocking pheasant population in the area averaged less than 4 birds per section, there is still some tangible evidence of the release. However,



unless a couple of the small "pockets" of birds yet to be found in a few places within the area can manage to "take hold" and show some substantial increase before long, the prospects for establishing a sizeable pheasant population from this particular stocking of birds certainly is not bright.

TABLE 3. Seasonal population fluctuations on the area in northwestern Jefferson County where 680 pheasants stocked on March 29, 1961.

Time of estimate	Cocks		Hens	
	Adult	Juvenile	Adult	Juvenile
March 29, 1961 (Birds stocked)	41		59	
Mid-May, 1961 (13 sections)	10		15	
Hatched during 1961 season		23		23
Loss during summer 1961	4	8	7	8
Present in fall 1961	6	15	8	15
Total pre-hunting population	21		23	
Mid-winter (late Feb. 1962)	7		8	
Early spring, 1962 (late Apr.)	5		6	
(Fall and winter loss - number)		(16)		(17)
(Fall and winter loss - percent)		(76%)		(74%)
Hatched during 1962 season		9		9
Loss during summer 1962	1	3	2	3
Present in fall 1962	4	6	4	6
Total pre-hunting population	10		10	
Mid-winter (late January 1963)	6		6	
Early spring 1963 (late March)	4		4	
(Fall and winter loss - number)		(6)		(6)
(Fall and winter loss - percent)		(60%)		(60%)

## 1962 QUAIL HUNTING SEASON

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This is a report on Iowa quail hunting. Most of the material is from the 1962 season, but there are comparisons with a few past seasons. Data are from hunters contacted in the field or on return from hunting.

Our quail population is slowly rebuilding after three unfavorable years, of which the worst portion was the 1959-60 winter. To compensate for fluctuations in numbers of quail it has been customary to adjust hunting seasons. Examples of these changes before 1950, are given in Table 1. Recent examples are in Table 2.

### METHODS

Hunting information has been gathered by Conservation Officers and other field personnel. From 1946 to 1959, information was gathered on quail contact cards on which Officers listed date, county, hunters and whether or not they were from nearby areas, party hours, use of dog, coveys and quail flushed and the hunter's opinion of whether the season was the same, better, or poorer than the previous season. In 1960 and 1961 the Officers used field contact record booklets in which they listed date, area, license number, name, address, species taken and number, hours hunted, and name of Officer along with a space for notes. In 1962 the record booklet was changed to record date, county number, location hunted, name and address, party objective, party size, party hours, species taken, number taken, and Officer's name.

I also continued the use of the cards to a limited extent in order to have a record that was comparable to records made previous to the date when use of booklets began.

### RESULTS

The 1962 season was mostly mild and dry. Corn and beans were harvested early in the hunting period with some delay due to wet corn (cobs and grain dried slowly). December found most of the grain harvested and the weather continued moderate with some snowfall. In 1962, 273 hunters indicated that they required 1,134 man-hours to take 590 quail. Of those contacted, 59 per cent were hunting during the first 10 days of the season, with most hunting effort being exerted during the first 2 days of the open season. Of the parties interviewed, 76 parties were checked during the first 10 days while only 53 parties were contacted during the last 32 days of the shooting period. Throughout the season, 77 per cent were hunting on Saturday or Sunday. Hunter success was at the rate of 1.9 hunter-hours per quail.

The 1961 quail hunting season was during a period when weather was so wet that corn and beans were not harvested, thus making the shooting difficult. A total of 204 hunters reported on 840 man-hours of hunting during which they shot and bagged 383 quail. Forty-seven per cent of these were out the first 10 days of the season; 66 per cent made their trips on week-ends. Hunting success was at the rate of 2.2 hunter-hours per bird.

In 1962 and 1961 the quail shooting season began earlier than the pheasant season while in

1960, a year when poor quail shooting was forecast, both seasons opened on November 5. Forty-three per cent hunted during the first 10 days; 70 per cent hunted Saturday or Sunday. A considerable number included other game in the bag. The taking of other game was not recorded for quail shooters before the use of booklets began.

