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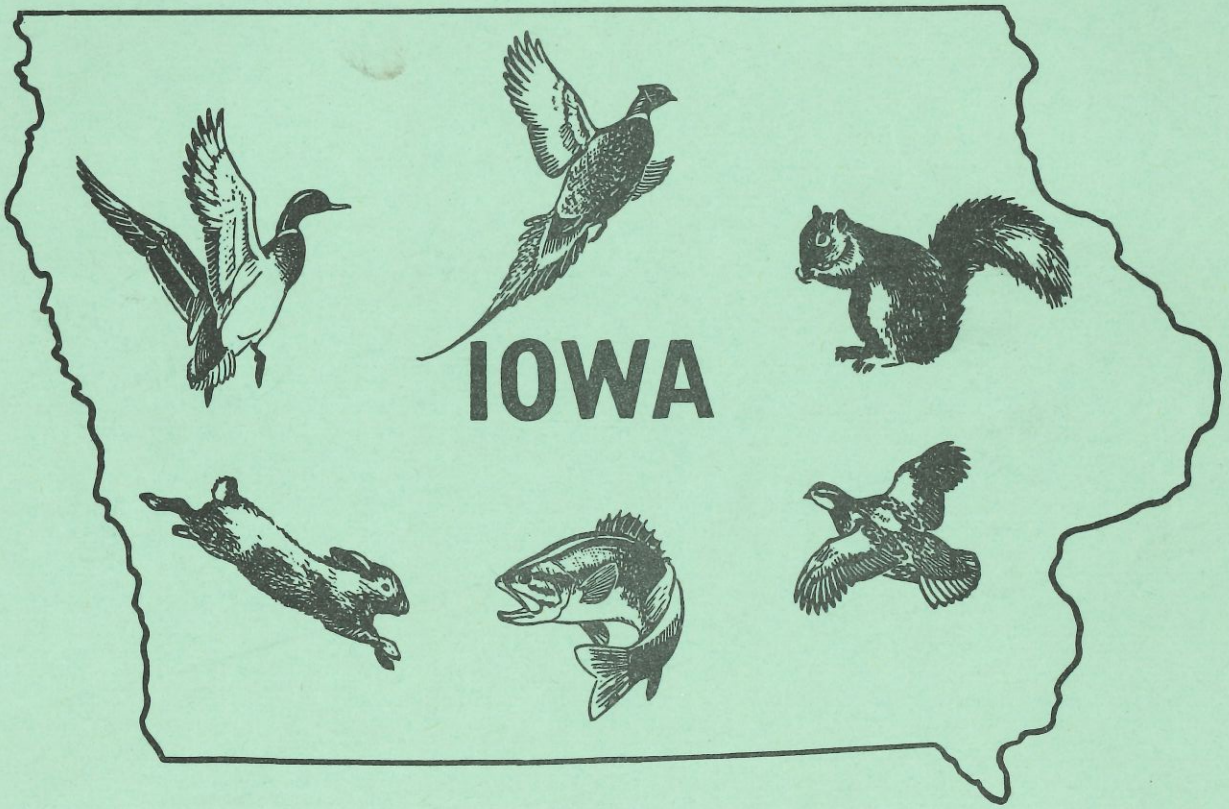

FISH AND GAME DIVISION — BIOLOGY SECTION

STATE CONSERVATION COMMISSION

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THE 1964 ANGLER SUCCESS AND HARVEST IN IOWA MAN-MADE LAKES

Jim Mayhew
Fisheries Biologist

Information on angler catch statistics was obtained for the fifth consecutive year by a Conservation Officer field contact census. The lakes were divided into separate groups based on primary use and purpose. Officers contacted 3,373 fishermen during the census. These people caught 8,548 fish after fishing 5,455 hours. Bullhead comprised 42 per cent of the angler catch. They were followed in importance by bluegill, crappie, largemouth bass, and channel catfish. The most contacts were made at state and county owned recreational lakes, followed by municipal reservoirs, commercial pits, and farm ponds. The catch rate varied from 1.2 to 1.9 fish per hour. Mean catch rate for all artificial lake fishermen was 1.6 fish per hour.

AGE AND GROWTH OF THE CHANNEL CATFISH IN THE CORALVILLE RESERVOIR

Don Helms
Fisheries Biologist

A sample of 1,554 channel catfish was collected in the headwaters, pool and tailwaters of the Coralville Reservoir. Back calculations were made on a subsample of 265 of these fish for age and growth analysis. It was found that fish from the headwaters and the pool tended to grow at an equal and rapid rate, while fish in the tailwaters grew markedly slower. The latter grew at a rate comparable to those in most other inland eastern Iowa rivers, and the former grew at a rate between those of other eastern Iowa rivers and the rapidly growing Mississippi River catfish. At the time of sampling, the headwaters and tailwaters were made up primarily of small fish, while the pool was dominated by large fish.

COMMERCIAL CHANNEL CATFISH CATCH STUDIES IN THE MISSISSIPPI RIVER IN 1964

Roger Schoumacher
Fisheries Biologist

A total of 4,861 commercially caught channel catfish were measured as part of a continuing study of this important commercial and sport fish. Spines were taken from 588 for aging. Forty-seven per cent of the fish were under 14 inches, 70 per cent under 15 inches, and only 2 per cent 19 inches or longer. Ninety-six per cent of the catch was age III and IV fish. Growth is very good. Studies are continuing to determine the proper management of the species.

RESULTS OF A VOLUNTARY CREEL CENSUS ON NORTHEASTERN IOWA RIVERS IN 1964

Robert Schacht
Fisheries Biologist

A voluntary creel census of better-than-average fisherman was continued in northeastern Iowa rivers, from the names of fishermen provided by Conservation Officers. Thirty-one anglers reported 534 trips totaling 1,942 hours of fishing. Seventy-one per cent of the trips were successful. Catfish was the primary species caught, comprising 63 per cent of all fish caught. Fishing was above average on the Cedar, average on the Wapsie, and below average on the Iowa.

1964 OFFICER CREEL CONTACT CENSUS FOR NORTH CENTRAL IOWA

Gary Ackerman
Fisheries Biologist

In order to obtain a quality and quantity inventory of Iowa fishing success, the officer creel contact census is conducted yearly on most of our rivers, lakes, and streams. This census in north central Iowa represents for the most part rather large river systems. In short, the quantity of fish being harvested is quite low. For example, the Des Moines River furnishes us a generalized picture of inland river fishing success: the harvest was 0.79 fish per hour and 0.78 fish per angler. The quality of fishing on this river consists of 59 per cent channel catfish, 27 per cent carp, 8 per cent bullhead, 3 per cent drum, and 2 per cent flathead catfish. The so called "fine species" compose less than 2 per cent of the total catch. There are, of course, notable exceptions to this very generalized illustration of inland river fishing. These exceptions are discussed in detail within the report.

CREEL CENSUS OF FOUR, NATURAL, IOWA LAKES - 1964-65

Terry Jennings
Fisheries Biologist

Data presented on the results of a comprehensive type creel census conducted on four natural lakes in Dickinson County. The census period on Spirit Lake and West Okoboji Lakes extended from May through October. These four lakes, totaling about 11,329 acres, produced an estimated 616,000 fish weighing about 283,500 pounds. Center Lake yielded 36 per cent of the total estimated catch of fish from the four lakes but the percentage of the total weight was quite low. Each of these trips lasted an average of 2.7 hours. Bluegills were the most abundant fish on the stringer comprising about 30 per cent of the total estimated catch. Nearly 84 per cent of all the bluegills creeled were caught from Center Lake.

MISSOURI RIVER OX-BOW LAKE FISHERY
PART I: CHANNEL CATFISH

Bill Welker
Fisheries Biologist

An extensive fishery investigation of five Missouri River ox-bow lakes was conducted in 1963 and 1964 by the Iowa Conservation Commission and the Nebraska Game, Forestation and Parks Commission. The population of channel catfish over five inches long was significantly more abundant in DeSoto than in any other lake during 1963. There was less difference in abundance among all the lakes during 1964 and no significant difference at each lake between 1963 and 1964. Reproduction of channel catfish in all the lakes appears limited or non-existant, especially in those lakes completely separated from the river. The average total length and average weight of channel catfish were greater in those lakes closed to the river than in the lakes open to the river. Also, considerably fewer sexually mature catfish were found in the lakes open to the river than in the lakes closed to the river. This indicates possible movement of mature catfish out of the lakes which open to the river.

RUFFED GROUSE AND WOODCOCK SURVEYS, SPRING 1965

Gene Hlavka
Game Biologist

Ten ruffed grouse roadside drumming counts made in northeastern Iowa in the spring of 1965 averaged 1.6 drums per stop. The 5-year average is also 1.6 drums per stop. A stable ruffed grouse population could present a harvestable surplus to the Iowa hunter. Ten woodcock singing ground counts were made in 1965 in the eastern half of the state. On 84 stops 14 woodcock were heard - an average of 0.17 birds per stop. The 1965 index of woodcock abundance is almost identical to the 1964 index but below the 5-year average.

IOWA'S SPRING PHEASANT POPULATION - 1965

Richard C. Nomsen
Game Biologist

The 1965 crowing count showed a statewide decrease of 21 per cent. Although counts in northwest and north central Iowa were down, averages for both regions remained above the state average. An adequate supply of cocks was evident in all areas of the pheasant range. There were 3,444 pheasants sighted on the 175 10-mile roadside routes censused this spring - an average of 1.97 birds per mile compared to 2.76 birds per mile in 1964. This part of the spring survey showed a decrease of 25 per cent in the number of roosters sighted and 31 per cent fewer hens when compared with the 1964 results.

QUAIL HUNTING RESULTS FOR THE 1964-65 SEASON

M. E. Stempel
Game Biologist

A postcard survey of small game hunters was made following the 1964 season. The names of about 1 1/2% of the resident hunting and combination license holders were selected from the files in the Des Moines Office. Also, nearly 2% of the non-resident licensees were sampled. Each of those chosen received a letter of instruction and the postcard which was to be filled in and returned. Quail shooting by residents was reported on 306 cards from the 99 counties, all of which were open for hunting quail. This represents 45,465 quail gunners who took 286,430 quail at a rate of 1.8 hunter-hours per bird. They took 77% of their quail in the 3 southern tiers of counties. Best rate of success in this area was 1.5 hours per quail. Of the total number of resident hunters who returned cards, 15 per cent had hunted quail. Other surveys have indicated that 12 to 28% of average hunters hunt quail, while in the best portion of the southern Iowa quail territory 54% indicated they went out after quail. In 1964, the non-resident gunners took 4,600 quail at 2.2 hours per bird. The 1964 postcard survey (1963 hunting) had indicated that 87% also shot pheasants and 65% had shot squirrels. In southern Iowa 73% did their gunning in the home county or in an adjoining county. Some Iowans drove 250 miles to a quail hunting spot.

IOWA WATERFOWL PRODUCTION AERIAL TRANSECT SURVEY, 1964-65

Richard Bishop
Game Biologist

On July 1 and 2, 1965, a 489-mile aerial waterfowl production survey transect was again flown to compare brood production and water conditions with that of 1964. In 1965, 89 broods of waterfowl were observed compared to 109 broods in 1964. Only 16% of the marshes and potholes sighted were dry in 1965, whereas 64% were dry in 1964. Refinements in technique of making this type of survey in Iowa are needed if maximum use is to be made of the information obtained.

POSTAL CARD SURVEYS OF SQUIRREL, RABBIT, FOX AND COYOTE HUNTERS FOR THE 1964-65 SEASON

Paul D. Kline
Ass't. Supt. of Game

One of the tools of the game manager is his knowledge of hunting pressure and distribution, seasonal kill, and relative importance of the huntable species. This report covers one phase of a postal card survey of licensed Iowa hunters for the 1964-65 season, which is aimed at providing some of these answers. The cottontail bag for the past season was 2,223,710 rabbits, with nearly 59% of the more than 310,000 hunters pursuing this species. There were 1,106,240 squirrels bagged, with 45% of the hunters after this species, and 91,550 foxes and coyotes taken by nearly 20% of the hunters. Only 10% of

the hunters went after jackrabbits, bagging 96,910 of them. Data on numbers of hours, trips, rate of success, differences between areas of the state, etc., are also given. Only 2.1% of the licensed hunters hunted cottontails on the September 12 opening day. Snow was on the ground only 30% of the 163 day season. Yet 61% of the cottontail hunting reported was done when there was snow, thus substantiating the belief that Iowa hunters wait and depend on snow for cottontail hunting.

RESULTS OF EXPERIMENTAL TRIALS OF A TAGGING DEVICE FOR DEER

Keith D. Larson
Game Biologist

A trial study of a tagging device for deer was initiated during the winter of 1964-65. Two hundred devices were employed on three study areas. Of the two hundred devices that were set in deer trails, 89 are assumed to be on deer. The device is considered to be an effective and economical method of marking deer for movement studies which could provide needed information about the seasonal movements of deer in Iowa and thus assist the field force in the annual census of deer which we undertake in Iowa.

BOW HUNTERS DEER KILL REPORTS - 1964

Keith D. Larson
Game Biologist

The twelfth Iowa bow season for deer was 51 days in length and was open statewide. Permits were issued to 3,678 applicants; the 3,556 who participated bagged 670 deer and had a hunter success ratio of 18.8%. Hunters averaged 54.7 hours of hunting and collectively spent 182,336 hours in deer hunting. A total of 56,265 deer were observed at the rate of 0.31 deer per hour of hunting, with the average bowman sighting 16.8 deer during the season. Archers again showed their preference for adult deer when they reported bagging deer in the ratio of 188 males: 100 females. Hunters reported taking 42.4% of their deer in the morning and 57.6% in the afternoon. Hunting became better with the onset of rut, with bow hunters indicating they took 21% of the bag during the first third of the season, 34% in the second, and 45% in the third portion of the season. A total of 400 hunters (12%) said they had wounded one or more deer and failed to retrieve it. A wounded: 100 recovered ratio of 72:100 was determined.

THE 1964 ANGLER SUCCESS AND HARVEST IN IOWA MAN-MADE LAKES

Jim Mayhew
Fisheries Biologist

For the fifth consecutive year Conservation Officer contacts were used to measure angler success and harvest in Iowa artificial lakes and reservoirs. As the Officer interviewed anglers during routine patrol a small card was filled out for the number of anglers in the party, number of hours fished, and the number and species of fish caught.

Information on catch statistics on a large scale basis such as this is of certain value to fishery management. First, it is the only practical means available to effectively determine the fishing "pulse" of Iowa recreational lakes. Second, it is also valuable in interpreting fishery inventory data. Catch success of many species of game fish is often determined by relative year class abundance. By combining catch data with preceeding inventory data it is possible to evaluate the contribution of year classes to the sport fishery.

Because the number of contacts made, time of day and year anglers are contacted is at the discretion of the individual Officers, analysis was completed only for number of contact, hours expended fishing, number of fish caught, and catch per unit effort. Harvest was also analyzed for only the major species; largemouth bass, bluegill, crappie, bullhead, and channel catfish. Several other species such as walleye, green sunfish, carp, and white bass contributed significantly to the catch in some lakes, but in the majority of impoundments they are relatively unimportant to the total catch and are listed in the tables as "other".

The man-made lakes in southern Iowa can be separated into groups based on primary and secondary use or purpose. Many of these lakes were constructed principally for outdoor recreation. This group includes state and county recreation lakes, and several privately owned ponds or small lakes. Other impoundments were constructed for municipal or commercial water supply, with recreation a secondary product. There are also countless agricultural ponds of multiple use such as livestock watering, erosion control, and recreation. The final group consists of abandoned strip mines, commercial pits, and gravel pits.

Preliminary analysis of catch statistics were completed for each different group of impoundments. Further analysis of individual impoundments was also completed and are listed in Tables 3, 4 and 5.

Angler Catch and Harvest - 1964

During 1964 Conservation Officers interviewed 3,373 fishermen. These people caught 8,548 fish after fishing 5,455 hours (Table 1). State and county recreational lakes were most frequently used by fishermen and comprised over 60 per cent of the contacts. Municipal reservoirs, commercial pits and farm ponds followed in order of importance. Bullhead was the most important species making up 43 per cent of the catch. Other species contributed the following portion of angler harvest: bluegill, 32 per cent; crappie, 12 per cent; largemouth bass, 5 per cent; channel catfish, 3 per cent; and other species, 5 per cent.

