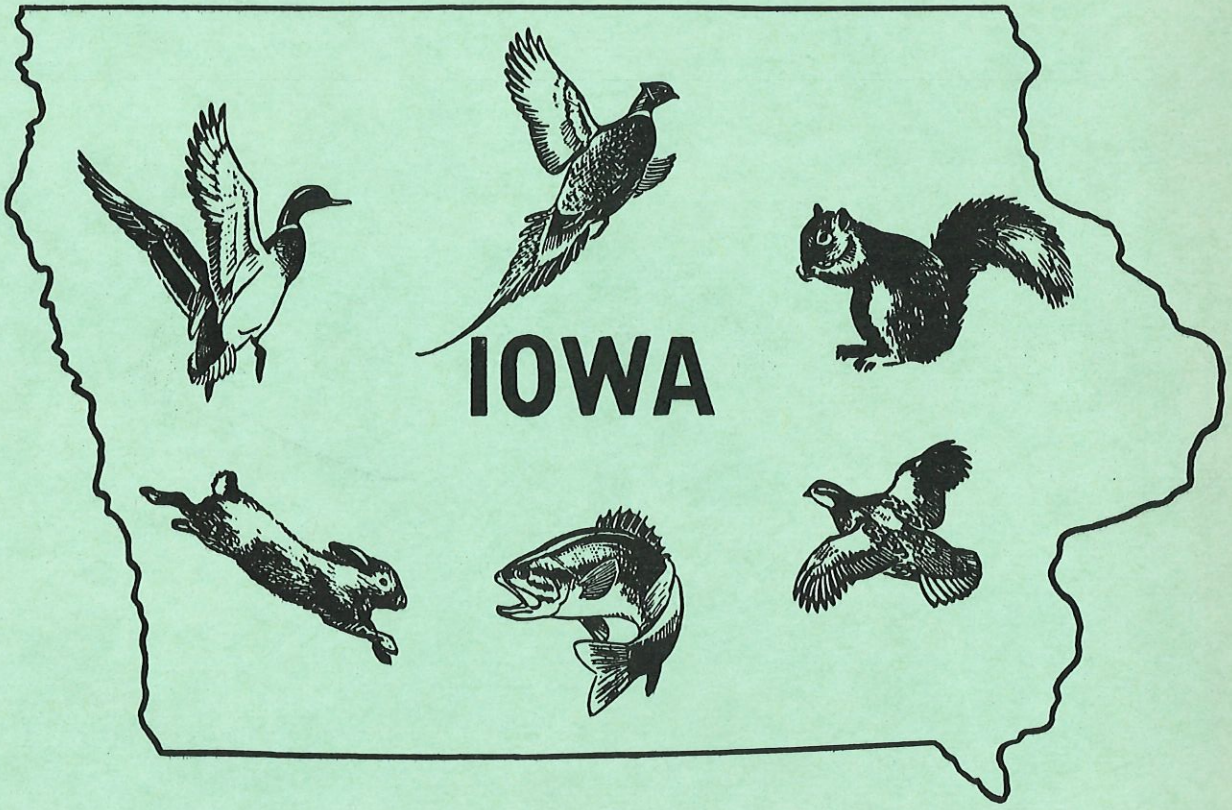
1961

QUARTERLY BIOLOGY REPORTS



FISH AND GAME DIVISION — BIOLOGY SECTION

STATE CONSERVATION COMMISSION

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MISCELLANEOUS MISSISSIPPI RIVER INVESTIGATIONS

BY

R. E. Cleary
Fisheries Biologist

A comparison between quantitative and qualitative types of creel census on the river indicated that the pre-designed method of contacting anglers resulted in a catch estimate reduction of 26% when compared to the results from an "undisciplined" census of the same waters.

In comparing catches made in "stiffened" and "soft" nylon trap nets, it was determined that more and larger commercial species are taken in "soft" nets, while, conversely, greater numbers of larger sport fish were taken in the treated nets. Practical ramifications being that not only will commercial operators benefit themselves by using "soft" nets but also will be less "bothered" with handling game fish.