#### Hunting by Districts and Counties

The southeast was the most important portion of the Iowa quail range in 1962. Best reports were from Appanoose, Davis, Des Moines, Lee, Jefferson, Van Buren, and Washington Counties. Average success was 1.4 hunter-hours per quail compared to 2.4 in 1961 and 2.0 in 1960.

Success was poor in the south-central portion of Iowa according to word from Clarke, Decatur, Lucas, Ringgold, and Wayne Counties. The take here was at a rate of 2.0 hours per quail in 1962 compared to 2.1 in 1961 and 2.0 in 1960. Throughout the balance of the quail range the success was 2.8 man-hours per quail in 1962, 2.1 in 1961 and 8.9 in 1960. For individual counties, highest 1962 success was in Van Buren where the rate of success was 0.9 in 1962. The 1962 rate for some other counties in the best quail range was as follows:

Appanoose	1.1	Clarke	3.5
Lee	1.5	Des Moines	5.3
Ringgold	1.8	Wayne	6.2
Decatur	2.0	Lucas	6.2
Jefferson	2.2		
Davis	2.6		

#### Records of the Biologist

These records were kept on the same type of cards that Officers used previously. I have taken only the reports of experienced quail shooting men, with 114 hunters being interviewed each season. These men were from Appanoose, Clarke, Davis, Keokuk, Jefferson, Lucas, Monroe, Van Buren, Wapello, and Wayne Counties. Best hunting was in the counties that lie east of Chariton. Most of the quail gunners saw quail every time they went hunting. One personal record of a Monroe County shooter indicated a take of 83 quail in 1962 and 65 in 1961. For experienced hunters who prepared for shooting by locating quail before the season, the 1962 season was far better than that of 1961.

Their comments on the past three shooting periods were as follows: 1962, best in years; 1961, better than 1960; 1960, the poorest in many years. A summary of opinions, and rate of success is given in Table 3.

TABLE 1. Some examples of shooting season lengths, areas open to hunting and bag limits from 1914 to 1949.

Year	Shooting Dates	Areas Open	Bag Limits
1914	11-1 to 12-15	Statewide	25
1916		None	
1933	11-15 to 12-14	14 Mgmt. Areas	6
1935	11-16 to 12-10	38 Counties	8
1949	11-1 to 11-15	13	6
	11-1 to 12-15	38	6

TABLE 2. Iowa quail hunting seasons, 1959 to 1962 (Hunting results from Officer's Field Contact Booklets).

Date	1959	1960	1961	1962
Bag and Possession	6-12	5-10	5-10	5-10
Counties Open				
Short Season	14	0	0	0
Long Season	52	69	69	69
No. Days				
Short Season	24	0	0	0
Long Season	45	30	42	42
Legal Hunting Hrs.	9-4:30	9-4:30	9-4:30	9-4:30
Hunter-Hrs. per Quail Bagged	1.6 (10 yr. avg. 1.8)	2.7	2.2	1.9
Per Cent of Hunting First Day of Season		03	25	45

TABLE 3. Summary of quail hunting success by party-hours and hunter-hours, and opinions of hunters on comparison of last three seasons (From selected hunter contacts by Biologist)

Year	No. of Party-Hrs. per Covey	No. of Hunter Hrs. per Quail	Comparison to Previous Year (per cent)		
			Same	Better	Poorer
1960	2.7	1.6	18	23	59
1961	1.5	1.1	60	40	0
1962	1.3	1.0	28	63	10

## RESULTS OF THE 1962 IOWA GUN SEASON FOR DEER

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### INTRODUCTION

The 1962 deer season marked the tenth anniversary of our modern series which commenced in 1953. Ten thousand gun permits were issued for the statewide "any-deer" season which was held December 15, 16, and 17, with landowners, tenants, and their children allowed to hunt without a special deer permit on property under their control.