TABLE 1. Angler success and harvest in four different types of man-made lakes in 1964

Type of Lake	Total No. Contacts	Total Hours	Total Fish	Fish/ Hour	Species					
					Bass	B'gill	Crappie	B'head	C. Cat.	Others
Recreation	2,203	3,813	6,254	1.6	303	1,837	880	2,928	29	277
Mun. Res.	730	1,034	1,204	1.2	98	569	93	166	184	94
Farm Ponds	181	288	542	1.9	40	171	15	224	5	87
Comm. Pits	259	320	548	1.7	25	172	12	323	2	14
Grand Total	3,373	5,455	8,548	1.6*	466	2,749	1,000	3,641	220	472

* Figure represents mean rather than cumulative total.

Catch rate of fish in the Iowa man-made lakes was higher in 1964 than any other year since the beginning of the Officer contact census. The average catch rate was 1.6 fish per hour compared to a mean of 1.3 the previous 4 years (Table 2). Farm pond fishermen had the best success, 1.9 fish per hour. Commercial pit and recreation lake anglers followed closely with a catch rate of 1.7 and 1.6 fish per hour respectively. The lowest catch rate of 1.2 fish per hour was recorded at municipal reservoirs.

TABLE 2. Comparison of angler catch and harvest from 1960-1964 in Iowa man-made lakes

Year	Total No. Contacts	Total Hours	Total Fish	Fish/ Hour	Species					
					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	3,826	7,642	8,909	1.2	812	2,325	1,299	3,942	87	459
1962	4,213	5,736	8,258	1.5	667	2,808	1,110	2,997	78	608
1963	4,824	9,338	12,017	1.3	893	4,929	1,506	3,425	74	1,190
1964	3,373	5,555	8,548	1.6	466	2,749	1,000	3,641	220	472

DISCUSSION

The Conservation Officer method of obtaining basic angler catch statistics has proven very successful during the past 5 years. Over 21,000 anglers have been interviewed. The real value in this type of census undoubtedly is information is obtained on a statewide basis which is available by no other practical means. It is also of value as supplemental data to fishery inventories, particularly in measuring the contribution of individual years classes to the sport fishery.

Although the catch statistics of this type of census are rather basic, without opportunity for statisitcal expansion into total catch, by comparing the data annually several rather important observations can be made concerning the exploitation of fish populations and habits of southern Iowa anglers. These are as follows:

1. Angling success was higher in 1964 than any other census year. The average artificial lake and reservoir angler caught 2.7 fish after fishing 1.7 hours.

2. Until 1964 the number of contacts made by Conservation Officers remained rather constant. During the past year there was a 30 per cent reduction in the number of contacts.

3. Farm pond fishermen have always had the highest rate of catch, ranging from 1.4 to 2.2 fish per hour. Other types of lakes have varied annually.

4. Bullhead, with the exception of 1963, are the most frequently caught species in artificial lakes and reservoirs. In that year bluegill were more abundant in the harvest.

5. Channel catfish angling has increased since the beginning of the census. This year there was a three-fold increase in the number of channel catfish caught in the artificial lakes and reservoirs.

TABLE 3. The 1964 angler catch and harvest in man-made recreational lakes

Lake	Total Contacts	Total Hours	Total Fish	Bass	B'gill	Crappie	B'head	C. Cat.	Others
Robbins Lake	11	9	13				13		
Viking Lake	3	6	9				9		
Willow Slough	134	329	565	4	1	5	537		18
Weise Slough	5	15	13	1	4	6	2		
Prairie Rose	62	109	60		1		50	4	5
Thayer	4	9	3			2	1		
Green Valley	110	249	259	3		93	111		
Lacey Keo.	3	1	1			1			
Walnut Creek	19	70	130	1	4		125		
Cone Marsh	5	2	7		1		6		
Odessa	37	67	96				90		6
Nine Eagles	68	107	275	24	218	27	1	5	
Ahquabi	256	364	466	29	270	114	19		34
Allerton	22	53	54	1	31	20	1	1	
Bays Branch	177	439	425	2	133	94	196		
Wapello	137	149	216	9	26	104	60		17
MacBride	67	93	252			44	207		1
Red Haw	102	325	588	16	490	46	7		29
Colyn	41	117	74	34		2	37	1	
Williamson	13	48	5		4		1		
Iowa Lake	104	158	177	105		7	65		
Hannen	20	18	83		4	79			
Dudgen Lake	11	6	9		4			5	
Pine Lake	92	156	141	8	92	40	1		
Cold Springs	81	112	471	6	19	7	439		
Swan Lake	234	269	754	3	17	1	722		11
Geode	153	188	222	6	180	29	7		
Rock Creek	232	345	886	51	338	159	221	2	115
Grand Total	2,203	3,813	6,254	303	1,837	880	2,928	29	277

TABLE 4. The 1964 angler catch and harvest in municipal reservoirs

Lake	Total Contacts	Total Hours	Total Fish	Bass	B'gill	Crappie	B'head	C. Cat.	Others
E. Osceola	79	142	188	36	144	3	4	51	1
W. Osceola	199	375	135	9	25	5	41		4
Griswold Pond	20	22	5	1		1	3		
U. Centerville	6	2.5	27		27				
Fairfield #2	3	3.5	2				2		
Cedar Lake	27	22	43	6	21	16			
Dale Maffitt	29	30	13	2	9		1		1
Ellis Lake	81	98	219	17	158	27	1		16
Morris Lake	69	59	145	13	88	36	7		1
Spring Lake	105	89	105	10	27	3	13		52
Fisher Lake	11	11	2		2				
Humeston	2	2	2				2		
Corydon	5	10.5	17				17		
Afton	2	1	0						
Summit	11	18.5	15				5		10
McKinley	33	49	71	4			58		9
Lock Ayr	36	85	173		28		12	133	
Albia Res.	12	14	42		40	2			
Grand Total	730	1,034.0	1,204	98	569	93	166	184	94

TABLE 5. The 1964 angler catch and harvest in farm ponds, and gravel pits

Lake	Total Contacts	Total Hours	Total Fish	Bass	B'gill	Crappie	B'head	C.Cat.	Others
Farm Ponds	181	288	542	40	171	15	224	5	87
Gravel Pits	259	320	548	25	172	12	323	2	14

AGE AND GROWTH OF THE CHANNEL CATFISH IN THE CORALVILLE RESERVOIR

Don Helms
Fisheries Biologist

Since creel census and fish population surveys of 1963 and 1964 have indicated that the channel catfish is one of the two primary game fish in the Coralville Reservoir (Helms and Mayhew, 1964; Helms, 1964; Mayhew, 1963 and 1964), it was deemed beneficial to learn more about the life history of this species under the existing reservoir conditions. Thus, it is the purpose of this paper to contribute toward this goal by presenting a comparative study of the age and growth of the channel catfish in the three major habitats (headwaters, pool and tailwaters) of the Coralville Reservoir.

METHODS

During the fall of 1964, 1,554 channel catfish were captured by using bait nets, and baited slat nets in three representative areas in the Coralville Reservoir. All fish caught were measured for total length, and spine samples were taken on a cross-sectional basis in each of the three areas.

Spine cross-sections were cut at the distal end of the basal recess. The cross-sections were then mounted between glass microscope slides and examined wet under 30X magnification on a microprojector. Annuli were marked on paper strips and subsequently interpreted on a nomograph. Cross-sections which were difficult to interpret for any reason were disregarded.

RESULTS AND DISCUSSION

Based on the calculated growth of 111 individuals (Table 1) representing year classes 1958 through 1963, channel catfish from the headwaters averaged 4.0 inches total length at the end of the first year and 6.8, 8.9, 10.9, 12.4 and 14.1 inches respectively at the ends of succeeding years. Similarly, the calculated growth of 106 individuals (Table 2) representing year classes 1955 through 1963 which were taken from the pool averaged 3.1 inches total length at the end of the first year and 6.0, 8.3, 10.5, 12.9, 14.2, 15.6, 16.3 and 15.0 inches respectively at the ends of succeeding years.

Thus, in comparing the two areas, we find that growth rates are quite similar. This would tend to indicate that the populations of the headwaters and pool either interchange freely or, they are subjected to equal, if not the same pressures. Growth rates in these two areas are slower than in the Mississippi River (Schoumacher and Ackerman, 1964) but faster than in most other eastern Iowa rivers.

The growth rate of catfish in the tailwaters is markedly slower and compares closely with growth in most other inland eastern Iowa rivers. The calculated growth of 48 individuals (Table 3) representing year classes 1957 through 1963 from this area averaged only 2.8 inches total length at the end of the first year and 4.7, 6.4, 7.9, 9.5, 10.9 and 12.0 inches respectively at the ends of succeeding years.

TABLE I. Calculated age and growth of channel catfish in the headwaters of the Coralville Reservoir in 1964

Year Class	Age Group	Number of Fish	Calculated average total length (inches) at end of the year						
			1	2	3	4	5	6	7
1963	I	40	2.8	(6.7)*					
1962	II	17	4.2	7.2	(9.7)				
1961	III	22	4.4	7.3	9.2	(11.2)			
1960	IV	15	4.1	6.3	9.1	11.0	(12.9)		
1959	V	12	4.2	6.6	8.2	10.3	12.2	(13.9)	
1958	VI	5	4.2	6.8	8.9	11.4	12.7	14.1	(15.2)
Total		111							
Grand average length			4.0	6.8	8.9	10.9	12.4	14.1	
Average annual increment			4.0	2.9	2.0	2.0	1.5	1.7	

* Numbers in parenthesis indicate average total lengths at time of capture.

TABLE 2. Calculated age and growth of channel catfish in the pool of the Coralville Reservoir in 1964

Year Class	Age Group	Number of Fish	Calculated average total length (inches) at end of year								
			I	2	3	4	5	6	7	8	9
1963	I	1	2.5	(7.8)*							
1962	II	30	2.5	6.4	(8.9)						
1961	III	10	2.6	6.0	8.4	(10.4)					
1960	IV	6	3.5	6.2	8.9	10.9	(12.8)				
1959	V	34	3.1	6.3	9.0	11.8	13.5	(15.5)			
1958	VI	16	3.2	6.0	8.1	10.4	13.2	14.1	(15.6)		
1957	VII	7	4.1	5.8	7.5	10.0	12.9	14.6	15.8	(16.5)	
1956	VIII	1	3.5	5.3	8.3	10.8	14.5	16.3	17.5	18.5	(19.8)
1955	IX	1	3.0	6.5	7.5	9.0	10.5	12.0	13.5	14.0	15.0 (16.5)
Total		106									
Grand average length			3.1	6.0	8.3	10.5	12.9	14.2	15.6	16.3	15.0
Average annual increment			3.1	2.9	2.2	2.2	2.4	1.3	1.4	0.7	1.3

* Numbers in parenthesis indicate average total lengths at time of capture.

TABLE 3. Calculated age and growth of channel catfish in the tailwaters of the Coralville Reservoir in 1964

Year Class	Age Group	Number of Fish	Calculated average total length (inches) at end of year							
			1	2	3	4	5	6	7	
1963	I	5	3.2	(5.6)*						
1962	II	11	3.0	6.3	(7.8)					
1961	III	11	2.6	4.9	7.2	(8.6)				
1960	IV	8	2.8	4.8	7.3	8.8	(11.1)			
1959	V	9	2.7	4.2	6.1	7.7	10.3	(12.7)		
1958	VI	2	2.3	4.3	6.0	7.9	9.3	11.3	(13.4)	
1957	VII	2	2.9	3.8	5.5	7.0	8.9	10.5	12.0	(14.3)
Total		48								
Grand average length			2.8	4.7	6.4	7.9	9.5	10.9	12.0	
Average annual increment			2.8	1.9	1.7	1.5	1.6	1.4	1.1	

* Numbers in parenthesis indicate average total lengths at time of capture.

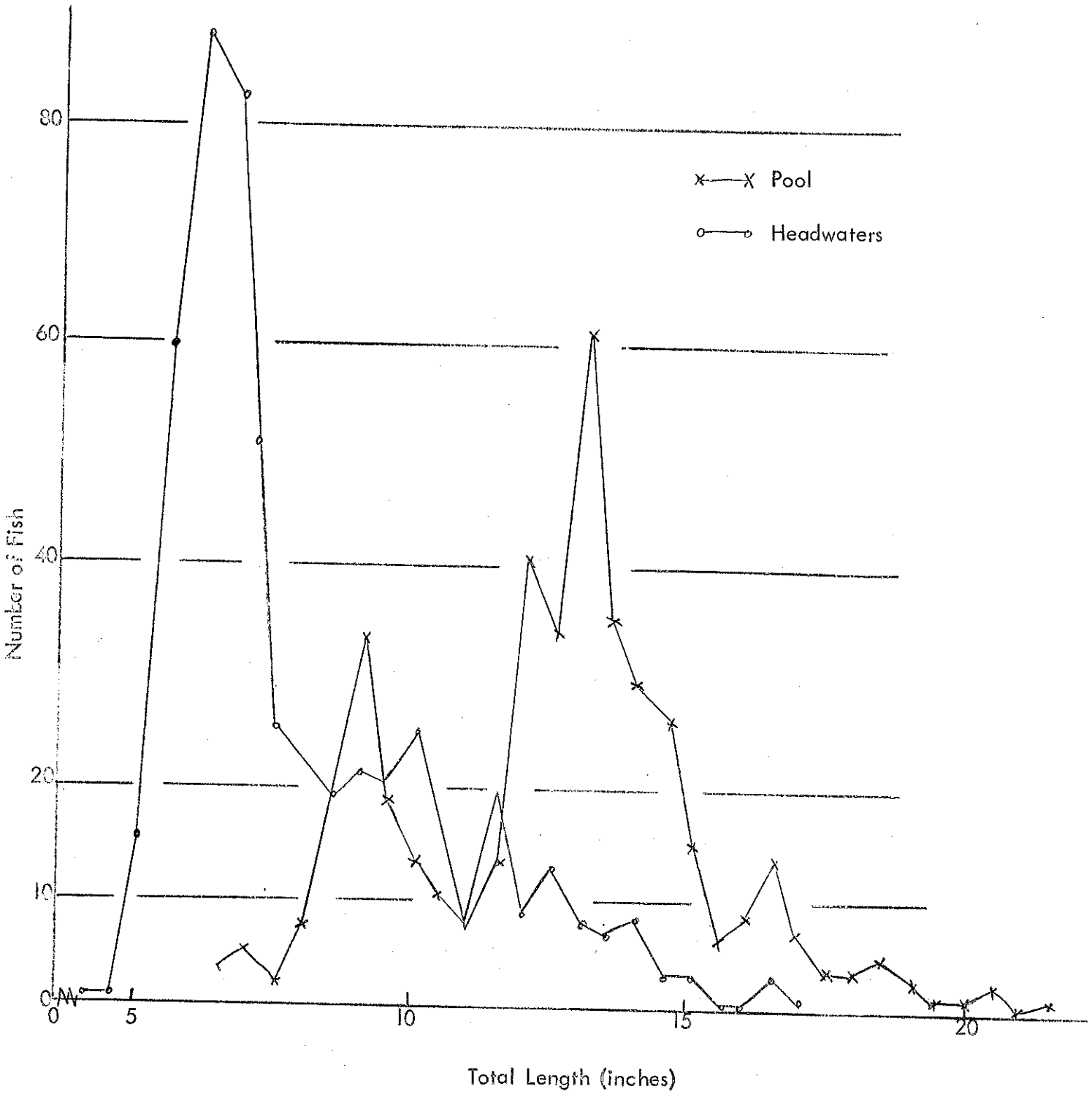

Figure 1. Length-frequency distribution of channel catfish caught in the pool and headwaters of the Coralville Reservoir