FISH POPULATIONS, CENTRAL IOWA LOWHEAD RIVER IMPOUNDMENTS

BY

Harry M. Harrison
Fisheries Biologist

The species composition of fish inhabitating five central Iowa river impoundments were determined by electro-fishing techniques. The results demonstrated that rough fish dominate game fish to an extent of 20 to 1 in these areas. Carpsuckers were predominant in four impoundments, and carp in one. Channel catfish, crappie, flathead catfish, walleye and smallmouth bass, in that order of abundance, constituted the list of game fish observed in the impoundments reported upon.

NATURAL LAKES CREEL CENSUS 1960-61

BY

Tom Moen
Fisheries Biologist

Quantitative creel census techniques were employed to obtain estimates of fishing pressure, fishing success, species composition of the catch, and the number and weight of each species taken from several natural lakes.

The five lakes censused during the summer of 1960 varied from 569 to 5,684 acres and have a combined surface area of 12,253 acres. During the summer census period these lakes were fished by a minimum of 188,197 men (trips) who fished a total of 560,031 hours. They caught 1,240,616 fish (78 per cent bullheads) at an average rate of 2.2 fish per hour. Individually the average rate of catch varied from a low of 1.58 fish per hour for Spirit Lake to a high of 3.49 fish per hour for East Okoboji Lake.

An ice fishing census was conducted on Spirit Lake and West Okoboji Lake during the winter of 1960-61. Walleyes and perch were the important species taken from Spirit Lake with the winter catch of walleyes accounting for 14 per cent of the total walleyes taken during the entire fishing season. Perch and bluegill were the important species taken during the winter from West Okoboji Lake.

THE VERTICAL DISTRIBUTION OF SEVERAL SPECIES OF FISH IN RED HAW LAKE, IOWA, DURING WINTER ICE COVER

BY

Jim Mayhew
Fisheries Biologist

The vertical distribution of six species of fish was studied at Red Haw Lake, Iowa during winter ice cover. A total of 2,451 fish were captured in 160 gill net days. Bullheads were the only fish found at all depths, however they were most abundant in the shallow depths. Golden shiners were never found below 12 feet. Bluegill, crappie, channel catfish, and yellow perch were concentrated toward the bottom of the lake. Bluegill showed the greatest tendency to inhabit the deeper stratum, with 80 per cent of the sample found in the last two feet of the experimental gill net.

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BY

Eugene D. Klonglan
Game Biologist

The ruffed grouse is a native Iowa game bird, once found over most of the state, but now present only in the northeastern counties. A three-phase investigation of the current status of the ruffed grouse in Iowa has been initiated to determine their present density and range, evaluate their harvest potential, and study the possibility of expanding their range. The spring roadside drumming count was selected as a census technique because it was adaptable to the amount and type of area to be covered and the time and personnel available. An average of nearly one drumming bird was heard per stop on fifteen routes in six northeastern counties. Allamakee County had the most grouse, followed by Winneshiek and Clayton, though not necessarily in that order. Grouse were also present in Fayette, Dubuque and Delaware Counties and possibly in other nearby counties. The grouse population in good northeastern Iowa forest cover varied between 10 and 40 birds per square mile (assuming a 1:1 sex ratio), with marginal areas having fewer and optimum habitats containing more.

AGE OF QUAIL TAKEN BY HUNTERS IN 1960

BY

M. E. Stempel
Game Biologist

During the 1960 quail hunting season in Iowa, the biologist and officers collected 671 quail wings from hunters. This reflects low production compared to the 1,432 wings

which were gathered in 1959 which was an average production year. Data obtained by aging the wings indicated that the peak of hatching occurred in July for young under 150 days old, while it was earlier for a group that was over 150 days old. Adults were completing moult by the end of the hunting period. The late spring (or late re-nesting) was reflected in this late moult. Even though brood stock was low there was a good supply of wings from the primary quail range in southern Iowa.

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BY

Eldie W. Mustard
Game Biologist

A sample of the deer harvested during the 1960 deer season revealed that the Iowa herd is in excellent condition and had good reproduction in 1960. Comparison of the age composition data for 1959 and 1960 indicated that the Iowa herd was not over-harvested in 1960. Data on the following were gathered and analyzed: age, sex, weight, number of antler points, beam diameter, and general physical condition.

Data were obtained for 791 of the 4,269 deer harvested in 1960 and it is thought that the sample is adequate for management purposes.