Data used in this report were taken from compulsory hunter card returns; Conservation Officer reports of tagged, farm-killed deer; and Officer estimates of untagged, farm-killed deer.

Hunter report cards were received from 9,968 of the 10,000 hunters, for a 99.7 per cent return. Of those reporting, 158 said they did not hunt, but it was assumed that the 32 who failed to submit reports did hunt: Hunter success was calculated on the basis that 9,842 permit holders participated in the 1962 gun season for deer.

### RESULTS

#### Deer Kill and Hunter Success

From a numerical standpoint, Iowa gun permit holders had their best season on record with a kill of 4,281 (Table I). Hunter success, however, was slightly below the 10-year average; 43.5 per cent of the licensed gun hunters bagged their deer this year compared to the 10-year average of 45.7 per cent.

All Iowa hunters harvested more deer in 1962 than in any of the preceeding seasons, with a total harvest of 5,703 (Table I). The total was made up of 404 kills by bow permittees; 4,281 by gun permittees; 644 tagged, farm-killed deer; and 374 untagged, farm-killed deer.

A summary of the kill, by county, which includes deer killed by hunters and those killed by other causes, as well as the percentage of the reported population that was killed in 1962 is given in Table 2.

Licensed farmers, who comprised 34 per cent of the gun permittees, had a hunter success ratio of 52 per cent and bagged 1,440 of the 4,281 deer taken by gun hunters. Urban permit holders registered a success ratio of 41 per cent.

#### Deer Hit but Not Retrieved

Gun permit holders were asked if they had wounded deer which they did not recover, and 800 (8.1 per cent) answered in the affirmative. These hunters said they had hit a total of 902 deer, for a wounded:recovered ratio of 21:100. Bow hunters in 1962 indicated that 10.9 per cent had wounded 1 or more deer, with a reported total of 307 deer and a wounded: recovered

TABLE I. Comparison of Iowa Shotgun Seasons for Deer, 1953-1962

Year	Number Permits	Shotgun Permit Kill	Total Kill**	Gun Hunter Success	Hrs. Hunted/ Deer Bagged	Season Length
1953 */	3772	2401	4008	61.1%	21.5	5 days
1954 */	3788	2411	2992	63.7	---	3
1955	5586	2438	3062	43.6	28.9	3
1956	5440	2000	2678	39.2	30.4	2
1957	5942	2187	2805	36.8	31.1	2
1958	6000	2141	2891	38.4	30.2	2
1959	6000	1935	2731	33.1	37.2	2
1960	7000	3188	4269	45.9	37.9	3
1961	8000	4033	5364	51.6	29.5	3
1962	10000	4281	5703	43.5	38.8	3
Totals	61528	27015	36503	---	---	-
10-Yr. $\bar{x}$	6153	2702	3650	45.7%	31.7	-

\*/ All counties not open for deer hunting: 45 counties in 1953 and 51.5 counties in 1954.

\*\*/ Includes kill of gun and bow permit holders and kill of non-permit holders (farmers, landowners, etc.).

TABLE 2. Summary of Known Deer Kills and Percentage of Estimated Fall Population Killed, Iowa, 1962