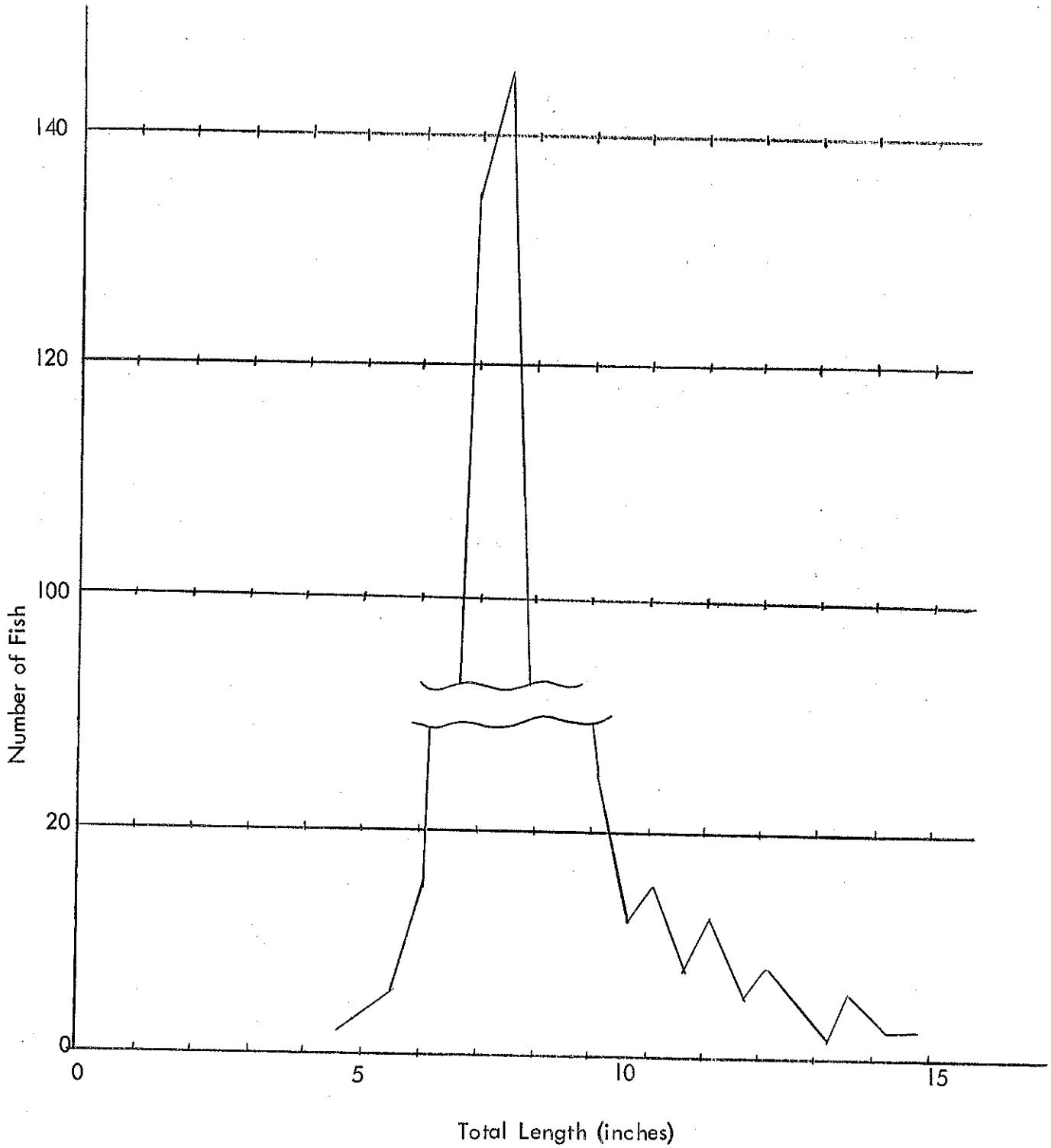

Figure 2. Length-frequency distribution of channel catfish caught in the tailwaters of the Coralville Reservoir

Length-frequency data for 522 fish collected in the headwaters and 418 fish collected in the pool (Figure 1) show a striking difference in the preponderance of size classes. The sample from the headwaters was made up primarily of fish under 8 inches while the smaller fish were virtually absent from samples taken in the pool.

This phenomenon could be attributed to a number of causes, but the author prefers to think that the headwaters is serving as a nursery area for the smaller catfish and that there is a downstream migrational trend when the fish reach 2 to 3 years of age. This theory is presently being investigated through a tagging study.

Length-frequency of 614 channel catfish taken in the tailwaters (Figure 2) is similar to the sample taken in the headwaters.

SUMMARY

A sample of 1,554 channel catfish were collected in the headwaters, pool and tailwaters of the Coralville Reservoir. Back calculations were made on a subsample of 265 of these fish for age and growth analysis. It was found that fish from the headwaters and the pool tended to grow at an equal and rapid rate, while fish in the tailwaters grew markedly slower. The latter grew at a rate comparable to those in most other inland eastern Iowa rivers, and the former grew at a rate between those of other eastern Iowa rivers and the rapidly growing Mississippi River catfish. At the time of sampling, the headwaters and tailwaters were made up primarily of small fish, while the pool was dominated by larger fish.

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TABLE 1. Length frequency of the commercial catch of channel catfish measured in the Mississippi River in 1964

Pool	Total No. Fish Measured	Per cent of catch in various length groups (inches)											
		10	11	12	13	14	15	16	17	18	19	20	21 and over
9	315		Tr.	11	46	19	10	5	4	1	Tr.	1	Tr.
10	189			8	41	30	6	10	4		1		
11	1,525		Tr.	11	36	29	12	5	3	2	Tr.	Tr.	Tr.
14	288			15	39	23	15	4	2	1	Tr.		
16	138		1	20	32	13	11	11	6	2	1		
17	380			11	43	24	14	4	3	1	Tr.		
18	260			12	44	24	11	5	2		Tr.	1	
19	1,585		Tr.	10	20	18	13	13	14	7	3	1	Tr.
20	181	Tr.	15	37	29	10	3	2	2				
All pools combined	4,861	Tr.	1	13	33	23	11	7	7	3	1	Tr.	Tr.

COMMERCIAL CHANNEL CATFISH CATCH STUDIES IN THE MISSISSIPPI RIVER IN 1964

Roger Schoumacher
Fisheries Biologist

For the past two years a study has been conducted on the commercial catch of channel catfish in the Mississippi River. These studies were prompted by complaints from commercial fishermen who said that the catch of channel catfish was declining in recent years, and by catch statistics compiled by the Iowa Conservation Commission that indicated a decline in the commercial catch. Previous seminars (Ia. Cons. Comm., Qtrly. Biol. Repts., (15)1, (16)1, and (16)2 have given additional background information and the results of the 1963 investigations.

During 1964, 4,861 commercially caught channel catfish were measured (total length to the nearest 1/10 inch) at landings and markets in Illinois and Iowa. Fish were taken in every pool except 12, 13 and 15. Spines were collected from 588 fish for aging.

Length Frequency

Fourteen per cent of the fish were under the legal 13-inch size limit, 47 per cent were under 14 inches, and 70 per cent were under 15 inches (Table 1). Only about 2 per cent were 19 inches or longer. These figures are almost identical with those for the 1963 catch. The size distributions from the various pools were similar to one another with the exception of pools 19 and 20. In pool 19 there was a greater percentage of larger fish (16-20 inches), whereas in pool 20 there was an unusually large number of small fish (under 13 inches).

Age Composition

The catch was dominated by age III and IV fish, contributing 47 and 49 per cent respectively. A pool-by-pool breakdown follows:

Pool 9 - In mid-July and early August the catch was dominated by age III fish, with the remainder nearly all age IV.

Pool 10 - In early August, 61 per cent of the fish were III and 31 per cent IV.

Pool 11 - In early August, 83 per cent of the fish were III and 12 per cent IV.

Pool 14 - In mid-August, 42 per cent of the fish were III and 58 per cent IV.

Pool 16 - In late July, 72 per cent of the fish were IV and 22 per cent V.

Pool 17 - In late July, 74 to 95 per cent were IV and 5 to 17 per cent III. In mid-August, 78 per cent were IV, 12 per cent III, and 10 per cent V.

Pool 18 - In late July, 82 per cent of the fish were IV and 15 per cent III.

Pool 19 - In the last half of May, 72 per cent of the fish were IV and 25 per cent III. By the end of July, 79 per cent were III and 20 per cent IV.

Generally, age IV fish are the most important in the catch early in the year. By mid-July or early August, age III fish become more important as they "grow into" the catch. This was shown in the 1963 data as well.

Growth

The average size of fish of various ages was calculated by month for each pool (Table 2). The average size of certain age fish in the commercial catch does not necessarily reflect the average size of that age fish in the population. For instance, the 13-inch size limit did not always allow the commercial fishermen to harvest the smaller age III fish, so the average size of age III fish in the commercial catch is larger than the average size in the river population.

These fish continue to show an excellent growth rate, as they did in 1963.

Studies are continuing in 1965 to determine if any changes should be made in the management of the channel catfish in the Mississippi River.

TABLE 2. Average size of commercially caught channel catfish of various ages measured in 1963

Pool	Month	Total length in inches at various ages		
		III	IV	V
9	July	13.4 (55)*	16.1 (22)	
9	August	13.6 (16)	16.7 (5)	
10	August	13.8 (27)	16.5 (16)	
11	August	14.3 (40)	16.3 (10)	21.4 (5)
14	August	13.4 (17)	15.0 (34)	
16	July		13.8 (26)	16.5 (7)
17	July	13.4 (6)	14.1 (67)	
17	August	13.2 (6)	14.5 (39)	16.0 (5)
18	July		14.2 (41)	
19	May	13.1 (18)	15.6 (51)	
19	July	14.6 (21)	16.8 (9)	

RESULTS OF A VOLUNTARY CREEL CENSUS ON NORTHEASTERN IOWA RIVERS IN 1964

Robert Schacht
Fisheries Biologist

A voluntary creel census was continued again in 1964 on major northeastern Iowa rivers. Conservation Officers in various counties were asked to supply a list of 6-10 better-than-average anglers who had agreed to record their fishing activities on post card report forms.

For 1964 only 31 anglers reported as compared to 73 in 1963. Only data from the Wapsipinican, Iowa and the Cedar was sufficient for interpretation. Fishermen reported 534 trips totaling 1,492 hours on the three rivers. Each angler averaged 17.2 trips per year with each trip being 2.8 hours in length. Seventy-one per cent of the trips were successful in 1964.

Three tables are included to interpret the data. Table 1 gives the number of trips, and the total fish caught. Table 2 provides the number of each species caught and the per cent of the total catch that each species comprises. Table 3 provides the fish caught per hour by species and the per cent of effort directed at each species.

Wapsipinican River

One hundred ten trips totaled 458 hours and produced 446 fish at a rate of .99 fish per hour. Eighty-one per cent of the trips were successful. Channel catfish made up 84 per cent of the catch and were caught at a rate of 1.41 per hour. Catfishing was better than average. Seventy-three per cent of the total fishing effort was for the catfish.

Iowa River

One hundred and sixty-five trips totaled 428 hours of fishing. A total of 315 fish were caught at a rate of .74 fish per hour. Only 58 per cent of the trips were successful. Sixty-three per cent of the catch was divided between bullheads (24 per cent), carp (21 per cent), and channel catfish (18 per cent). Catfishing was down yielding only .69 fish per hour. Twenty-six per cent of the effort was directed at the catfish, again the most sought of all the species.

Cedar River

Two hundred and fifty-nine trips yielded 606 hours of fishing. A total of 695 fish were caught at the rate of 1.13 fish per hour. Sixty-eight per cent of the trips were successful. Channel catfish made up 69 per cent of the catch. The channel catfish received the most pressure with 63 per cent of the fishermen trying for the channel catfish. Channel catfish were caught at a rate of .99 fish per hour.

TABLE 1. 1964 voluntary creel census data for northeastern Iowa rivers

River	No. Trips	% Successful Trips	Hrs. Fished	Fish/ Hr.	Total Fish Caught
Wapsie	110	81%	458	.99	446
Iowa	165	58%	428	.74	315
Cedar	259	68%	606	1.13	695
Totals	534	71%	1,492	.97	1,451

TABLE 2. 1964 voluntary creel census data for northeastern Iowa rivers
(Expressed as number of each species caught and per cent of the total catch by species)

	Fish caught	Bluegill	Crappie	L.M. Bass	S.M. Bass	Walleye	N. Pike	Channel Catfish	Flathead Catfish	Bullhead	Carp	Misc.
Wapsie	441	5 1%	13 3%	1 -	7 2%	- -	4 1%	375 84%	1 -	1 -	29 6%	5 1%
Iowa	315	5 2%	28 9%	2 1%	30 9%	4 2%	36 12%	57 18%	9 2%	76 24%	67 21%	1 -
Cedar	695	5 -	27 4%	- -	52 8%	2 -	- -	476 69%	20 3%	10 1%	90 13%	13 2%
Totals	1451	15 1%	68 4%	3 -	89 6%	6 -	40 3%	908 63%	30 2%	87 6%	186 14%	19 1%

TABLE 3. 1964 voluntary creel census data for northeastern Iowa rivers
(Expressed as fish caught per hour by species and per cent of effort directed at each species)

River	All Species	Channel Catfish	S.M. Bass	L.M. Bass	Crappie	Carp	N. Pike	Bullhead	Walleye	Flathead Catfish	Mixed Bag
Wapsie	.99	1.41	.78	-	3.0	-	.50	-	-	-	
	100%	73%	3%	-	1%	-	1%	-	-	-	1.26
											22%
Iowa	.74	.69	.63	.67	2.8	2.35	.76	6.5	.50	.50	1.74
	100%	26%	11%	2%	4%	12%	19%	5%	4%	1%	16%
Cedar	.97	.99	.50	-	1.0	2.11	-	.50	-	.25	1.73
	100%	63%	2%	-	1%	7%	-	1%	-	1%	24%

1964 OFFICER CREEL CONTACT CENSUS FOR NORTH CENTRAL IOWA

Gary Ackerman
Fisheries Biologist

INTRODUCTION

This report concerns the inland rivers and streams making up the Des Moines and Skunk River watersheds in Iowa. Creel contact information is compiled for the following rivers and streams: the main stem of the Des Moines, the East Fork of the Des Moines, West Fork of the Des Moines, North Raccoon, Middle Raccoon, South Raccoon, Middle River, Winnebago, Boone, and the Skunk River.

The information contained in this report is at best only an indication of the quality of fishing in Iowa streams and the quantity of fish being harvested as reported by conservation officer contact census. Quality is represented by comparing the percentage for each species being taken with the total number of fish harvested by the anglers contacted. This information is further broken down on a county-by-county basis and then totaled for each river system. Quantity is approached by comparing the production; i.e. fish per hour and fish per fisherman.

PURPOSE

When assuming all bias of this data being equal from year to year and when this data is complete and in large enough samples, some long range trends may be detected. For example, yearly data may indicate some degree of success or failure of artificially stocked game fish. These game fish should show up in the creel in order to indicate a successful management technique. Another example, as future impoundments are constructed and as new habitats are created, present fish populations will change. Creel contact census may furnish valuable information in detecting this change in the future. Further, creel census information may be used for comparison purposes in areas where severe fish kill has occurred.

RESULTS

Des Moines River

In total, the creel census report for this river is fairly complete. Channel catfish compose 59 per cent of the total catch and carp make up 27 per cent. Flathead catfish compose 2 per cent which shows some utilization of this species by sport fishermen. Other game fish including walleye, smallmouth bass, northern pike and crappie compose less than 2 per cent of this total.

East Fork of the Des Moines River

Bullheads appear to be by far the most important game species creeled in this river. They make up 82 per cent of the catch while channel catfish make up only 9 per cent. Walleye make up 6 per cent.

West Fork of the Des Moines River

This river offers the best fishing for game fish in central Iowa. Game fish make up 70 per cent of the total creel, and are caught as follows: walleye (22%), channel catfish (19%), bullhead (18%), crappie (6%), and northern pike (5%). Carp make up the remaining 30 per cent.

Raccoon River

The officer creel contact census for this river is quite complete. It should be noted that exactly the same species composition percentages for the two major species harvested were the same for this river as was recorded for the Des Moines River, namely, channel catfish (59%) and carp (27%). Other fish were caught in the following proportions: flathead catfish (2%), bullhead (1 1/2%), buffalo (1 1/2%), quillback (3%), and smallmouth bass (4%). The major portion of smallmouth bass were reported from Sac County.

Skunk River

Data for this river is incomplete. Species composition is as follows: channel catfish (40%), carp (33%), bullhead (21%), drum (2%), and crappie (2%).