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BY

James G. Sieh
Game Biologist

(Report not abstracted by biologist)

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BY

Richard Nomsen
Game Biologist

The results of the 1961 crowing count indicated a 14 per cent decrease in the spring pheasant population. However, a portion of this decrease was due to poor checking conditions during the winter sex ratio count. Pheasant populations remained stable or increased in the western two-thirds of the pheasant range. A substantial increase was recorded in central Iowa. A moderate decrease was recorded in the east central district, however, the sex ratio was noticeably low in this area last winter because of mild winter weather conditions.

MISCELLANEOUS MISSISSIPPI RIVER INVESTIGATIONS

BY

R. E. Cleary
Fisheries Biologist

Comparison Between a Quantitative and Qualitative Creel Census - 1960

In 1960, a situation arose which allowed for a comparison between the gross results of a quantitative and a qualitative creel census coverage of the same general waters during the same period of the year.

Prior to the 1960 "open-water" angling season, Iowa Conservation Officers were instructed to make notations as to fishing success in their routine angler checks. They were furnished "Contact" books and instructed to note the contact's name, license number, where and how long he had been fishing, and his success. The instructions further admonished the Officer to "spread out" his contacts over the season and not make them "all in one locality."

In 1960, Biologist Aides assigned to Mississippi River contacted fishermen on an alternate weekly basis, over a 22-week period - May to October. Their method of contact was based on a pre-arranged sampling plan, in which the days, hourly intervals, and pool portions covered, were designed to give equal coverage to all variables, with the exception that the tailwaters of each navigation pool were given double coverage, as were Saturdays and Sundays. This design was set up to give a statistical estimate of total open-water fishing pressure on the Iowa territorial waters of the Mississippi River.

Table 1. Comparative Angling Data Secured Through Two Census Methods on the Iowa Waters of the Mississippi River - 1960

	Angler Contact Hours		Total Fish Caught		Fish Per Hour	
Pool	Quant. Method	Qual. Method	Quant. Method	Qual. Method	Quant. Method	Qual. Method
9	148	164	157	493	.96	3.01
10	753	336	1,320	659	1.76	1.96
11	345	1,025	467	1,566	1.35	1.53
12	184	815	123	1,012	.67	1.24
13	164	65	198	52	1.21	.80
14	361	502	402	501	1.11	1.00
15	254	11	218	24	.86	2.18
16	969	105	571	125	.59	1.19
17	469	129	534	124	1.14	.96
18	500	35	618	29	1.24	.83
19	306	235	272	204	.89	.87
20	569	24	471	49	.83	2.09
Totals	4,902	3,415	5,251	4,838	1.07	1.45

On a pool-by-pool basis the differences between the aides' estimate of success and the Officers' estimate range from a negative departure of 50% to a positive of 214%; with the quantitive census being 26% lower than the qualitative (Officer) estimation of mean river angling success.

There is a subtle, but obvious bias which could tend to swell the Officers' estimate of success.

Angling concentrations, while not always, are usually indicative of better-than-average angling. They usually occur in the tailwaters of the locks and dams and are therefore noticeable and usually easily accessible. These conditions compound into an overly attractive lure to the uncommitted Officers choice of, "Where shall I check anglers today?"

Fishing Gear Evaluation - 1960

A change in trap-net construction and mesh size occurring prior to the 1960 netting season necessitated a catch comparison being made to adjust survey data collected prior to that time in "old style" trap nets.

Nets used prior to 1960 were standard fish management gear used in Iowa. The frames were 30 x 72 inches and the hoops 28 inches in diameter covered with 1¼-inch cotton web, tarred down to 1 3/16 bar mesh. The frame and lead were 1 1/8-inch cotton tarred to a 1-inch bar measurement.

The net dimensions of the 1960 nets remained the same; however, they were constructed entirely of 1½-inch bar measure; nylon web, lead, frame and hoops.

To make catch comparison, a cotton net was included in a battery of six nylon nets, the latter being set randomly at each station. Each net was numbered and catches were recorded on a separate basis. It was arbitrarily decided to compare the catches of the "old style" cotton net with the No. 3 nylon net at each station (Table 2).