County	Permit		Non-Permit		Total Hunter Kill	Traffic, Dog, Illegal, Misc.		Total Known Kill	Est. Fall 1962 Pop.	Pct. Fall Pop. Killed
	Bow	Gun	Tagged	Untagged		Kill				
1. Adair	4	31	8	0	43	0	43	236	18%	
2. Adams	1	36	7	2	46	9	55	112	49	
3. Allamakee	0	159	14	20	193	7	200	1020	20	
4. Appanoose	1	17	1	2	21	7	28	163	17	
5. Audubon	1	21	4	0	26	6	32	122	26	
6. Benton	2	31	2	1	36	3	39	87	45	
7. Black Hawk	14	29	3	0	46	9	55	230	24	
8. Boone	8	24	2	2	36	5	41	199	21	
9. Bremer	3	32	6	1	42	5	47	94	50	
10. Buchanan	3	17	0	1	21	3	24	144	17	
11. Buena Vista	3	25	0	4	32	3	35	70	50	
12. Butler	7	38	3	4	52	12	64	306	21	
13. Calhoun	0	5	0	0	5	3	8	42	19	
14. Carroll	1	16	2	0	19	4	23	44	52	
15. Cass	3	43	11	0	57	22	79	379	21	
16. Cedar	0	20	0	2	22	3	25	264	9	
17. Cerro Gordo	3	6	2	0	11	1	12	42	28	
18. Cherokee	3	68	22	7	100	8	108	168	64	
19. Chickasaw	3	14	1	2	20	9	29	94	31	
20. Clarke	3	39	2	12	56	17	73	442	16	
21. Clay	6	59	6	2	73	5	78	99	79	
22. Clayton	9	179	16	2	206	2	208	1564	13	
23. Clinton	8	66	3	0	77	7	84	272	31	
24. Crawford	2	93	15	0	110	9	119	340	35	
25. Dallas	1	74	11	4	90	13	103	323	32	
26. Davis	0	17	3	5	25	7	32	124	26	
27. Decatur	0	74	19	14	107	13	120	578	21	
28. Delaware	10	67	4	4	85	2	87	264	33	
29. Des Moines	10	47	1	0	58	8	66	291	23	
30. Dickinson	6	34	9	0	49	8	57	110	52	
31. Dubuque	2	15	2	5	24	5	29	298	10	
32. Emmet	10	30	17	0	57	9	66	136	48	
33. Fayette	1	90	1	0	92	14	106	119	89	



County	Permit		Non-Permit		Total Hunter Kill	Traffic, Dog Illegal, Misc.		Total Known Kill	Est. Fall 1962 Pop.	Pct. Fall Pop. Killed
	Bow	Gun	Tagged	Untagged		Kill	Kill			
34. Floyd	2	26	2	2	32	4	36	212	17%	
35. Franklin	2	2	0	1	12	4	16	153		10
36. Fremont	1	14	5	0	20	10	30	282		11
37. Greene	1	36	6	0	43	6	49	128		38
38. Grundy	0	1	0	0	1	0	1	0		-
39. Guthrie	10	109	22	1	142	2	144	842		17
40. Hamilton	3	26	4	0	33	5	38	162		23
41. Hancock	0	7	0	0	7	1	8	34		24
42. Hardin	7	40	10	0	57	6	63	144		44
43. Harrison	13	93	22	2	130	11	141	544		26
44. Henry	0	19	3	0	22	3	25	136		18
45. Howard	5	21	1	10	37	4	41	272		15
46. Humboldt	3	26	2	0	31	4	35	94		37
47. Ida	0	9	3	0	12	6	18	61		30
48. Iowa	2	53	2	2	59	19	78	196		40
49. Jackson	5	105	10	55	175	11	186	969		19
50. Jasper	4	22	9	0	35	0	35	119		29
51. Jefferson	0	18	3	5	26	6	32	136		24
52. Johnson	2	29	6	3	40	15	55	187		29
53. Jones	5	34	3	6	48	11	59	604		10
54. Keokuk	0	37	4	0	41	7	48	189		25
55. Kossuth	4	16	1	0	21	6	27	99		27
56. Lee	9	38	10	11	68	11	79	245		32
57. Linn	5	40	1	2	48	2	50	289		17
58. Louisa	1	13	3	2	19	6	25	119		21
59. Lucas	9	108	12	14	143	14	157	876		18
60. Lyon	11	88	13	0	112	15	127	246		52
61. Madison	8	66	7	2	83	22	105	408		26
62. Mahaska	0	39	11	0	50	11	61	156		39
63. Marion	2	53	5	7	67	9	76	238		32
64. Marshall	3	23	3	3	32	6	38	173		22
65. Mills	5	46	13	3	67	26	93	420		22
66. Mitchell	1	32	3	4	40	5	45	221		20