DISCUSSION

If the creel census is to be of value, conservation officers should strive to make an adequate number of contacts in their respective counties. Undoubtedly, the total worth of this census is largely dependent upon the individual officer. Due to different individual personalities, experience, ambition, and knowledge, this data may possess certain bias; so the only recourse is to assume this bias to remain generally the same from year to year.

Data should be collected at random rather than at select sites such as impoundments and below dams. Also, the time of the year and of the day when this data is collected will have some effect upon its reliability. For example, one could simply fill out the Field Contact Report record for a given stream in one week and then forget about this report for the rest of the season. To be sure, this is not the case; but for an exaggerated example, this illustrates my point.

The one important point of this census is that it is giving some fact and record to the fishermans' success upon our waters. Normal surveys only reveal the streams potential uses and the needs for management techniques; but they do not reveal the all important success of the fishermen. It seems apparent that fisherman success is our main objective and goal of fishery management and our success or failure at this art is directly reflected by the contents of the fishermans' creel.

SUMMARY

1. Channel catfish are the most important game species taken in inland Iowa streams in north central Iowa. Bullhead rank second.

2. Where adequate data has been collected, the "fine species" (walleye, smallmouth bass, northern pike, crappie, and bluegill) make up not more than 6 per cent of the reported catch. A notable exception to this is the data from the West Fork of the Des Moines River. Since this area has been recently renovated, it is unique.

3. Channel catfish are the most important species while carp rank second for the total creel as indicated by the officer creel census.

4. The headwaters of the rivers tend to produce more of the finer species while the tailwaters of the rivers tend to produce more carp and channel catfish.

DES MOINES RIVER

County	Total No. Contacts	Total No. Hrs. Fished	Total No. Fish Caught	Fish/Hr.	Fish/Man
Webster	77	71	18	0.25	0.23
Boone	329	687	159	0.23	0.48
Polk	376	808	330	0.41	0.87
Warren	12	51	12	0.24	1.00
Marion	99	168	100	0.60	1.01
Mahaska	---	---	---	----	----
Wapello	248	330	231	0.70	0.93
Davis	12	13	13	1.00	1.08
Van Buren	65	64	89	1.39	1.37
Lee	---	---	---	----	----
Totals	1,218	2,191	952	*0.79	*0.78

SPECIES COMPOSITION PERCENTAGES OF CREEL FOR TOTAL RIVER

	Channel Catfish	Flathead Catfish	Bullhead	Carp	Drum	Quillback	Shad	Sturgeon	Walleye	Crappie	Bluegill
Per Cent	59%	2%	6%	27%	3%	Tr.	Tr.	Tr.	Tr.	Tr.	Tr.
Sample	566	18	52	257	31	7	8	1	4	7	1

* This indicates average based on total number of contacts, hrs. fished, and fish caught rather than an average by county.

EAST FORK OF THE DES MOINES RIVER

County	Total No. Contacts	Total No. Hrs. Fished	Total No. Fish Caught	Fish/Hr.	Fish/Man
Emmet	6	14	61	4.36	10.17
Kossuth	21	10	58	5.80	2.76
Humboldt	19	31	13	0.42	2.76
Totals	46	55	132	*2.40	*2.87

SPECIES COMPOSITION PERCENTAGE FOR TOTAL RIVER

	Channel Catfish	Bullhead	Carp	Walleye
Per Cent	9%	82%	3%	6%
Sample	12	108	4	8

WEST FORK OF THE DES MOINES RIVER

County	Total No. Contacts	Total No. Hrs. Fished	Total No. Fish Caught	Fish/Hr.	Fish/Man
Emmet	-	-	-	-	-
Palo Alto	-	-	-	-	-
Humboldt	334	555	294	*0.53	*0.88

SPECIES COMPOSITION PERCENTAGE FOR TOTAL RIVER

	Channel Catfish	Bullhead	Carp	N. Pike	S.M. Bass	Crappie	Walleye
Per Cent	19%	18%	30%	5%	Tr.	6%	22%
Sample	56	52	89	15	1	17	64

RACCOON RIVER

County	Total No. Contacts	Total No. Hrs. Fished	Total No. Fish Caught	Fish/Hr.	Fish/Man
Buena Vista	-	-	-	-	-
Sac	60	106	56	0.53	0.93
Calhoun	8	13	5	0.38	0.62
Carroll	137	261	161	0.62	1.17
Greene	240	442	162	0.37	0.67
Dallas	161	187	98	0.52	0.60
Polk	25	59	31	0.53	1.24
TOTALS	631	1,068	513	*0.48	*0.81

SPECIES COMPOSITION PERCENTAGE FOR TOTAL RIVER

	Channel Catfish	Flathead Catfish	Bullhead	Carp	Buffalo	Quill-back	Sucker	S.M. Bass	Walleye	Bluegill	Drum
Per Cent	59%	2%	11/2%	27%	11/2%	3%	Tr.	4%	Tr.	Tr.	Tr.
Sample	304	10	6	139	6	14	2	21	3	3	2

SKUNK RIVER

County	Total No. Contacts	Total No. Hrs. Fished	Total No. Fish Caught	Fish/Hr.	Fish/Man
Story	49	79	35	0.44	0.71
Jasper	-	-	-	-	-
Marion	-	-	-	-	-
Mahaska	-	-	-	-	-
Keokuk	-	-	-	-	-
Washington	7	35	31	0.88	4.42
Jefferson	-	-	-	-	-
Henry	288	547	200	0.37	0.69
D. Moines & Lee	54	148	61	0.41	1.12
TOTALS	389	809	327	*0.40	*0.82

SPECIES COMPOSITION PERCENTAGE FOR TOTAL RIVER

	Channel Catfish	Flathead Catfish	Bullhead	Carp	Drum	Buffalo	Sucker	Bluegill	Crappie
Per Cent	40%	0%	21%	33%	2%	Tr.	Tr.	Tr.	2%
Sample	131	0	69	109	7	2	2	1	6

* This indicates average based on total number of contacts, hrs. fished, and fish caught rather than an average by county.

CREEL CENSUS OF FOUR, NATURAL, IOWA LAKES - 1964-65

Terry Jennings
Fisheries Biologist

Spirit Lake

Creel census data have been collected from Spirit Lake, Iowa's largest natural lake (5,660 surface acres), each year since 1945. However, it was not until 1956 that the present quantitative or comprehensive type of creel census was first employed. The creel census for this lake covers a ten-month fishing period extending from May through February. There is a limited amount of fishing in the lake during March and April each year but the fishing pressure is insufficient to warrant a full scale census. To conform with past reports, this segment of the report is divided into an open water fishing period covering May through November and a winter fishing period of December through February.

Open Water Fishing, 1964

Bullheads, yellow perch and walleyes, in that order of importance, accounted for nearly 88 per cent of the total fish creeled during the open water fishing period (Table 1). The bullheads individually made up 60 per cent of the total estimated catch while perch and walleyes each made up about 14 per cent of the total fish creeled. There were 8 other species of fish harvested by hook and line fishermen.

In 1961 there were over 11,000 white bass in the creel. Each year since, the white bass catch has gradually declined to a low of nearly 2,700 fish creeled in 1964. However, the average weight per fish has steadily increased from an average weight of 0.7 pounds per fish in 1961 to 2.10 pounds per fish in 1964, which seems to indicate limited reproductive success in the past few years for this species.

Even though channel catfish was in last place when ranked numerically, their presence is significant in that this was the first year they were present in the creel census data following 3 years of intensive fingerling stocking.

When ranked by total weight creeled, bullheads continue to lead the list followed by walleyes, perch and northern pike. These four species comprised 31, 25, 14, and 13 per cent respectively of the total weight in the creel. Seven other species accounted for the remaining 17 per cent of the total weight recorded.

The rate of fishing gradually improved throughout the summer months to a peak in August when an average of 2.79 fish were creeled per hour of fishing and then declined through the remainder of the open water fishing period. Walleyes were the dominant fish on the stringer during the spring months and bullheads were the dominant fish harvested through the summer months.

Winter Fishing, 1964-65

Yellow perch and walleyes were the most abundant fish in the creel during the winter fishing period making up 49 and 44 per cent respectively (Table 2). Northern pike, crappie,

TABLE I. Total harvest of fish, as determined by comprehensive creel census methods, from Spirit Lake during the open water fishing period of May through November, 1964

Species	May	June	July	August	September	October	November	Totals or Averages	% of Catch	Average Weight Per Fish
Bluegill	0	3,175	1,728	698	843	32	117	6,593	4.1	.53
Crappie	942	604	97	46	138	151	0	1,978	1.2	.57
Walleye	9,091	9,039	2,467	649	966	837	46	23,095	14.2	1.02
White Bass	147	524	1,446	434	115	18	0	2,684	1.6	2.10
Northern Pike	4,241	1,791	452	179	368	399	136	7,566	4.7	1.58
Bullheads	5,286	5,766	18,422	45,970	15,609	912	538	92,503	56.9	.30
Largemouth Bass	87	68	528	83	12	0	0	778	0.5	1.91
Smallmouth Bass	0	38	26	18	12	0	0	94	0.1	1.73
Sheepshead	220	938	713	643	168	10	0	2,692	1.6	1.72
Yellow Perch	0	1,492	2,283	7,326	5,850	7,605	24	24,580	15.1	.58
Channel Catfish	0	16	12	0	0	0	0	28	Tr.*	2.78
Totals	20,014	23,451	28,174	56,946	24,081	9,964	861	162,591	100.0	.57
Total Anglers	11,622	11,501	8,062	8,158	6,581	4,160	1,238	51,322		
Total Hours	32,714	31,945	18,566	20,065	16,142	10,278	4,338	150,407		
Fish Per Man	1.73	2.04	3.49	6.87	3.66	2.40	.69	3.15		
Fish Per Hour	.61	.73	1.52	2.79	1.49	.97	.18	1.09		

* Less than 0.1%

TABLE 2. Total harvest of fish, as determined by comprehensive creel census methods, from Spirit Lake during the ice fishing period of December through February, 1964-65

Species	December	January	February	Totals or Averages	% of Catch	Average Weight Per Fish
Crappie	0	55	0	55	0.4	.74
Walleye	5,010	911	56	5,977	44.0	1.94
Northern Pike	82	329	133	544	4.0	2.60
Bullheads	20	0	0	20	0.2	1.20
Smallmouth Bass	0	13	10	23	0.2	1.63
Yellow Perch	5,309	1,245	413	6,967	51.2	.71
Totals	10,421	2,553	612	13,586	100.0	1.34
Total Anglers	4,033	1,743	452	6,228		
Total Hours	11,021	5,338	1,365	17,724		
Fish per Man	2.58	1.46	1.35	2.18		
Fish per Hour	.95	.48	.45	.78		

smallmouth bass, and bullheads in that order of relative abundance, made up the remaining 7 per cent of the fish creeled. During January and February, the fishing was very poor in Spirit Lake with an average of only .46 fish harvested per fishing hour. This catch rate is nearly the lowest on record.

The winter fishing period produced only 8 per cent of the total estimated fish taken during the ten-month census period, a marked decrease from the 22 per cent in 1963-64. However, considering the poor winter fishing and the increased numbers of bullheads harvested during the open water fishing period, this fact is not surprising.

During the ten-month census period, Spirit Lake provided an estimated 57,550 fishing trips and 168,131 hours of fishing recreation. This amounts to approximately 12 trips and 30 hours of fishing per surface acre of water in Spirit Lake. Nearly 30 fish totaling 20 pounds were creeled by these fishermen per acre.

West Okoboji Lake

West Okoboji Lake is a rather deep lake (maximum depth 132 feet) for this region, it is highly eutrophic and normally provides good fishing for several species. The ten-month census period on this 3,939 acre lake extends from May through February. A limited amount of fishing occurs during the months of March and April but the amount is not sufficient to justify a full scale census. Once again the data is divided into open water fishing and winter fishing periods. The open water fishing period encompasses the months from May through November and the winter fishing period extends from December through February.

Open Water Fishing, 1964

For the fourth consecutive season, yellow perch provided the best fishing of all the fish creeled during the open water fishing period (Table 3). They accounted for nearly 69 per cent of the 105,758 fish in the creel during these seven months of fishing. Bluegills were the second most abundant fish comprising 14 per cent of the creeled fish. Third on the list was bullheads which made up 10 per cent of the fish harvested. None of the remaining nine species in the creel made up more than 3 per cent of the total estimated catch and the aggregate made up only 7 per cent of the fish on the stringer.

Channel catfish in the creel is relatively new to West Okoboji Lake. The 45 channel catfish creeled during 1964 was the second highest estimated total taken since 1957, when the comprehensive type of creel census was first used on West Okoboji. The total channel catfish taken in itself is insignificant to the total catch of fish, but it does indicate the intensive stocking of sub-adult channel catfish from the Mississippi River into East Okoboji Lake is beginning to pay dividends. It also indicates there is considerable movement of the catfish through the narrow connecting way between East and West Okoboji Lakes following stocking.

There were more fish harvested during August than any of the seven other open water fishing months. During August there was an average 3.36 fish creeled each fishing hour. Even though August was the best fishing month, the following three months were close behind

TABLE 3. Total harvest of fish, as determined by comprehensive creel census methods, from West Okoboji Lake during the open water fishing period of May through November, 1964

Species	May	June	July	August	September	October	November	Totals or Average	% of Catch	Avg. Wt. /Fish
Bluegill	187	5,209	2,782	5,584	1,185	176	111	15,234	14.4	.45
Crappie	1,899	78	54	226	155	45	0	2,457	2.3	.62
Walleye	119	179	77	11	322	297	193	1,138	1.1	2.02
White Bass	25	14	297	84	458	155	18	1,051	1.0	1.05
Northern Pike	205	111	29	59	90	55	143	692	0.7	3.12
Bullhead	3,195	2,360	1,081	3,470	193	581	15	10,895	10.3	.65
Largemouth Bass	86	89	26	0	35	14	0	250	0.2	1.27
Smallmouth Bass	17	48	33	0	23	30	9	160	0.2	1.86
Carp	10	0	0	0	0	0	0	10	Tr.*	8.00
Sheepshead	94	135	201	609	192	7	11	1,249	1.2	1.30
Yellow Perch	206	499	811	16,587	13,929	22,114	18,302	72,448	68.5	.45
Channel Catfish	0	14	19	12	0	0	0	45	Tr.*	1.00
Sunfish	0	50	30	11	27	11	0	129	0.1	.18
Totals	6,043	8,786	5,440	26,653	16,609	23,485	18,802	105,758	100.0	0.54
Total Anglers	2,973	4,450	2,048	3,338	3,224	2,949	2,328	21,310		
Total Hours	7,911	10,064	4,698	7,928	6,406	7,242	6,083	50,332		
Fish Per Man	2.03	1.97	2.66	7.98	5.15	7.96	8.08	7.30		
Fish Per Hour	.76	.87	1.16	3.36	2.59	3.24	3.09	1.11		

* Less than 0.1%

with excellent fish per hour rates of 2.59, 3.24, and 3.09.

Winter Fishing Period, 1964-65

Yellow perch continue to be the most abundant fish creeled during the winter fishing period, comprising about 78 per cent of the 49,971 total estimated fish creeled (Table 4). Bluegills were the second most abundant fish caught. They comprised about 18 per cent of the creeled fish. Northern pike were third, making up about 2 per cent of the fish harvested. The remaining four species creeled, in the order of their relative abundance, were walleyes, crappies, largemouth bass, and smallmouth bass.

Fishing was good during the early part of the season but gradually declined thereafter from a high of 2.63 fish creeled per hour of fishing in December to a low of .83 fish taken per hour in February.

Even when both open water and winter fishing data are combined, the fishing pressure on West Okoboji Lake was very light, totaling only 8 fishing trips and 20 hours per surface acre. For the season, an average of 40 fish weighing a total of 20 pounds were harvested from each acre of water in West Okoboji Lake.

East Okoboji Lake

East Okoboji Lake, one of the chain of six lakes locally known as the "Iowa Great Lakes", has a surface area of approximately 1,400 acres. Although this lake has a maximum depth of 26 feet, the upper one-third of the lake (above the narrows) has an average depth of only 6 feet. East Okoboji is a highly eutrophic lake subject to heavy blooms of blue-green algae. A creel census program of some type has been in operation of this lake each year since 1945. The comprehensive type census presently employed on East Okoboji Lake has been in operation since 1957.