Table 2. Catch Comparison Between Nets of Different Size Mesh at Eight Mississippi River Survey Stations

	1 3/16" Mesh Cotton Net (Bar Meas.) (29 Effective Sets)		1½" Mesh Nylon Net (Bar Meas.) (30 Effective Sets)	
Category	Average Number Per Set	Average Weight Per Set	Average No. Per Set	Average Wt. Per Set
Sport Fishes	60.4	18.1	42.6	15.2
Commercial Fishes	6.6	12.2	6.9	11.0
Predatory Fishes	.3	1.0	.3	1.5
Forage Fishes	3.7	1.7	.5	.8

The catch-by-weight of the two nets is quite similiar in all categories. The major difference in the Sport and Forage categories is the product of the increased catch of smaller fish in the smaller meshed net. The average sport fish in the cotton net weighed .30 lb.; in the nylon net, .35 lb. The average forage fish (sucker) taken in the cotton net weighed .49 lb.; in the nylon net, 1.60 lbs. In the other categories there were correspondingly smaller-sized fish caught in the smaller mesh, as could be expected. It was also noted that the qualitative picture of the catch was the same in both nets.

On the basis of these studies we will reduce our pre-1960 inventory data by the following factors to make them comparable with future years' data.

Category	Number	Weight
Forage Fish	Minus 86%	Minus 52%
Sport Fish	Minus 29%	Minus 16%
Commercial Fish	Plus 5%	Minus 10%
Predatory Fish	No change	Plus 50%

Prior to their use on survey, the white nylon was dyed (Rit) to a gray-green color. Midway during the netting season it was decided to "stiffen" a portion of the nylon nets to facilitate handling and to compare their catches with untreated nets of the same dimensions. Four of the nets (hoops and leads only) were subsequently "stiffened" with a solution (50/50) of screen paint and thinner. This solution also darkened the nets perceptibly, giving them a brownish cast.

A catch comparison on randomly set "stiffened" and "soft" nets was made. Indications are that, while the stiff nets took game fish more readily, the soft nets, though harder to set since they "hung up" on everthing, took nearly 50 percent more commercial fish and those were of larger average size (Table 3). They also "gilled" more fish than the "stiffened" net.

Table 3. Catch Comparisons Between "Stiffened" and "Soft" Nylon Trap Nets

	"Stiffened" Nets 60 Effective Sets		"Soft" Nets 29 Effective Sets	
Category	Average Number Per Set	Average Weight Per Set	Average Number Per Set	Average Weight Per Set
Sport Fishes	27.4	11.8	15.0	7.2
Commercial Fishes	10.6	15.1	14.2	22.8
Predatory Fishes	1.1	2.1	.8	1.8
Forage Fishes	.3	.3	.3	.2

The "Predatory" and "Forage" categories of the catch were quite similar. The catches of commercial fish were nearly 50 percent greater, numerically, in the untreated or soft nets. Correspondent with this 1960 increased catch, the average size of the fish taken in the untreated nets was 12 percent heavier.

The increase in the weight and numbers of commercial fish taken in these untreated nets is of significant magnitude to warrant future investigation. This project will be continued in 1961, with comparisons also being made on the incidence of game fish "gilling."

Sport fish were taken in greater numbers (83% increase) in the stiffened nets and were 64 percent larger fish on the average than those taken in the soft nets; just the reverse of the commercial catch situation.

FISH POPULATIONS, CENTRAL IOWA LOWHEAD RIVER IMPOUNDMENTS

BY

Harry M. Harrison
Fisheries Biologist

INTRODUCTION

Studies conducted in Iowa's inland warm water streams over the past fifteen years have revealed the continued existence of lush fish populations. In all but rare cases, rough fish dominate. In most instances they make up as much as 90 per cent of the fish present, and in many places they dominate in excess of 95 per cent. On the basis of this knowledge it follows that fisheries management in Iowa streams is faced with a serious rough fish problem that will require a fair degree of solution before a good and prolonged sport fishery can prevail.