County	Permit		Non-Permit		Total Hunter Kill	Traffic, Dog Illegal, Misc.		Total Known Kill	Est. Fall 1962 Pop.	Pct. Fall Pop. Killed
	Bow	Gun	Tagged	Untagged		Kill				
67. Monona	10	108	40	0	158	3	161	978	16%	16%
68. Monroe	5	75	6	7	93	21	114	408	28	28
69. Montgomery	5	32	2	4	43	13	56	255	22	22
70. Muscatine	5	21	1	0	27	8	35	102	34	34
71. O'Brien	2	22	7	2	33	0	33	34	97	97
72. Osceola	1	3	0	0	4	1	5	54	9	9
73. Page	1	24	0	0	25	3	28	230	12	12
74. Palo Alto	1	36	9	3	49	9	58	73	79	79
75. Plymouth	4	49	9	1	63	20	83	269	31	31
76. Pocahontas	0	12	2	0	14	1	15	48	31	31
77. Polk	5	20	5	0	30	29	59	212	28	28
78. Pottawattamie	1	164	32	14	251	117	368	1998	18	18
79. Poweshiek	2	13	3	0	18	1	19	51	37	37
80. Ringgold	0	32	8	1	41	7	48	104	46	46
81. Sac	5	7	0	0	12	5	17	97	18	18
82. Scott	4	8	5	5	22	7	29	76	38	38
83. Shelby	5	97	17	1	120	5	125	459	27	27
84. Sioux	17	43	16	1	77	22	99	196	50	50
85. Story	2	14	2	1	19	10	29	80	36	36
86. Tama	0	25	0	2	27	4	31	134	23	23
87. Taylor	0	15	3	1	19	1	20	70	28	28
88. Union	3	41	7	5	56	12	68	122	56	56
89. Van Buren	0	13	4	8	25	8	33	199	16	16
90. Wapello	2	24	4	8	38	5	43	280	15	15
91. Warren	8	78	7	6	99	24	123	204	60	60
92. Washington	0	50	1	6	57	1	58	510	11	11
93. Wayne	1	9	0	2	12	8	20	178	11	11
94. Webster	0	24	3	2	29	9	38	170	22	22
95. Winnebago	5	28	2	0	35	1	36	85	42	42
96. Winneshiek	4	177	20	35	236	25	261	867	30	30
97. Woodbury	11	156	24	28	219	28	247	620	40	40
98. Worth	4	30	3	0	37	14	51	104	49	49
99. Wright	0	19	6	0	25	11	36	100	36	36
TOTALS	404	4281	644	374	5703	939	6642	27097	24%	24%

ratio of 76:100 (Mustard, 1962).

In 1960 and 1961, 9.8 and 7.6 per cent, respectively, of the gun hunters said they had wounded deer which had not been recovered. The percentage of hunters wounding and not recovering deer seems to remain fairly constant. There may be, and I believe should be, some correlation between wounding losses and snow cover.

#### Sex and Age Ratios of Harvested Deer

A sex ratio of 113 males:100 females was indicated by the gun hunters for the 4,252 deer on which the sex was reported. This is only slightly different from the 117:100 ratio given by gun permittees in 1961 and adds credence to the hypothesis that hunters were biasing their returns in some years as when the reported sex ratios reached a high of 280 males:100 females.

Hunters are no longer asked to save female reproductive tracts so there is now no reason for them to lie about the sex of the deer they harvest.

Age ratios are quite another matter and I am firmly convinced that a great percentage of our hunters can't tell a fawn from an adult, for I can see no apparent reason for hunters to purposefully bias this information. The hunters said they harvested 753 fawns and 3,387 adults for an age ratio of 22 fawns:100 adults. cursory analysis of data collected by State Conservation Commission personnel at check stations and locker plants indicates there was an age ratio of about 70 fawns:100 adults in the 1962 harvest.