East Okoboji Lake normally supports several species of fish that are important in the winter sport fishery of other lakes but during the past fourteen years of legal winter fishing, the winter fishery has failed to develop to a point where the fishing pressure would warrant the cost of the censusing operation. As a result, the census period extends only from May through October.

Open Water Fishing, 1964

Each year since 1949, bullheads have dominated the catch and 1964 was no exception when they accounted for 61 per cent of the creeled fish (Table 5). Although bullheads lead the list in numbers creeled, the 10 pounds per acre harvested was far below the average 68 pounds per acre, per year which were harvested between 1957 and 1962. Population data from other sources indicate that the population of large adults has been rather low during 1963 and 1964 but these data also indicate there is a large population of smaller bullheads present. Apparently by September, 1964, these smaller fish had obtained a size more desirable to the angler.

TABLE 4. Total harvest, as determined by comprehensive creel census methods, from West Okoboji Lake during the three months of winter fishing from December through February, 1964-65

Species	December	January	February	Totals or Average	% of Catch	Average Weight Per Fish
Bluegill	5,602	3,212	438	9,252	18.5	.36
Crappie	122	0	20	142	0.3	.54
Walleye	130	339	0	469	0.9	1.40
Northern Pike	245	643	119	1,007	2.0	2.95
Largemouth Bass	20	0	65	85	0.2	1.63
Smallmouth Bass	0	0	37	37	0.1	3.30
Yellow Perch	24,364	13,486	1,069	38,919	78.0	.39
Totals	30,483	17,680	1,748	49,911	100.0	.46
Total Anglers	3,917	4,561	575	9,053		
Total Hours	11,594	13,879	2,105	27,578		
Fish Per Man	7.78	3.88	3.04	5.52		
Fish Per Hour	2.63	1.27	.83	1.83		

TABLE 5. Total harvest of fish, as determined by comprehensive creel census methods, from East Okoboji Lake during the open water fishing period of May through October, 1964

Species	May	June	July	August	September	October	Totals or Averages	% of Catch	Avg. Wt. /Fish
Bluegill	244	539	915	1,409	1,178	88	4,373	7.3	.48
Crappie	604	280	0	0	26	101	1,011	1.7	.45
Walleye	494	160	0	17	292	131	1,094	1.8	1.07
White Bass	92	69	21	0	38	34	254	0.4	.65
Northern Pike	113	9	12	0	74	0	208	0.4	2.43
Bullhead	3,688	8,772	4,792	5,430	12,359	1,845	36,886	61.9	.40
Largemouth Bass	23	33	10	3	29	0	98	0.2	1.22
Smallmouth Bass	0	0	0	0	21	0	21	Tr.*	.62
Sheepshead	265	619	178	170	119	0	1,351	2.3	1.16
Yellow Perch	184	770	1,099	1,841	8,566	1,673	14,133	23.7	.58
Channel Catfish	0	0	75	42	0	0	117	0.2	1.61
Carp	0	0	28	0	11	0	39	0.1	5.60
Sunfish	0	10	18	0	0	0	28	Tr.*	.35
Totals	5,707	11,289	7,120	8,923	22,702	3,872	59,613	100.0	.49
Total Anglers	3,575	8,092	2,175	1,793	3,434	1,471	20,540		
Total Hours	10,626	23,426	5,127	4,106	6,506	3,341	53,132		
Fish Per Man	1.32	2.10	3.27	4.98	6.61	2.63	2.90		
Fish Per Hour	.54	.72	1.39	2.17	3.49	1.16	1.12		

* Less than 0.1%

Yellow perch were the second most abundant species harvested. They accounted for 23 per cent of the creeled fish. Bluegills, the third most abundant species caught, comprised 7 per cent of the fish in the creel. Sheepshead, walleyes and crappies were the next most abundant species, each accounting for about 2 per cent of the fish in the creel. Seven other species were harvested but together they only comprised about 3 per cent of the total creeled fish.

The 117 channel catfish creeled during the open water fishing period was the highest estimated yearly total on record. The significance of these data are that they indicate the stocking of the sub-adult catfish into East Okoboji each year since 1962 is beginning to produce fishing.

Nearly 33 per cent of the 36,886 estimated bullhead catch for the six-month census period were caught during September. Also about 60 per cent of the 14,000 perch harvested were creeled during September. The excellent fishing for these two species helped make September the best fishing month on East Okoboji Lake during 1964. On the average, during this month, each hour of fishing produced 3.49 fish on the stringer.

During 1964 there were 14 fishing trips made and 38 hours of fishing recreation spent on each surface acre of water in East Okoboji Lake. There was also 42 fish totaling about 21 pounds harvested per acre of water in East Okoboji.

Center Lake

This is the second consecutive year that there has been a comprehensive type creel census employed on Center Lake. This small (329 acres), highly eutrophic lake was treated with toxaphene in the fall of 1958 with a complete kill obtained. Re-stocking recommendations called for largemouth bass and bluegills. Crappies were added accidentally, yellow bullheads and northern pike have since been stocked intentionally. Black bullheads were added from an unknown source. Adult bluegill and crappie stocked in the spring of 1960 produced exceptionally large year classes that summer. Population estimates completed two years later (Moen, 1962) indicated that there were a minimum of 500,000 bluegills and 100,000 crappies in the lake. During the latter part of the 1962 season, these fish reached a size where they were readily taken by anglers. The following year, Center Lake was added to the list of lakes censused. During 1964, the census period extended from May through October.

Bluegills lead the list as the most abundant fish in the creel (Table 6). They accounted for 69 per cent of the numerical total and about 57 per cent of the total estimated weight creeled. Crappies were the second most abundant fish creeled comprising 30 per cent of the fish taken and 39 per cent of the total weight harvested. Black bullheads, largemouth bass, northern pike, and yellow perch, listed in the order of their relative abundance, made up the other species on the stringer. Together, they only comprised about 1 per cent of the total estimated hook and line harvest.

The 224,369 estimated fish creeled during 1964 represents nearly a 200 per cent increase in the numbers of fish harvested by the hook and line fishermen from Center Lake. Fishing was phenomenal during May, June, and July when there were on the average 6.75, 4.48, and 4.09 fish creeled each hour of fishing respectively.

TABLE 6. Total harvest of fish, as determined by comprehensive creel census methods, from Center Lake during the open water fishing period of May through October, 1964

Species	May	June	July	August	September	October	Total or Average	% of Catch	Average Weight Per Fish
Bluegill	54,822	46,365	31,493	9,262	10,184	2,645	154,771	69.0	.24
Crappie	24,207	10,685	7,813	12,502	10,892	1,676	67,775	30.2	.36
Northern Pike	0	93	0	0	0	0	93	Tr.*	3.03
Bullheads	169	70	323	752	0	0	1,314	0.6	1.11
Largemouth Bass	0	130	61	77	131	0	399	0.2	2.15
Yellow Perch	17	0	0	0	0	0	17	Tr.*	.41
Totals	79,215	57,343	39,690	22,593	21,207	4,321	224,369	100.0	.28
Total Anglers	5,400	4,526	4,354	4,716	2,739	968	22,703		
Total Hours	11,728	12,813	9,705	11,472	6,329	2,410	54,457		
Fish Per Man	14.67	12.67	9.12	4.79	7.74	4.46	9.87		
Fish Per Hour	6.75	4.48	4.09	1.97	3.35	1.79	4.12		

* Less than 0.1%

On a per acre basis, Center Lake provided 682 fish weighing a total of nearly 200 pounds and 165 hours of angling recreation.

LITERATURE CITED

Moen, Tom. 1962. Center Lake progress report. Iowa Conservation Commission. Quarterly Biology Reports, XIV (3), Mimeographed.

TABLE 1. Eighty-eight per cent confidence intervals around the median catch of channel catfish over five inches long in a series of 15 gill nets

Lake	1963	1964
Omadi[1]	$1 \leq \leq 3$	$1 \leq \leq 2$
Snyder[1]	$1 \leq \leq 3$	$0 \leq \leq 4$
Lower Decatur[1]	$0 \leq \leq 3$	$1 \leq \leq 6$
Upper Decatur[2]	$1 \leq \leq 3$	$0 \leq \leq 3$
DeSoto[2]	$4 \leq \leq 7$	$3 \leq \leq 7$

[1] Lakes which are open to the river

[2] Lakes which are closed to the river

Reproduction

Reproduction of channel catfish in Omadi, Snyder, and Lower Decatur is difficult to determine since these lakes open to the Missouri River at their lower ends, allowing the possible immigration of young-of-the-year catfish into the lake. Young-of-the-year channel catfish were collected from Snyder in 1963 (Table 2). Fingerling channel catfish were stocked in this lake during 1962; however, these fish could be expected to be longer than 3.4 inches during mid-September, 1963. No young-of-the-year were caught in 1964. No young-of-the-year were caught in Omadi or Lower Decatur either year.

Either reproduction in the lake or immigration from the river occurred in Upper Decatur during 1963 since young-of-the-year were collected in the survey. The opening in the levee may have allowed young-of-the-year from the river to enter the lake. None were caught in the lake during 1964 (Table 2).

DeSoto was stocked with fingerling channel catfish during 1962 and 1963 but not in 1964. These stockings are probably responsible for the large number of sub-adults collected with seines during 1964. Seine Hauls later during mid-summer and fall, 1964, failed to collect young-of-the-year channel catfish.

Reproduction of channel catfish in any of these lakes appears limited.

Movement of Sexually Mature Fish

There appears to be movement of adult channel catfish from those lakes that open to the river. If 13 inches total length is chosen as the approximate minimum length Iowa channel catfish sexually mature (Harlan and Speaker, 1951) evidence can be presented to support this theory (Table 3).

TABLE 2. Total number of seine hauls, total catfish caught, total length range, and period of sampling in five Missouri River ox-bow lakes

Lake	Year	Total Seine[1] Hauls	Total Fish Caught	Total Length Range	Period of Survey
Omadi	1963	18	11	4.0 - 14.5	July
	1964	32	2	- 10.5	August
Snyder	1963	16	11	3.4 - 4.2	September
	1964	32	0	-	August
Lower Decatur	1963	23	9	6.0 - 7.0	August
	1964	32	4	4.9 - 8.5	July
Upper Decatur	1963	13	9	1.0 - 2.0	July
	1964	32	0	-	July
DeSoto	1963	16	3	2.6 - 8.6	May
	1964	32	383	2.7 - 8.5	May

[1] Both daytime and evening seining

Less than 12 per cent of those catfish caught in each lake open to the river either year were over 13 inches long. During most surveys of the open lakes, less than 5 per cent of the catfish were over 13 inches long. At least 22 per cent of the catfish caught in the closed lakes either year were over 13 inches long (Table 3).

Poor reproduction in the lakes separated from the river might explain why they contain a higher per cent of catfish over 13 inches long than in the open lakes. However, this does not explain the almost complete lack of catfish over 13 inches long in the open lakes.

Other evidence to support the possibility of sexually mature catfish movement is average total length and weight data (Tables 4 and 5). Average total lengths and weights of channel catfish caught both years were significantly larger in those lakes separated from the river than in those lakes open to the river. This indicates a larger per cent of the catfish population in the closed lakes is composed of the larger fish than in the lakes open to the river.

TABLE 3. Total channel catfish caught in 18 gill nets and the per cent above and below 13 inches total length from five lakes during 1963 and 1964

Lake	1963			1964		
	Total Caught	Per Cent Above 13 Inches T.L.	Per Cent Below 13 Inches T.L.	Total Caught	Per Cent Above 13 Inches T.L.	Per Cent Below 13 Inches T.L.
Omadi[1]	46	8.7	91.3	37	2.7	97.3
Snyder[1]	61	3.3	96.7	45	11.1	88.9
Lower Decatur[1]	45	4.4	95.6	81	2.3	97.7
Upper Decatur[2]	51	22.0	78.0	30	45.5	54.5
DeSoto[2]	70	29.3	70.3	97	64.1	35.9

[1] Lakes open to the river.

[2] Lakes closed to the river.

At present, all evidence indicates the apparent shortage of channel catfish over 13 inches long in those lakes open to the river is attributed to movement of these fish into the river. Future studies should include catfish tagging which could provide further information about the apparent movement of mature individuals.

TABLE 4. Total number caught, average total length, average weight, and total weight of channel catfish caught in 18 gill nets fished in five lakes during 1963

Lake	Total Caught	Average Total Length	Average Weight	Total Weight
Omadi[1]	46	11.0	0.49	22.40
Snyder[1]	61	10.9	0.34	20.50
Lower Decatur[1]	45	9.7	0.26	11.69
Upper Decatur[2]	51	12.5	0.76	38.80
DeSoto[2]	70	13.0	1.01	71.52

[1] Lakes open to the river

[2] Lakes closed to the river

TABLE 5. Total number caught, average total length, average weight, and total weight of channel catfish caught in 18 gill nets fished in five lakes during 1964

Lake	Total Caught	Average Total Length	Average Weight	Total Weight
Omadi[1]	37	10.7	0.34	12.4
Snyder[1]	44	10.8	0.40	17.5
Lower Decatur[1]	81	9.2	0.28	22.6
Upper Decatur[2]	30	14.1	1.21	35.8
DeSoto[2]	97	14.9	1.58	153.2

[1] Lakes open to the river

[2] Lakes closes to the river

LITERATURE CITED

Harlan, James R. and Everett Speaker. 1951. Iowa fish and fishing, Des Moines, Iowa State Conservation Commission.

RUFFED GROUSE AND WOODCOCK SURVEYS, SPRING 1965

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RUFFED GROUSE

In 1956 and 1960 a few exploratory roadside drumming counts were made in northeastern Iowa, the only area in the state where ruffed grouse are found at present. More intensive surveys were begun in 1961 and have been continued since that year. The spring roadside drumming count technique was selected as the most suitable census method for our purposes. Background information can be obtained from preceding issues of the Quarterly Biology Reports.

In the spring of 1965, 10 drumming counts were made in three northeastern Iowa counties. On 147 stops there were heard 230 drums - an average of 1.6 drums per stop (Table 1). The stability of the grouse population seems to be indicated by the indexes of abundance for the past 5 years (Table 2).

WOODCOCK

Iowa is one of the many states where woodcock nest. The singing ground surveys have been conducted each year since 1961 to obtain an index of abundance for the breeding population. This work is done in cooperation with the U. S. Fish and Wildlife Service.

Ten singing ground counts were made in 1965 in the eastern half of Iowa. Two routes could not be run because of high water. There were 14 woodcock heard on 84 stops - a mean of 0.17 birds per stop (Table 3). This mean is almost identical to the 1964 mean but below the 5-year average (Table 4).

Brood sightings and spring surveys show that breeding woodcock may be more widespread and common than generally believed. In 1965 one brood of four chicks was observed in Lucas County by the writer. In 1964 a nest with four eggs was found in Lee County by the Area Forester. Also in Lee County in 1963 a brood of four was photographed by the local Conservation Officer. In 1963 in Lucas County a chick was brought in to one of the biologists by his Brittany Spaniel. In Pottawattamie County in 1963 a brood was sighted by the Missouri River Unit Game Manager. Reports of sightings of adult birds without broods indicate the birds are widely scattered over the state during the breeding season, with the higher concentrations in eastern Iowa.