A project concerning rough fish in streams has been underway for several years. One facet of that work involves the use of and preference by rough fish for river reaches impounded by lowhead dams in central Iowa streams. The point presently being investigated concerns the feasibility of eliminating the vast populations of rough fish that exist in river impoundments, resulting in the creation of a large void which might serve as an attraction for rough fish living in the unimpounded reaches. Theoretically, this habitat, devoid of fish, would be invaded quite rapidly by rough fish from the unimpounded reaches. Channel catfish, smallmouth bass, and walleye pike fish which have strong preferences for unimpounded waters in streams would then inherit space in which to expand their individual size and numbers.

Prior to the actual eradication of fish population, at least two basic biological factors should be known: (1) species composition in impounded waters to determine the relative abundance of game to rough fish and (2) the angler use in these areas.

The present paper summarizes the information accumulated to this date with respect to these items. Five impoundments are reported upon; they are located at Adel on the North Raccoon River, and at Des Moines, Boone, Fraser, and Fort Dodge on the Des Moines River.

SPECIES COMPOSITION

The species composition in river impoundments has been determined by electro-shocking. The Des Moines and Adel impoundments have been studied annually since 1954; the other three have been surveyed only irregularly since that time. During the current year, a concerted effort has been made to determine the species composition in all five areas.

Essentially, the method employed in making our shocker surveys consists of logging fish as they are observed in the electrical field from the bow of the shocker boat. Because of the limited time that a fiah may be in view, it becomes impossible to make specific identifications in the case of the carpsucker, and between the silver, and golden redhorse. For this reason, species of carpsucker and redhorse are not differentiated in our surveys. It is pointed out, however, that four species of carpsucker and three of redhorse occur in the areas included in this study.

The species composition by impoundments as determined in 1961 was compared (Table 1), as was the species composition by impoundments for other years (Table 2). The frequency of occurrence shown in the tables is based upon the number of times an individual species occurs

in each 100 fish observed.

It was found that carpsuckers, carp, and redhorses, in that order of abundance, make up the vast majority of the population. It was further revealed that game fish populations are consistently low in lowhead impoundments in central Iowa streams. Of the cases reported, channel catfish had an occurrence rate exceeding five only three times; flathead catfish had an occurrence of six in one instance. Other game or desirable fish, including smallmouth bass, walleye, and crappie, which are inhabitants in central Iowa streams, were either absent, occurred as traces, or appeared in very low numbers.

Population studies based on shocker techniques are known to contain biases. Important among these is the fact that many, if not all, species react differently to electrical stimulus, and as a result may be observed in greater or lesser numbers than they actually occur in a population. In view of this, knowledge gained by long experience of using shockers together with creel census and netting surveys must be considered to add credulance to the results obtained by electro-fishing.

In the current study, carpsuckers, carp, and redhorses were observed in large numbers, indicating that they are abundant and that the occurences for these fish must be quite reliable. Walleye and smallmouth bass are always vulnerable to shocking; they occur quite rarely in impounded waters, and their occurrence rates (as shown in the Tables) are considered somewhat high. The main bias probably occurs in the channel catfish and crappie, which usually sink from view when shocked, and with the buffalo which is better able to avoid contact with the electrical field because of its swimming speed and open water preference.

Crappie observed in central Iowa impoundments are usually small and of little value. As a consequence, whether occurrence figures are correct or not has little bearing on the fishery resource. On the other hand, buffalo are rough fish, and the fact that they may be more abundant than indicated results in a more serious rough fish problem.

The channel catfish, then, presents the principal enigma. They probably occur in larger numbers than indicated by our electrical surveys. However, they have not been taken by angling or by nets in sufficient numbers from any central Iowa impoundment to indicate serious errors in the results.

In summarizing the species composition data, it is believed that, although some errors are present, the over-all results are quite indicative of conditions which actually exist.

ANGLER USE

Counts of fishermen and appraisals of angler sign associated with impoundment fishing have been made from time to time over the past years. The actual data have not been compiled for this report, but generalized statements for each impoundment can be made.

Adel: Fishing activity is moderate. Carp is the principal species caught. Channel catfish are caught in fair numbers from time to time, but there is no consistent fishery for this species. The area produced excellent flathead fishing prior to 1956.

Des Moines: Fishing activity is light to moderate. Carp is by far the principal species sought for and caught. Channel catfishing in the lower impoundment is consistently poor. Some flathead catfish are taken each year.