#### Hours Hunted Per Deer Killed and Deer Observed

Gun hunters said they hunted an average of 16.9 hours in 1962 for a collective total of 166,239 hours. It required 38.8 hours of hunting for each deer bagged in 1962; this is the longest period of hunting per deer bagged on record (Table I). In my opinion, this is not an indication that we had fewer deer than in previous years, but rather is an indication that lack of snow cover, coupled with increased party hunting, increased the time necessary to bag a deer for the individual hunter.

The average gun hunter saw 7.0 deer during the season at the rate of 0.41 deer per hour. This is a slight decrease in the deer sighted per hour from previous years, 0.45 and 0.51 for 1960 and 1961; however, considering the complete lack of snow cover in the 1962 gun season, I would say these data are fairly consistant.

#### Day Killed and Time of Day

Hunters indicated the day they bagged their deer for 4,175 of the 4,281 deer harvested. As shown in Table 3, there seems to be little difference in the percentages of deer killed on the same day for the 3 years on which we have data. Iowa deer hunting has evolved into a party-type hunt, in which the hunting ends when all have their deer or the season ends, whichever comes first. I believe this somewhat biases the data in regard to the day hunters report killing deer because they continue to hunt after they kill their own deer, which is contrary to Iowa law, but not custom, and some are fearful enough, and cagey enough, to report they killed their deer on the third day when they actually got it the first or second.

Above all this indicates is that it is difficult to legislate human behavior. To my knowledge,

no concerted effort has ever been made to prevent hunters from hunting after they have killed their deer and, in my opinion, if we are interested in providing recreation, no effort should be made to curb it. So long as many of our Iowa hunters don't care who kills their deer, just so they get one, I can see no biological reason to actively attempt to prevent group hunting. In a sense, it is a question of quality versus quantity hunting and, to most hunters, quality is relegated to a secondary position.

As in past years, a slightly greater percentage of deer were killed in the morning than in the afternoon (Table 3).

TABLE 3. Percentage of Deer Killed, By Day and Time, Iowa Gun Seasons for Deer, 1960-1962

Year	Day Killed			Time Killed	
	1	2	3	AM	PM
1960	36.5%	35.1%	28.4%	51.9%	48.1%
1961	34.5	37.5	28.0	50.9	49.1
1962	33.8	36.8	29.4	51.1	48.9

#### Hunter Mobility and Distribution

Iowa deer hunters have had a 3-day season for 3 years, starting in 1960. Hunter mobility, as determined by dividing the number of counties hunted by the number of hunters reporting, has not changed appreciably. In 1960, 1961, and 1962, with 3-day seasons, hunters hunted an average of 1.24, 1.18, and 1.23 counties respectively.

Hunter distribution is of great importance to game managers who are primarily interested in obtaining proper utilization of a wildlife crop while maintaining an adequate base herd to perpetuate the species. State game departments have tried various techniques to obtain adequate and equitable harvests; the most common of which are pre- and post-seasons, multiple deer permits to entice hunters into the more inaccessible areas, and "any deer" type seasons in areas where "bucks only" hunting has been allowed.

Iowa, with its relatively limited deer area, has not been plagued with an over-abundance of deer; in fact, at the present time we limit the number of permits. We have, however, allowed hunters to hunt wherever they wished in open counties since our seasons originated in 1953. Some attempt has been made through public relations media to inform the hunters as to the relative deer populations, but no other attempt has been made to distribute hunters.

The number of gun permits issued remained fairly constant from 1955 through 1959 and then a gradual increase in the number of permits was allowed until we reached 10,000 in 1962 (Table 1). The steadily increasing number of hunters led to the question of hunter distribution, that is, whether or not the hunters were, with our traditional free-choice basis, distributing themselves according to the deer population.