TABLE 1. Results of spring 1965 ruffed grouse drumming counts in northeast Iowa

Route	County	No. Stops	Drums Heard	Drums Per Stop
Yellow River State Forest	Allamakee (SE)	15	37	2.5
Village Creek	Allamakee (C)	15	41	2.7
Harpers Ferry - Wexford	Allamakee (E)	15	24	1.6
Upper Iowa	Allamakee (N)	15	34	2.3
Lower Yellow River	Allamakee (SE)	15	15	1.0
Highlandville - North Bear	Winneshiek (NE)	15	46	3.1
Frankville - Yellow River	Winneshiek (SE)	15	10	0.7
Sny Magill - Bierbaum	Clayton (NE)	15	5	0.3
Bloody Run	Clayton (NE)	15	15	1.0
Garnavillo - Buck Creek	Clayton (EC)	12	3	0.3
TOTALS		147	230	1.6

TABLE 2. Indexes of grouse abundance in northeast Iowa, 1961-65

Year	Drums Per Stop
1961	1.5
1962	1.8
1963	1.7
1964	1.5
1965	1.6
5 yr. Avg.	1.6

TABLE 3. Results of spring, 1965, woodcock singing ground counts in Iowa

Route	County	No. of Stops	No. of Birds Heard	Birds Per Stop
Luster Heights	Allamakee	8	1	0.13
Paint Creek	Allamakee	9	3	0.33
Sand Cove	Allamakee	8	0	0.00
Sny Magill	Allamakee	7	3	0.43
Rock Creek	Jasper	8	0	0.00
Buck Creek	Clayton	10	2	0.20
Canoe Creek	Winneshiek	9	0	0.00
Wapsie Bottoms	Bremer	10	2	0.20
Otter Creek	Tama	Not run because of high water		
Colyn Area	Lucas	10	1	0.10
Klum Lake	Louisa	Not run because of high water		
Lick Creek	Lee	5	2	0.40
TOTALS		84	14	0.17

TABLE 4. Indexes of woodcock abundance in eastern half of Iowa, 1961-65

Year	Birds Per Stop
1961	0.22
1962	0.21
1963	0.35
1964	0.16
1965	0.17
5 yr. Avg.	0.23

IOWA'S SPRING PHEASANT POPULATION - 1965

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INTRODUCTION

The crowing cock count, started in 1950, is the primary method for obtaining information on the spring pheasant population in Iowa. A 10-mile roadside count was added in 1962 when routes were shortened to 10 stops. There were 175 routes checked this year compared to 140 routes in 1964. Routes were checked by Conservation Officers, Unit Game Managers and Biologists.

The winter of 1964-65 was the coldest since 1935-36, but no severe snowstorms occurred until March. The second blizzard on March 17-18 caused above normal losses to Iowa's brood stock over much of the primary pheasant range in northern Iowa. Birds in adequate cover survived well but those in poor or marginal cover were lost. Storm loss was evident in about one-third of northwest and north central Iowa.

METHODS

The technique for conducting the spring crowing and roadside counts remained the same as in previous years (see April-June 1963 Quarterly Biology Reports, pp. 35-40). Results are given for the six major regions as well as statewide.

The winter pheasant count was conducted from January 1 to March 15, 1965 to determine the sex ratio of Iowa's post-season pheasant population. These results are presented and are used to complete the crowing cock count.

RESULTS AND DISCUSSION

Sex Ratio Count

Conservation Officers, Unit Game Managers and Biologists reported a total of 27,718 pheasants during the winter survey (Table 1). Snow cover was adequate and checking conditions were favorable, which increased the number counted this year. The observed sex ratio of 4.3 hens per cock indicated that hunters harvested 75 per cent of the cocks last fall.

This was the first good winter count following a long season - the count in 1964 was quite variable due to poor checking conditions. The 1965 results indicated that the harvest of roosters during the long season was much more favorable than for previous years.

TABLE 1. Observed sex ratios of pheasants, by regions, during the 1965 winter survey

Region	Number of Hens	Number of Cocks	Sex Ratio
Northwest	6,983	1,987	3.5
North central	6,419	1,195	5.4
Central	4,777	1,099	4.4
Southwest	2,994	632	4.7
East	722	167	4.3
South	607	136	4.5
STATEWIDE	22,502	5,216	4.3

Crowing Cock Count

Spring Count

The 1965 crowing cock census showed a statewide decrease of 21 per cent (Table 2). As was expected, the largest decrease was reported in the area hit by the blizzard on March 17-18. Although counts in the northwest and north central regions were down, averages for both regions remained above the statewide average. An adequate supply of cocks for brood stock was evident in all areas of the pheasant range.

Records from southwest and southern Iowa indicated a definite increase in this area of the state.

Censusing conditions were generally favorable in 1965 although a few counts were taken later because of strong winds. The 1965 average wind velocity reported on the counts was 3.0 mph. (Table 3). The average completion date was about one week earlier in southern Iowa and about the same in the northern range.

The statewide hen index was determined by multiplying the average number of calls per stop by the observed sex ratio from winter observations. Using the data obtained during the regular winter count, this survey indicated only a slight loss (-7%) in the spring hen population. However, data obtained after the blizzard indicated that hens suffered more severe losses than cocks. Direct counts before and after the storm on the Winnebago Research Area showed a 50 per cent loss of hens and a 20 per cent decrease in the number of cocks. If this correction is applied to the north central and northwest regions, the statewide sex ratio would have been 3.5 hens per cock instead of 4.3 and the spring hen index would be 32.9 - a decrease of 23 per cent in the statewide hen population.

TABLE 2. Results of the 1965 spring pheasant crowing cock counts made by Conservation Officers, Unit Game Managers and Biologists, and comparison with 1964 counts

Region of State	1965		1964		Change from 1964
	No. of Counts	Mean Calls per Stop	No. of Counts	Mean Calls per Stop	
Northwest	27	11.4	20	20.4	-44%
North central	25	12.8	21	19.1	-33%
Central	29	9.5	25	15.0	-37%
Southwest	21	13.6	21	10.6	+28%
East	32	5.3	20	5.9	-10%
South	41	7.2	33	4.4	+64%
STATEWIDE	175	9.4	140	11.9	-21%

TABLE 3. Comparison of dates on which spring pheasant counts were taken and mean wind velocity during counts, 1965 vs. 1964

Region	Mean Date of Counts		Mean Wind (mph)	
	1965	1964	1965	1964
Northwest	May 15	May 18	3.5	4.4
North central	May 17	May 14	3.6	4.6
Central	May 13	May 15	3.1	3.7
Southwest	May 8	May 19	2.4	2.5
East	May 12	May 13	3.1	2.3
South	May 7	May 18	2.0	3.2
STATEWIDE	May 12	May 16	3.0	3.4

Spring Roadside Counts

There were 3,444 pheasants sighted on the 175 10-mile roadside routes censused this spring - an average of 1.97 birds per mile compared to 2.76 birds per mile in 1964. This part of the spring population survey showed a decrease of 25 per cent in the number of roosters sighted and 31 per cent fewer hens when compared with the 1964 results. Figures indicated the most severe loss in the northwest region, and the northwest half of the north central region.

The statewide observed sex ratio on the 1965 roadside counts was 2.3 hens per cock, which was about the same as in 1964 when 2.4 hens were reported.

Thus, when all counts are considered, Iowa's spring pheasant population was somewhat lower than in 1964 but was equal to the 1963 population and higher than in 1962 (Table 4).

TABLE 4. Results of spring pheasant population counts, 1962-65

Year	Calls per Stop	Hen Index	Cocks per Mile	Hens per Mile	Birds per Mile
1962	11.6	36.0	0.74	1.02	1.77
1963	12.9	38.7	0.95	1.36	2.31
1964	11.9	42.8	0.80	1.96	2.76
1965	9.4	32.9 Est.	0.61	1.36	1.97

TABLE 5. Results of the 1965 spring roadside pheasant counts

Region of State	No. of Miles	No. of Cocks	No. of Hens	Total Birds	Cocks per Mile	Hens per Mile	Total per Mile	Sex Ratio (M:F)
Northwest	270	152	244	396	0.56	0.90	1.46	1.6
North central	250	243	549	792	0.97	2.20	3.17	2.3
Central	290	187	389	576	0.64	1.34	1.98	2.1
Southwest	210	170	581	751	0.81	2.77	3.58	3.4
East	320	142	324	466	0.44	1.01	1.45	2.3
South	410	166	297	463	0.40	0.72	1.12	1.8
STATEWIDE	1,750	1,060	2,384	3,444	0.61	1.36	1.97	2.3

QUAIL HUNTING RESULTS FOR THE 1964-65 SEASON

M. E. Stempel
Game Biologist

INTRODUCTION

This report on quail hunting success for the past season is based on an Iowa postcard survey. This survey was more comprehensive than those made in the past. The latter included checking station questionnaires in 1933, when data indicated that gunners take only a small per cent of the wild quail, and more recently, Officer contact booklets. Both of these gave a general view of hunting by a few hunters. The 1964-65 survey is based on mail contacts of a sample taken from the 189,000 resident hunting and 112,650 combination hunting-fishing license holders and the 8,350 non-resident licensees. Through the 1965 postcard survey, about 5,000 hunters were contacted and data from those that replied are herein expanded to represent the 1964-65 success of all Iowa quail shooters.

Quail hunters in 1964-65 had the benefit of regulations based on high production due to an open winter and a favorable spring and summer. Hence, there was a slight liberalization over the previous season when gunning was from November 2, 1963 to January 1, 1964; hours were 8:30 A.M. to 5:00 P.M. with a daily limit of 6; possession limit of 12; with 69 counties open for quail hunting. Other 1963-64 information is in the April-June Biology Reports, 1964. The 1964-65 season was October 31, 1964 to January 3, 1965; hours, 8:30 A.M. to 5:00 P.M.; bag 8; possession 16. The entire state was open for quail shooting.

METHODS

The names of cooperators were obtained by drawing from the duplicate license files in Des Moines about 1.6 of each 100 resident combination licenses and each 100 resident hunting licenses. About 1.75 were drawn from each 100 of the non-resident hunting licenses. Of these, each holder received a letter of instructions and the postcard which was to be filled in and returned. On the reverse side of the card were spaces for recording the county hunted, species of game, hours, and related items.

RESULTS

Resident Licensees, Statewide

From the entire state, 2,022 cards were returned. On 306 there was useable data concerning quail shooting, indicating 15.1 per cent of resident hunters shot quail. This material came from all the 99 counties. Resident hunters bagged 286,430 quail (Table 1). The 45,465 such hunters made 136,400 quail gunning trips involving 527,400 hours.

The average hunter who shot quail made 3.0 trips during the 1964-65 season. The average hunting outing for the individual was 3.8 hours, with 2.1 birds bagged per trip and a success rate of 1.8 hunting hours per quail (.55 bird per hour).

TABLE I. Results of 1964-65 Iowa quail hunting season (from hunter postcard questionnaire)

	Resident	Non-Resident	Total
Statewide Bag - Quail	286,430	4,600	291,030
Total Hunting Hours	527,400	9,950	537,350
Total Hunting Trips	136,400	3,105	139,505
No. Hunting This Species	45,465	1,070	46,535
Per Cent Hunting This Species*	15.1%	12.8%	15.0%
Avg. No. Trips Per Hunter	3.0	2.9	3.0
Avg. No. Gun Hours Per Hunter	11.6	9.3	11.5
Avg. No. Hours Per Trip	3.8	3.2	3.8
Avg. No. Bagged Per Hunter Per Season	6.3	4.3	6.3
Avg. No. Bagged Per Trip	2.1	1.5	2.1
Avg. No. Bagged Per Gun Hour	0.55	0.46	0.55
Avg. No. Hours Per Bird Bagged	1.8	2.2	1.8

* Based on 301,650 resident hunting and combination hunting-fishing licenses and 8,350 non-resident licenses.

The State Divided into 9 Regions

Iowa census and hunting records dating back to 1933 indicate that quail hunters are more plentiful in southern Iowa than in northern Iowa. The relative abundance can be established by using data from the postcard survey.

For this, the state is here divided into 9 sections, and each is made up of one horizontal tier of counties. The irregularly arranged eastern border counties are included in a convenient logical pattern so that all are within one of the 9 sections. Number 1 tier is in the south.

Tier 1 has 10 counties; Fremont County is on the west, Lee on the east. In the sample of resident hunters who purchased licenses in these 10 counties, 45 per cent reported they hunted quail. In tier 2, it was 38 per cent. In tiers 3, 4 and 5 it was 22, 22 and 21 per cent respectively. For number 6 it was 7 per cent and this diminished to 2 in the northern tier (number 9).

The State Divided into 3 Regions

As another step in utilizing the quail data, we can divide Iowa into 3 regions. The best quail territory is within the 3 southern tiers of counties where the low-grade land is not heavily farmed, or cultivated, and here the good quail cover is most abundant. Seventy-seven per cent of the quail reported shot were taken in this southern one-third of Iowa. Sixty-seven per cent of all trips were made in this territory. In this section, 31 counties were open for shooting quail and in 1964-65, 223,415 birds were shot by 25,006 licensed resident shooters. They made 90,024 trips and spent 348,084 hours in the field in this area.

Average time for each trip was 3.5 hours during which they took an average of 2.4 quail with a success rate of 1.6 hours per bird (.63 bird per hour). Best success in this area was in prime range in the south central part where the rate was 1.5 hours per bird (0.66 bird per hour).

Just to the north of the above, in the central one-third of the state, a total of 83,065 quail were taken by 19,095 hunters during 39,556 trips on which the shooters spent 147,672 hours. Average hours per trip was 3.5, and 1.5 birds were taken per trip at a rate of 2.3 hours per quail (.43 bird per hour).

In the northernmost one-third, 2,864 quail were shot by 455 hunters during 1,364 trips with an expenditure of 5,274 hours. Average quail trips lasted 4.8 hours with 0.38 bird per trip at a rate of 12.1 hours per bobwhite (.08 quail per hour).

Zoogeographical Regions

The best quality quail range adjoins the state of Missouri; this is the region of southern Iowa loess which is described in "Soils of Iowa" Iowa State College of Agriculture (Brown, 1936). The area lies in south central and southeastern Iowa. In this high quality range the postcard survey indicated that the average cooperator had a success rate of 1.6 hunting hours per quail (.63 quail per hour), with Decatur County results at 1.1 (.90 quail per hour), Wayne County at 1.2 (.85), and Wapello at 1.3 (.77).

In secondary or border range where counties are partially within, but north and west of, the main quail range, the survey revealed that average success was 1.7 hours per bird, and the highest success was in Madison County at 1.0, with Union at 1.1, and Marion at 1.4.

Marginal range lies in better grade soils that are heavily tilled and where there is no extensive quail cover. This is in an area west of the secondary range as well as to the north and it includes the middle one-third of Iowa. The card survey revealed that average hunter success was 2.3 hours per quail with best success in Jasper County at 1.0, with Polk at 1.5, Scott at 2.0 and Linn at 2.8.

Counties Where the Take of Quail Was High

Data on bag, hours, trips and number of hunters indicate the distribution of hunting pressure; i.e., heavily hunted counties are pointed out. These counties are extensively hunted because they offer some gunning near large towns, or because they offer outstanding shooting.

Heaviest reported kill of quail was in Decatur, Wapello, Union, Marion and Wayne Counties with about 13,500 birds taken in each county, with Decatur showing the highest take. Other counties where the take was high were Appanoose, Ringgold, Lee, Madison, Lucas, Mahaska, Warren and Van Buren, which contributed about 9,000 each with Appanoose having the highest count. There was an average kill of about 3,000 quail for each of the 99 counties.

Several counties that have high bobwhite hunting pressure attract hunters because they have both quail and pheasants, and in addition they are fairly close to large towns.

A Special 3-County Survey

While the wide-scale survey gave information on several aspects of hunting, an additional sample was taken to determine more precisely the importance of quail hunting among residents of southern Iowa. For this additional survey, 260 letters and cards of the postcard survey were apportioned among the approximately 8,000 licensed shooters in Wapello, Warren and Wayne Counties. All 3 counties are popular with quail men. Of those hunters contacted, 95 returned the card. Fifty-four per cent of these had gone hunting for quail. It is also noted that each spent 1.7 hours per bobwhite in the bag and 39 per cent hunted primarily in the county where the license was purchased. For comparison, in the statewide survey 57 cards were returned from the above 3 counties (29 included quail, 28 did not). Added to the special survey cards this made 152 returns; and of these, 53 per cent had pursued quail.

Non-Resident Hunters

In addition to licensed resident quail shooters, 86 non-residents returned the report cards and 11 of these said they hunted quail, indicating 12.8 per cent of the total had hunted quail in 1964-65. Non-residents bagged 4,600 quail last year (Table 1). One thousand seventy such hunters made 3,105 quail hunting trips involving 9,950 hours.

Non-resident quail shooters recorded an average (per man) hunting trip of 3.2 hours, with 1.5 birds per trip at the rate of 2.2 hours per quail (.45 quail per hour).

Discussion and Comparison With Related Surveys

The 1964-65 postcard survey provided a statewide sample of quail hunting and it was made during a period when the quail population was on the increase. The postcard survey indicated fairly good success, and the same was indicated in the Conservation Officers' field contact booklet record of the 1964-65 season.