Boone: Fishing in the impoundment is light to moderate. Carp is the principal species sought for and caught. Fair numbers of channel catfish and a few flatheads and walleye are caught each year.

Fraser: Fishing activity in the impoundment is light. Carp, catfish, and flatheads are taken in small numbers from the impoundment proper.

Fort Dodge: Fishing pressure is moderate to quite heavy. Carp is the major species caught. Channel catfish are taken quite frequently, and walleye and crappie are caught in fair numbers.

CONCLUSION

Information resulting from the present study, together with that accumulating from other sources, lends undeniable support to the fact that rough fish out-number desirable species to an extent of twenty to one in central Iowa lowhead river impoundments. Since impoundment fishing pressure is light and principally for coarse varieties leaves, little value can be assigned these areas for their fishery resource. From a biological point of view any fisheries management that holds a measure of promise seems justifiable.

Table 1. Frequency of Occurrence By Species; Central Iowa River Impoundments, 1961

	Impoundment				
	Adel	Des Moines	Boone	Fraser	Fort Dodge
	Sample Size				
	618	414	1401	444	1384
Species	Frequency Occurrence				
Carp	18	12	14	12	88
Carpsuckers	75	87	80	85	10
Redhorse	5	*tr.	4	1	tr.
Channel Catfish	tr.	tr.	tr.	tr.	tr.
Buffalo	1	tr.	tr.	tr.	tr.
Common Sucker	tr.	--	--	--	--
Sunfish	tr.	tr.	tr.	tr.	tr.
Eel	tr.	--	--	--	--
Flathead Catfish	--	--	tr.	tr.	--
Walleye	--	--	tr.	--	tr.
Smallmouth Bass	--	--	tr.	--	--
Crappie	tr.	tr.	tr.	tr.	tr.

* tr. - trace, less than one occurrence in 100 fish

TABLE 2. FREQUENCY OF OCCURRENCE BY SPECIES
CENTRAL IOWA LOWHEAD RIVER IMPOUNDMENTS
1954 - 1960

Species	IMPOUNDMENT																			
	Fort Dodge	Fraser			Boone		Adel							Des Moines						
	1957	1955	1957	1959	1957	1954	60	59	58	57	56	55	54	60	59	58	57	56	55	54
	Frequency Occurence						Frequency Occurrence							Frequency Occurrence						
Carp	61	14	15	16	15	12	13	12	22	27	51	23	11	18	20	39	25	22	34	21
Carpsucker	26	79	74	72	78	82	75	81	60	53	40	72	83	74	66	32	67	68	39	60
Redhorse	11	5	9	10	2	3	14	7	6	16	1	1	--	4	9	13	4	6	6	12
Channel Catfish	tr	tr	tr	tr	2	tr	--	tr	6	4	8	1	1	tr	tr	--	tr	3	7	tr
Buffalo			1	tr			--	tr	2	tr	--	tr	4	2	1	1	1	tr	11	4
Flathead		tr	1	1	2	tr	--	tr	--	tr	--	2	--	1	2	6	1	1	--	2
Walleye	2		tr	tr		1			1	tr	tr	tr			1		1	1		tr
Crappie	tr			tr	1	tr	1	tr						tr	1	2	2	--	3	tr

NATURAL LAKES CREEL CENSUS 1960-61

BY

Tom Moen
Fisheries Biologist

Quantitative creel census techniques were employed to obtain estimates of fishing pressure, fishing success, species composition of the catch, and the number and weight of each species taken from several natural lakes. Clear Lake in Cerro Gordo County, North Twin Lake in Calhoun County, and Black Hawk Lake in Sac County were censused only during the month of June and July, 1960. East Okoboji Lake in Dickinson County was censused from May through October; West Okoboji Lake was censused on a spot basis during the summer months and quantitatively during the winter ice fishing season. Spirit Lake in Dickinson County was censused from May through February 15, 1961 on a quantitative basis.

The method of gathering and processing the data has been described in detail in previous Quarterly reports; only a summary of the method will be presented in this paper.