A correlation analysis was made for the 1961 deer season to determine the correlation between the number of hunters hunting a county and the reported deer population. A positive correlation value, "r", of 0.747 ( $r.Ol = .254$ ) was obtained for the 1961 data which indicated there was a very strong relationship between the number of deer and the number of hunters. The " $r^2$ " value indicated that 55.8 per cent of the variation in hunter distribution could be attributed to the deer population in 1961.

A correlation analysis, using the deer population estimates and the number of hunters hunting the various counties for 1962, yielded a "r" value of 0.760 ( $r.Ol = .254$ ) and indicated that 57.8 per cent of the variation in hunter distribution was due to the deer population level.

Apparently, Iowa deer hunters, if left to their own devices, do a reasonably good job of distributing themselves. As we allow more permits, however, hunting pressures could develop which will call for the State Conservation Commission to do more to direct hunters, or to limit the kill. This is especially true in areas, such as north central Iowa, where deer hunting is relatively easy due to the terrain and the general lack of escape cover. Efforts to limit the kill in Iowa would probably involve either limiting the number of hunters in specific portions of the State, or reducing the number of days deer hunting is allowed. Because Iowa allows persons living on farms to hunt without permit, the final choice will probably be to reduce the period of the open season. It would be unfair to restrict those who buy licenses and let those who do not to take the game.

#### Non-Permit Hunters

Iowa law permits resident landowners, tenants, and their children to hunt deer on their property without a special deer permit. In our management it is important that we have some knowledge concerning the number of non-permit hunters who hunt deer; this will be increasingly true as we approach the point where hunters and other decimating factors are removing the annual increment.

As an indication of the importance of the non-permit hunter, data taken from the 1955-1962 deer seasons indicates that these hunters have accounted for an average of 19 per cent of the hunter deer kill, with a narrow, rather consistent, range of 17-21 per cent of the kill for the 8-year period (Table 4).

It is difficult for me to understand, or to offer reasons, why the non-permit hunter kill has increased numerically each year since 1959 when prior to that it had been relatively stable (Table 4). Our rural population certainly isn't increasing because reports indicate that the average size of farms is increasing; with larger farms there should be fewer rural inhabitants, thus fewer non-permit hunters. However, comparison of the non-permit kill of 566 in 1955 with the 1,018 in 1962 shows an increase in the farm-kill of almost 80 per cent in this 8-year period.

The number of non-permit hunters can be estimated in at least two ways: the ratio of unlicensed to licensed hunters checked in the field; and comparison of the known-kill by a known number of licensed farmers with the reported kill by non-permit hunters.

During the 1962 gun season Mr. Bob Rollins, Superintendent of the Law Enforcement Section, instructed Officers to list all hunters checked in the field as either licensed or farmer (non-permit) hunters. As reported in a letter from Mr. Rollins, dated January 23, 1962, Officers

TABLE 4. Summary of Non-permit (Landowners, Tenants, and their Children) Deer Kill, Iowa, 1955-1962

Year	Tagged	Untagged	Total	Percent of Gun Permit Kill	Percent of Total State Kill
1955	338	228	566	23%	18%
1956	195	366	561	28	21
1957	144	336	480	22	17
1958	187	401	588	27	20
1959	223	318	541	28	20
1960	403	401	804	25	19
1961	522	442	964	24	18
1962	644	374	1018	24	18
Totals	2656	2866	5522	--	--
8-Yr. x	332	358	690	25%	19%

checked 4,396 licensed hunter and 992 farmers. Using these data and the known number of permit hunters, 10,000, the estimated number of non-permit hunters would be 2,257.

The 2,771 permit hunters, who indicated on their hunt report cards that they were farmers, had a hunter success ratio of about 52 per cent and indicated they had killed 1,440 deer. Using these data, with the 1,018 non-permit kills reported by the Conservation Officers, we arrive at an estimate of 1,959 non-permit hunters for the 1962 gun season which does not differ greatly from the estimate quoted earlier.