Comparison of the success of resident hunters as given by the cards and by the booklets is as follows: In the prime range in the southern Iowa loess area, cards showed an average success rate of 1.6 hours per quail (.55 quail per hour). Officers' booklet records showed 1.2 (.82 quail per hunter-hour). In secondary range the cards indicated an average of 1.7 (.59 quail per hour) while booklets indicated 3.0 hours per quail (.33 quail per hour). In marginal range, the card results were 2.3 (.44) while no 1964-65 booklet reports were received.

This postcard survey revealed that 15.1 per cent of resident shooters and 12.8 per cent of non-residents take quail. Other surveys have indicated that from 12 to 28 per cent of average gunners shoot some quail, while the recent special survey in 3 southern counties indicated that 54 per cent of these hunters pursue quail.

In addition to the kind of game sought, the bobwhite shooters made other decisions as to travel, the places hunted and other species taken. Twenty-four per cent hunted primarily outside the county where they purchased their license. Some hunted in an adjoining county, and the 1963-64 postcard survey showed that others travel up to 500 mile round trips. Non-residents travel from as far as Wyoming and Ohio. Best hunting (1.6 hours per bird, by the 1965 survey) is in the southeast and the south central part of Iowa. Quail are also taken along with other game since 87 per cent of quail gunners included pheasants and 65 per cent included squirrels in their reports of game bagged.

SUMMARY

1. A sample of 1.6 per 100 of resident hunters and 1.7 per 100 of non-resident hunters in Iowa was contacted by mail after the 1964-65 quail hunting season and asked about their hunting activity and success.

2. A total of 2,022 resident and 86 non-resident hunters filled out and returned the postcards, or less than half of those contacted.

3. Returns indicated that 15.1 per cent of residents and 12.8 per cent of non-residents hunted quail.

4. Resident hunters totaling 45,465 took 286,430 quail at the rate of 1.8 hours per bird.

5. Non-residents totaling 1,070 took 4,600 quail at the rate of 1.8 hours per quail.

IOWA WATERFOWL PRODUCTION AERIAL TRANSECT SURVEY, 1964-65

Richard Bishop
Game Biologist

INTRODUCTION

During the summer of 1965 an aerial transect route was flown across the northern part of Iowa to count young waterfowl. This route was flown for the first time during the summer of 1964. The transect route was established to provide a method of evaluating the production of waterfowl in that section of the state which is of primary importance in this respect.

Marsh and pothole numbers and conditions were also noted while taking the transect.

METHODS

The transect was flown by a commercial pilot during 1965; however, in 1964 the Conservation Commission used its own airplane to fly the route. The brood count transect covered a 1/8-mile wide strip on each side of the airplane. The airplane was flown at an altitude of 150 feet and at speeds of 80 to 90 miles per hour. The pilot and three observers flew the transect. One observer routed the course and the other two observers made the counts.

While taking the transect, observations were taken 1/2 mile on each side of the airplane to count the number of potholes and marsh areas sighted along the transect route and record their condition.

The 1st and 2nd of July were selected as the dates for the transect to be flown.

RESULTS

The transect route was divided into four segments for recording the numbers of waterfowl, potholes and marsh areas. There were 489 miles flown to cover the entire transect route.

Sixteen per cent of the potholes and marsh areas were dry compared to sixty-four per cent in 1964. In 1965, 255 wet potholes were observed and 47 dry potholes compared to 46 wet potholes and 127 dry potholes in 1964.

Only one brood was observed on the potholes and marsh areas; however, numerous adults were observed using them. There were 89 broods observed along the transect in 1965 and 109 broods in 1964.

Spotting broods was very difficult due to vegetative conditions and the speed and position of the airplane. Brood sizes were not obtained because of the high degree of inaccuracy in counting under these conditions.

Vegetative conditions were fair to good on the larger marshes and good to excellent on the smaller potholes, most of which were dry during 1964. The dry period of 1964 allowed reseeding of marsh plants which resulted in excellent conditions in 1965.

TABLE 1. Classification of broods observed during 1965 waterfowl aerial transect survey

Blue-winged Teal	Mallard	Coot	Unknown	Total
29	11	28	21	89

DISCUSSION

Weather, vegetation, and height and speed of the airplane influenced the number of broods sighted. The density of the vegetation varies on the different marshes in different years and it is almost impossible to have the same conditions every year. The less vegetation in a marsh, the easier broods are to see; but usually fewer broods are produced. Therefore, you could get an increase in broods sighted on certain areas but have lower over-all production.

Brood sizes could not be accurately determined under existing conditions and only a small strip of marsh or lake can be sampled at one crossing. Broods could be concentrated on one side of a marsh or in a certain type of vegetation. By crossing the area once, they could easily be missed. Also, the position and height of the plane often hampers one's ability to see broods. Due to the extreme variability of spotting broods, this technique will need considerable further evaluation before it can be used with confidence to estimate waterfowl production trends. A primary value of this survey is the determining of the relative abundance of wet potholes. With an increase in wet areas, we should expect a larger net production of waterfowl.

If the major goal is to determine the trend of Iowa's waterfowl production, it will be necessary to select a number of key marshes and lakes and survey them from the ground in much more detail and correlate this information with the aerial survey. A smaller plane, preferably a two-seater, should be used and the transect flown slower and at lower altitudes. Broods could be seen at low altitude with a small plane well enough to determine species. Using this overall survey method, more reliable information on which to base a production trend would be obtained.

Plans should also be made to survey these marshes earlier and count breeding pairs using the areas. This along with the summer brood counts on the different areas would give a broad idea of overall production.

TABLE 2. Results of aerial transects flown during July 1964 and 1965

Area	County	Broods 1964	Broods 1965
Segment A			
Elk Creek Marsh	Worth	1	0
Silver Lake	Worth	0	3
Harmon Lake	Winnebago	8	6
Little Goose Lake	Kossuth	0	0
Iowa Lake Marsh	Kossuth	0	1
Tuttle Lake	Emmet	0	0
Eagle Lake	Emmet	1	2
Christopherson Slough	Dickinson	7	2
Swan Lake	Dickinson	0	4
Marble Lake	Dickinson	1	0
Hottes Lake	Dickinson	0	1
Grovers Lake	Dickinson	2	1
Iowa Lake Marsh	Osceola	2	0
Rush Lake	Osceola	5	10
Total		27	30
Segment B			
Stony Lake	Dickinson	2	0
Garlock Slough	Dickinson	0	1
Lower Gar Lake	Dickinson	0	0
Prairie Lake	Dickinson	1	0
Spring Run Area	Dickinson	1	1
Lily Lake	Dickinson	2	1
4-Mile Lake	Emmet	2	0
Cheever Lake	Emmet	5	3
West Swan Lake	Emmet	9	2
East Slough	Emmet	7	0
Cunningham Slough	Emmet	3	0
Ingham Lake	Emmet	0	2
High Lake	Emmet	0	0
Bur Oak	Emmet	0	0
Buffalo Creek	Kossuth	0	0
Union Slough	Kossuth	11	15
Total		43	25

Area	County	Broods 1964	Broods 1965
Segment C			
Ventura Marsh	Cerro Gordo	3	5
Eagle Lake	Hancock	0	3
Five Island Lake	Palo Alto	0	2
Palo Alto Meadow Area	Palo Alto	3	0
Blue Wing Marsh	Palo Alto	3	3
Oppedahl Tract	Palo Alto	6	0
Smith's Slough	Clay	2	4
Trumble Lake	Clay	0	0
Dan Green Slough	Clay	9	8
Total		26	25
Segment D			
Round Lake	Clay	1	0
Barringer Slough	Clay	2	2
Virgin Lake	Palo Alto	1	0
Silver Lake	Palo Alto	0	3
Rush Lake	Palo Alto	0	1
West Twin Lake	Hancock	4	2
East Twin Lake	Hancock	5	0
Total		13	8
Total for entire transect		109	89

SUMMARY

1. On July 1st and 2nd, 1965, a 489-mile aerial waterfowl production survey transect was again flown to compare brood production with that of 1964.

2. In 1965, 89 broods of waterfowl were observed compared to 109 broods in 1964, but the many influencing factors preclude making a direct comparison of the two numbers.

3. Only 16 per cent of the marshes and potholes sighted were dry in 1965, whereas 64 per cent were dry in 1964.

4. The variability of observing broods is so great under the existing conditions, that if the information is to be usable the technique must be refined.

POSTAL CARD SURVEYS OF SQUIRREL, RABBIT, FOX AND COYOTE HUNTERS FOR THE 1964-65 SEASON

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Ass't. Supt. of Game

INTRODUCTION

One of the tools of the game manager is his knowledge of hunting pressure and distribution, seasonal kill, and relative importance of the huntable species. A method by which this knowledge can be gained is by mail contact of a sample of hunters. This paper constitutes a report on one phase of a postal card survey of licensed Iowa hunters for the 1964-65 season.

METHODS

In obtaining a sample, 5,000 of 301,964 hunters were contacted. Sampling was stratified by estimated sales of hunting and combination hunting-fishing resident licenses sold in each county. Names and addresses of potential hunters were copied from the State Conservation Commission license files. Because 134 attempted contacts were not delivered for various reasons, only 4,866 contacts actually were made of resident hunters. A total of 123 non-resident hunters were contacted.

Each potential cooperator was mailed a letter of instruction and a card at the end of February following the close of the rabbit season. He was asked to record on the card for each of cottontails, jackrabbits, raccoon, foxes, coyotes, and deer the number of times he hunted, how many hours he spent hunting, total bag for the season, and county in which he hunted most. Also, he was asked to record his county of residence (state in case of non-residents); the date when he first hunted cottontails; and the number of times he hunted cottontails when snow covered the ground. Squirrel data was obtained from a companion survey which was mailed in January following the close of the pheasant and quail seasons. It will suffice to record that the squirrel data was obtained in a similar manner.

RESULTS

Response: Sales of resident hunting and combination licenses for 1964 totaled 301,964. Of these, 1.6 per cent were contacted in this survey. Non-resident licenses totaled 8,370. Of these, 1.5 per cent were contacted. Resident hunters returned 1,703 cards for a response of 35.0 per cent. Forty-eight non-residents returned cards for a response of 39.0 per cent.

Cottontails: Of those reporting, 58.7 per cent hunted cottontails. Complete tabulation of the hunting success and effort for five species appears in Tables 1 and 2. For cottontails licensed hunters expended 2,992,000 hours and bagged 2,223,710 cottontails (0.74 per gun hour) during 1,086,250 trips. In 1963-64, 0.79 cottontails were bagged per hour by

TABLE 1. Statewide results of 1964-65 postal card survey of hunting success reported by residents

Species	% of Returns Reporting Hunting	Avg. No. Trips Per Hunter	Avg. No. Gun Hours/Hunter	Avg. No. Hours/Trip	Total Resident Hunters
Cottontail	58.66	6.15	16.94	2.75	179,793
Squirrel	45.08	4.69	13.49	2.88	138,170
Fox & Coyote	19.49	5.14	20.63	4.01	59,737
Jackrabbit	10.45	3.42	9.02	2.64	32,029

Species	Avg. No. Bagged/ Hunter/Season	Avg. Bag/ Trip	Avg. Bag/ Gun Hour	Total Hunting Trips	Total Hunting Hours	Statewide Bag
Cottontail	12.59	2.05	0.74	1,086,250	2,992,000	2,223,710
Squirrel	8.15	1.74	0.60	636,600	1,831,100	1,106,240
Fox & Coyote	1.56	0.30	0.08	301,640	1,210,670	91,550
Jackrabbit	3.08	0.90	0.34	107,610	283,810	96,910

TABLE 2. Statewide results of 1964-65 postal card survey of hunting success reported by non-residents

Species	% of Returns Reporting Hunting	Avg. No. Trips Per Hunter	Avg. No. Gun Hours/Hunter	Avg. No. Hours/Trip	Total Non-Resident Hunters
Cottontail	35.42	6.40	18.29	2.86	3,011
Squirrel	8.14	2.67	14.00	5.24	692
Fox & Coyote	------ 1 trip recorded; one fox killed ------				
Jackrabbit	4.17	2.00	9.00	4.50	354

Species	Avg. No. Bagged/ Hunter/Season	Avg. Bag/ Trip	Avg. Bag/ Gun Hour	Total Hunting Trips	Total Hunting Hours	Statewide Bag
Cottontail	12.29	1.92	0.67	18,945	54,140	36,380
Squirrel	7.43	2.78	0.53	1,815	9,520	5,050
Fox & Coyote	------ 1 trip recorded; one fox killed ------					
Jackrabbit	2.50	1.25	0.28	700	3,150	875

resident hunters, although fewer (2,049,527) were bagged. Apparently, more cottontail hunting occurred in 1964-65 than during the previous season. Success varied some in different portions of Iowa (Table 3). Highest success per hour appeared in the southern loess, poorest in the northern glaciated and western loess areas. Highest cottontail populations were known to occur in the southern loess prior to the season.

Only 2.1 per cent of the licensed hunters hunted cottontails on opening day (Table 4). Less than 1/3 hunted prior to November 16th. Data from Climatological Data - Iowa, U. S. Weather Bureau, indicated that 1 inch or more snow depth occurred an average of 49.5 days over the various portions of Iowa during the 163 day season (September 12-February 21). Snow was available only 30.4 per cent of all days. On the other hand, 61.0 per cent of the cottontail hunting reportedly was done when snow covered the ground. These data substantiates the belief that Iowa hunters wait and depend on snow for cottontail hunting.

Squirrels: Of the reporting resident hunters, 45.1 per cent hunted squirrels. The expanded data indicate 1,831,100 hours were expended to bag 1,106,240 squirrels, or 0.60 squirrels per gun hour (Table 6). Iowans spent less time and had slightly poorer success in squirrel hunting during 1964-65 than during 1963-64. Hunting success ranged from 0.54 squirrels per gun hour in the northern glaciated to 0.68 and 0.69 for the driftless and western loess areas respectively.

Foxes, Coyotes, and Jackrabbits: Fox and coyote hunters comprised 19.5 per cent of the licensed resident hunters (17.6% in 1963-64). The expanded data indicate 91,550 foxes and coyotes were bagged during 301,640 trips while 1,210,670 hours were expended hunting. An average of 0.073 foxes and 0.003 coyotes were bagged per gun hour.

Jackrabbit hunters totaled 10.5 per cent of the licensed resident hunters (9.9% in 1963-64). It appears 96,910 jackrabbits were harvested during 107,610 hunting trips, while 283,810 hours were expended in hunting them. The bag per gun hour averaged 0.34 as compared to 0.35 for 1963-64.

TABLE 3. Average cottontail hunting success by areas, 1964-65: Resident hunters only.

Area	No. Trips/ Hunter/Season	No. Hours/ Hunter/Season	No. Hours/ Trip	No. Bagged/ Hunter/Season	No. Bagged/ Hunter/Trip	No. Bagged/ Gun Hour
Western Loess	6.04	15.60	2.58	10.07	1.67	0.65
N. Glaciated	5.80	14.76	2.54	9.43	1.63	0.64
Southern Loess	6.79	21.15	3.11	19.53	2.88	0.92
Eastern	6.07	16.57	2.73	11.00	1.81	0.66

TABLE 6. Average squirrel hunting success by areas for 1964: Resident hunters only.

Area	No. Trips/ Hunter/Season	No. Hours/ Hunter/Season	No. Hours/ Trip	No. Bagged/ Hunter/Season	No. Bagged/ Hunter/Trip	No. Bagged/ Gun Hour
Western Loess	5.09	12.06	2.37	8.35	1.64	0.69
N. Glaciated	4.21	12.34	2.93	6.64	1.58	0.54
Southern Loess	4.94	14.47	2.93	9.16	1.85	0.63
Driftless	5.82	17.61	3.03	11.91	2.05	0.68

TABLE 4. Percentages of hunters who first hunted cottontails on or prior to various dates: 1964-65 season

Area	Opening Day (Sept. 12)	October 16	November 16	December 16	January 16	End of Season (February 21)
Western Loess	2.7 (4)*	6.1 (9)	23.1 (34)	62.6 (92)	94.6 (139)	100.0 (147)
N. Glaciated	1.3 (4)	6.6 (21)	35.4 (113)	74.9 (239)	95.0 (303)	100.0 (319)
Southern Loess	3.3 (7)	8.8 (19)	32.6 (70)	73.4 (158)	95.3 (205)	100.0 (215)
Eastern	1.5 (2)	7.3 (10)	34.3 (47)	73.0 (100)	97.8 (134)	100.0 (137)
Statewide	2.1 (17)	7.2 (59)	32.3 (264)	72.0 (589)	95.5 (781)	100.0 (818)

* Numbers within parenthesis in each instance represents number of reports from which percentage derived.