If we assume that the non-permit hunters had a success ratio similar to the permit hunters who were farmers, and that the ratio, as reported by the Conservation Officers of licensed to unlicensed hunters is correct, we would have a total non-permit kill of 1,173 instead of the 1,018 reported, a close comparison.

A summary of the above indicates: (1) non-permit kills averaged about 19 per cent of the total kill and about 25 per cent of the gun kill from 1955-1962; (2) the annual non-permit kill has increased 80 per cent from 1955-1962 in spite of a decline in the rural population; (3) the number on non-permit kills remained relatively constant until 1960 when it started to increase; (4) the number of non-permit hunters was estimated to range from 2,000-2,500 in 1962, or about 20-25 per cent of the 10,000 gun permit hunters; and (5) the non-permit kill, as reported by the Conservation Officers, is probably very close to the true non-permit kill.

### DISCUSSION

Although the 1962 deer season was a successful one, with a record number of deer killed and with the success ratio of gun hunters only 2 per cent below the 10-year average, I do not feel the total harvest was great enough to yield much additional information concerning the potential deer kill we can expect before we begin to over-harvest. I had anticipated, and I might add hoped for, a total hunter kill of about 6,500, but the total 1962 kill was 800 fewer than anticipated due, I believe, to the warm weather and lack of snow cover which accompanied the 1962 gun season for deer. In effect, we found out little concerning potential harvests and the number of gun permits we can safely issue even though the number of permits was increased to 10,000 from the previous year's 8,000.

The known deer kill for the several counties ranged from 9 per cent to 97 per cent of the estimated Fall 1962 deer population, with a statewide average of 24 per cent (Table 2). There are several reasons, or possible explanations, for the wide range in the percentages of the deer killed in the various counties. These include: hunter distribution, ease or difficulty of hunting, under or over estimates of deer populations, failure to report deer killed by means other than legal hunting, combinations of these, and perhaps others.

For the most part, I feel the Officers are doing a fine job in estimating their deer populations, in reporting deer deaths throughout the year, and in reporting the non-permit kills. There are some areas about which we know very little, but as our work continues we will acquire more knowledge and a better understanding of the population dynamics operating with the Iowa Deer Herd. I feel we have come a long way since we started in 1953 and can only hope we can progress as much in the next 10 years.

Iowa's progressive deer program has been the product of teamwork involving personnel from most of the Divisions and Sections which comprise the State Conservation Commission;

this includes those serving in administration, clerical, and field positions. With the continued support of all, I am confident our deer management program can be an even greater credit to the Iowa Conservation Commission and a recreational asset to the people of Iowa.

#### LITERATURE CITED

Mustard, Eldie W.

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#### SUMMARY

1. Gun permits were issued to 10,000 hunters in 1962 for the 3-day season for deer.
2. Hunter report cards were received from 99.7 per cent of the gun permittees.
3. The total hunting season deer kill, greatest in the 10 years Iowa has had an open season, was 5,703: bow permittees, 404; gun permittees, 4,281; and non permittees, 1,018 deer.
4. Licensed gun hunters had a hunter success of 43.5 per cent in 1962, which was only slightly below the 10-year average of 45.7 per cent.
5. Deer were reported wounded and not recovered by 800 (8.1 per cent) of the gun hunters who said they wounded 902 deer for a wounded:recovered ratio of 21:100.
6. The average gun hunter saw 7.0 deer in 1962 at the rate of 0.41 per hour of hunting.
7. Correlation values, "r", of 0.747 and 0.760 for 1961 and 1962, respectively, were found using the number of hunters hunting a county and the estimated deer population as variables. These data are taken as evidence, or an indication, that Iowa gun hunters do reasonably well in distributing themselves according to deer populations.
8. An estimated 2,000-2,500 non-permit hunters hunted deer in 1962. This group killed a reported 1,018 deer, or 24 per cent as many as the licensed gun hunters. Non-permit hunters are apparently increasing even though Iowa's rural population is decreasing.