TABLE 5. Use of snow cover by hunters: 1964-65 season

Area	Total Hunting Trips Reported	Hunting Trips With Snow	Total Days Snow Avail.*	Per Cent of Days Snow Available	Per Cent of Hunting Trips With Snow	Index of Snow Hunting
Western Loess	684	391	49.5	30.4	57.2	1.89
N. Glaciated	1,745	1,159	67.5	41.4	66.4	1.60
Southern Loess	1,522	897	31.0	19.0	58.9	3.10
Eastern	682	381	50.0	30.7	55.9	1.82
Statewide	4,633	2,828	49.5	30.4	61.0	2.01

* Only days when 1 inch or more snow occurred were used: Traces reported were not used.

RESULTS OF EXPERIMENTAL TRIALS OF A TAGGING DEVICE FOR DEER

Keith D. Larson
Game Biologist

INTRODUCTION

One of the most difficult problems we face annually is a census of the deer herd. More information about the movements of deer, both daily and seasonally, would be desirable under the habitat conditions as found here in Iowa. In some winters, like 1964-65, there are yarding movements where deer appear to have moved into heavy cover from a wide area. There are movements in mild winters where deer appear to move along narrow river valleys for many miles regularly and then cross wide-open areas to other drainages.

Research in other states has indicated that white-tailed deer in general are apt to spend their life in a two-square-mile area. Obviously deer that follow this pattern of normal movement are finding all their requirements in this size area. Greater movements than this would mean that all requirements are not met in this size area.

Much of the habitat in Iowa would appear to be marginal in that deer occupy narrow wooded strips along streams and are often seen far from cover in our agricultural fields. Before the cornfields are harvested in the fall, bow hunters report the best hunting in much of Iowa is to be found in this cover. This would indicate an adaptation to terrain and cover conditions that is quite different from the early years of the whitetails' return to Iowa. These movements over many miles may also occur in some of our best habitat in our most heavily wooded counties, but to a lesser degree.

Deer exhibit some yarding tendencies in Iowa but they are of short duration. The deer will move into a well-protected and isolated area and stay only for the duration of a storm. When the weather improves, they commonly move out again. A census of the deer is undertaken in late winter, and an actual head count is sought together with an estimate of the total herd for a territory. Many deer are no doubt counted twice because of these movements of deer over larger than normal distances. Many deer are probably not counted at all. Questions similar to the following arise frequently to the field force: Are fourteen deer seen in one area on Monday the same deer as the thirteen seen four miles away on Wednesday?

Because of these questions and the considered need to improve our census techniques, it is believed imperative to obtain information about the movements of deer in Iowa.

Review of Literature

Trapping of deer with the Stephenson-type trap or the Clover trap is considered too expensive an operation for these purposes. When the age of the deer needs to be known at the time of marking, then traps or drugs need to be used.

Verme (1962) adapted a tagging device originated by Romanov (1956) which has been rather successful in Michigan. Hale (1965) stated that Wisconsin has used this device with success. This investigator secured a sample in December of 1963 and has been experimenting with modifications and methods since that time.

Study Areas

One hundred devices were built by the Long Creek Conservation Club for use on the Iowa Army Ammunition Plant area at Middletown. Two sportsmen, Mr. Elmer Phillips and Mr. Lyal Colton, from that club conducted the tests. They acquired a high degree of skill and were quite successful. The plant area had a herd of 850 adult deer during the study period with ideal conditions for testing. The area comprises nearly 20,000 acres with deer use over 2/3 of the area. An aerial census of the area revealed 464 deer in one 1 1/2-hour flight at dusk.

Testing of the device by the author was carried on at the Wildlife Research Station, Boone, and at Pilot Knob State Park near Forest City. The area involved at the station covered about two square miles. This was the home range of approximately 50 deer during the winter of 1964-65. The Pilot Knob area of study has several thousand acres of continuous timber and winters deer from several counties. In a winter like 1964-65, with heavy snow, it was used by more deer than would be usual in an open winter. The concentration of deer during the past winter made it ideal as a test area. An aerial flight over the area revealed 81 deer in the area.

METHOD

The device is designed to function like a snare and is set in well-used deer trails. The basic feature of the device is a polyethylene collar with a dog leash snap attached on one end and a figure eight ring on the other. A breakaway wire is attached to the dog snap and is attached to a tree along the trail. The noose is held open by soft wire guys about 15 inches above the deer trail and adjusted to 15 inches diameter (Figure 1). The device can be produced in a machine shop for 95 cents including material cost.

Information that can be obtained from the use of this device is primarily movement data. The date and place of assumed tagging is recorded. If and when the deer is shot, or killed by traffic, a new date and location is established if the collar is returned to the Commission. With most disturbed and unsuccessful sets the tagging device is found in the trail within a few feet of the set.

RESULTS

Of one hundred devices being used and kept in repair at the ordinance plant by two people working on off duty time, 57 are assumed to be on deer. In the last few weeks of the study this March, one of the sportsmen had developed sufficient skill at placement that he took five sets out one evening and had four of them gone the next morning.

The secret of success seemed to be to use them only at sites where the deer is likely to be distracted. These sites are either next to a road or in brush. High success can be achieved at these locations. A set on a well worn deer trail that is open with no brush will cause the deer to start a new trail around the set. Generally, the noose should be kept small for best success.

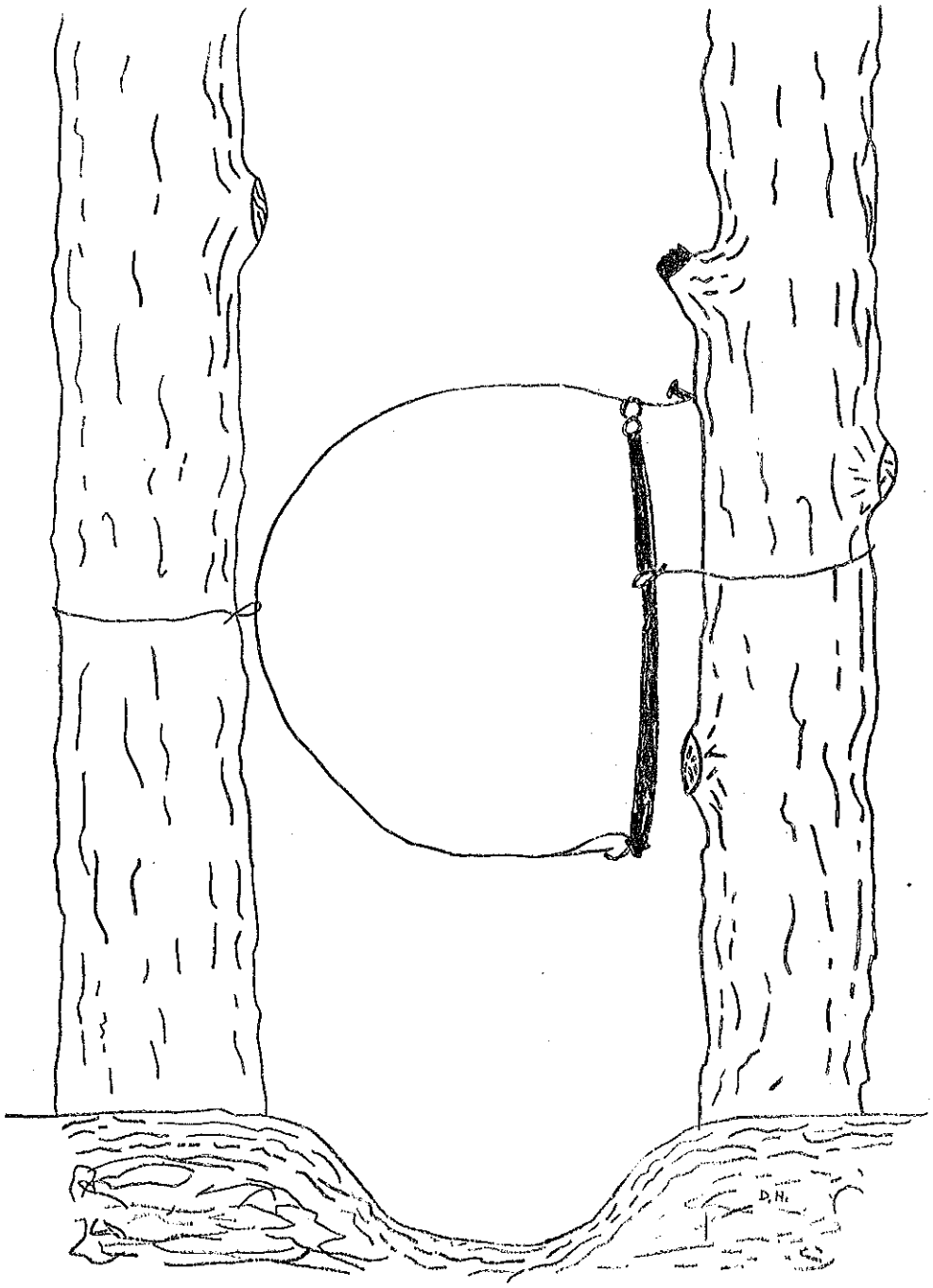

Figure 1. Technique for setting automatic tagging device in deer runway

At the Wildlife Research Station area, using 50 devices, 20 collars are assumed to be on deer. At the Pilot Knob area, the degree of success can best be described. Thirty-eight devices were set and run twice at two-week intervals. Snow was deep and trails were well defined at the time of first setting. The park roads were impassable. Nine collars were assumed placed on deer and 15 additional sets malfunctioned. Most of these 15 malfunctions had deer hair in the snap and in the braiding of the collar. The principal causes of the malfunctions were believed to be these: (1) The double-ring or figure eight ring would bind on the snap, probably because the ring was too thick, (2) the collars were too small for some of the larger deer, and (3) the rope material and the wire on the noose were not always assembled in the same coil direction which caused the collar and wire to twist when the deer released the set.

Additional sets were made at Pilot Knob to replace successful and malfunctioning sets so that there were 30 sets out for the second two-week period. Of these, 3 were assumed to be on deer, 10 malfunctioned and the remainder of 17 were untripped. Conditions were not good for this second two-week period, as the snow melted and left the sets too high above the ground.

Collared Deer

At the ammunition plant, 5 deer have been reported sighted with collars. At the biology station, 3 deer have been reported with collars. The park officer at Pilot Knob and the local conservation officer together have reported 3 collared deer.

CONCLUSIONS

1. The period from January to April was the best tagging time as far as set success was concerned. The period from late October through December was the best for deer activity; however, deer with antlers tore up the sets more frequently.

2. With incorporated modifications as to ring size and collar size, the device was considered to be an effective, and economical, method of marking deer for a movements study.

3. Most outdoorsmen could have good success if directions are followed. Employment of the device can be by general field personnel.

4. Experience improves set success.

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BOW HUNTERS DEER KILL REPORTS - 1964

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INTRODUCTION

The 1964 bow season was the twelfth consecutive year that bow hunting has been permitted in Iowa. There were 3,678 permits issued, which represents a 28.7% increase over 1963 and continues to illustrate the dramatic increase of bow hunting as a sport since 1953 when ten archers participated in the deer hunt.

Bow hunters were again allowed a 51-day season, extending from October 17 until December 6, inclusive. Hunting was permitted from one-half hour before sunrise until one-half hour before sunset for the second consecutive year. A restriction of 40 lbs. minimum bow pull was reduced to 30 lbs., which was the only change in basic regulations from those of 1963.

RESULTS

Card Returns

The hunter report card was returned by 3,455 (94%) of the 3,678 permit holders. Of the total permittees, 122 indicated that they did not use their permits. For the purpose of computing hunter success, those that did not report were assumed to have hunted.

Total Kill and Success Ratio

Bow hunters killed 670 deer, which represents an increase of 12% over 1963. The hunter success ratio was 18.8% and was the same as in 1963.

Hours of Hunting and Hours Hunted Per Deer Bagged

Collectively, bow hunters spent 182,366 hours hunting deer in 1964, or an average of 54.7 hours per hunter. The mean number of total hours of hunting required to bag a deer in 1964 was 272 hours which is approximately equal to the 3-year average. The successful hunter averaged 60.3 hours of hunting to bag his deer.

Deer Observed

An average of 16.8 deer was sighted per hunter in 1964 at the rate of 0.31 deer per hour. The number of deer sighted per hour has remained relatively stable since 1957 (Table 1). The bow hunters said they observed a total of 56,265 deer in 1964 compared to 39,668 in 1963.

Sex and Age Ratio of Harvested Deer

Archers reported harvesting 426 males and 226 females for a sex ratio of 188 males: 100 females. Again, the bow hunters appear to be highly selective in their choice of targets

TABLE 1. Summary of data from bow seasons for deer, Iowa, 1956-1964

	1956*	1957	1958	1959	1960	1961	1962	1963	1964
Number of Permits	1,280	1,228	1,380	1,627	1,772	2,191	2,404	2,858	3,678
Deer Killed	117	138	162	255	277	367	404	538	670
Hunter Success (%)	9.1	11.4	12.4	16.2	16.0	17.1	16.9	18.8	18.8
Total Hours/Deer Killed	432	370	363	252	311	283	293	254	272
Deer Sighted per Hour	0.12	0.29	0.34	0.33	0.27	0.30	0.28	0.30	0.31
Length of Season (Days)	31	31	30	31	44	48	51	51	51

* First year a special permit was required to hunt deer with a bow and arrow.

as to both sex and age, as the age ratio of this harvest was 14 fawns:100 adults.

Time of Day and Part of Season Deer Were Taken

Successful bow hunters were asked to indicate whether they killed their deer in the morning hours or afternoon hours. They reported that 42.4% were taken in the morning and 57.6% were taken in the afternoon. This has been typical of previous years' results, and probably only means that the opportunity to hunt is greater rather than afternoon hours providing better hunting.

The 51-day season was divided for this analysis into three 17-day periods: October 17 to November 2, November 3 to November 19, and November 20 to December 6. As in past seasons, the kill became progressively higher as the season advanced, with 21 per cent of the kills occurring in the first period, 34 per cent in the second, and 45 per cent in the third. This indicates a slight shift to an increased kill in the second period, which is attributed to a season which was five days later. The rut or increased activity by the deer would occur to a greater extent during the second period of the later season. The greatest rutting activity still occurred in the third period, and is considered the paramount factor in the success of the hunters during that period.

Deer Wounded But Not Retrieved

Approximately 12 per cent of the bow hunters said they had hit but failed to retrieve one or more deer in 1964. This is an increase of 0.4% over 1963, and is only slightly higher than 1961 and 1962 figures. Four hundred hunters indicated they had wounded a total of 487 deer.

DISCUSSION

Bow hunters in various parts of the state had an opportunity to hunt with snow cover present for several days of the season in 1964. This factor is believed to have kept the success ratio stable in the face of a 28% increase in hunters and also helped stabilize crippling losses. Snow cover contributes to the quality of deer hunting obtainable with a bow.

SUMMARY

1. The twelfth Iowa bow season for deer was 51 days in length and was open statewide.

2. Permits were issued to 3,678 applicants; the 3,556 who participated bagged 670 deer and had a hunter success ratio of 18.8%.

3. Hunters averaged 54.7 hours of hunting and collectively spent 182,336 hours in deer hunting.

4. A total of 56,265 deer were observed at the rate of 0.31 deer per hour of hunting, with the average bowman sighting 16.8 deer during the season.

5. Archers again showed their preference for adult deer when they reported bagging deer in the ratio of 188 males:100 females.

6. Hunters reported taking 42.4% of their deer in the morning and 57.6% in the afternoon.

7. Hunting became better with the onset of rut, with bow hunters indicating they took 21% of the bag during the first third of the season, 34% in the second, and 45% in the third portion of the season.

8. A total of 400 hunters (12%) said they had wounded one or more deer and failed to retrieve it. A wounded:100 recovered ratio of 72:100 was determined.