METHOD

One census clerk was assigned to North Twin and Black Hawk Lakes; one clerk was assigned to Clear Lake, and one clerk to the Dickinson county lakes. Each man followed carefully planned schedules as to the time he would make fisherman counts and interviews. Special consideration was given to week-ends and early and late fishing for each month. All boats and shore fishermen were counted every two hours during any one eight-hour period. During the interval between counts the census clerk interviewed fishermen who had completed their fishing trip or who has completed at least two hours of fishing. The latter exception to the completed trip contact applied only to shore fishermen. These interviews supplied the data for calculation of the various statistics of measurement such as fish per hour, fish per man, weight of the fish, etc. Through the use of an IBM data processing machine these forgoing items were calculated on a monthly basis.

GENERAL RESULTS

The five lakes censused during the summer of 1960 varied from 569 to 5,684 surface acres and have a combined area of 12,253 acres. Due to budget problems the summer census period for North Twin, Black Hawk and Clear Lakes covered only the months of June and July, 1960, while Spirit Lake and East Okoboji Lake were censused for a six-month period, May through October. An ice fishing census was conducted on West Okoboji and Spirit Lakes.

During the summer census period these five lakes were fished by a minimum of 188,197 men (trips) who fished a total of 560,031 hours. They caught 1,240,616 fish (78 per cent bullheads) at an average rate of 2.2 fish per hour (Table 1).

Table 1. Basic catch data for five lakes censused during all or part of the summer season of 1960

Name of Lake	Size (acres)	Census period	Total trips	Fish caught	Fish per hour
Spirit Lake	5,684	May-Oct.	92,660	433,077	1.58
East Okoboji	1,400	May-Oct.	52,355	501,057	3.49
Black Hawk	957	June-July	12,893	111,076	2.87
Clear	3,643	June-July	24,775	140,910	1.61
North Twin	569	June-July	5,514	44,496	2.98
Totals & or Average	12,253		188,197	1,240,616	2.2

Individually the average rate of catch varied from a low of 1.58 fish per hour for Spirit Lake to a high of 3.49 fish per hour for East Okoboji.

The more important features of the catch will be discussed under separate headings for each lake. Data concerning the catch by species for each lake appears in Appendix Tables 1, 2, and 3.

North Twin Lake

In spite of a severe freeze-out during the winter of 1959-60, the fishing success at North Twin Lake remained about the same during the months of June and July as it was during the same period in 1959; however, the species composition of the catch was altered considerably. During 1960 black bullheads made up 97 per cent of the 44,000 fish taken during the two-month period. During the same period in 1959, yellow bass made up 80 per cent of the catch and bullheads only 15 per cent. The quality of the bullheads should have discouraged the fishermen, but nearly as many fished for the ½-pound bullheads in 1960 as fished for the yellow bass in 1959. An additional five species of fish were recorded in the catch, including crappie, walleye, channel catfish, perch, and carp, totaling about 1,500 fish of which 1,400 were carp.

Routine lake survey work indicated that bullheads and carp surviving the low oxygen produced an exceptionally large hatch. The size of these hatches was considered detrimental to future management of the lake and recommendations were made to apply to light toxaphene treatment.

Black Hawk Lake

During the months of June and July of 1960 the fishing on Black Hawk Lake was slightly better that it was in 1959 (the fourth consecutive season that has shown an increase in fishing success). Bullheads ranked first in both years, making up about 40 per cent of the catch, followed by crappie and channel catfish. In 1959 the crappie and channel catfish were about equally represented in the catch, but in 1960 crappies contributed nearly as many fish to the creel as bullheads; 30,000 crappies were caught during the month of June. About 1,000 walleyes were taken during June and July of 1960 compared to 700 during the same period in 1959. Six additional species completed the composition. Of these only carp and bluegill added any appreciable number to the total number of fish

taken. The total poundage of carp removed by fishermen equalled or surpassed that all other species except bullheads.

Clear Lake

The major change in the June and July fishing in Clear Lake during 1960 over that of 1959 took place in the number of crappies caught. In 1959 only 13,500 crappies were reported as compared to 44,200 in 1960. Bullheads dominated the catch, as they have in the past several years, with an estimated catch of 79,500 for the 60 day period. Walleye fishing was considerably better, with 6,600 taken during the two months as compared to 900 in 1959. The yellow bass catch totaled 5,900 fish for the period. Bluegills, white bass, perch, channel catfish, northern pike, largemouth bass and carp were also included in the species composition in about that order of importance.

East Okoboji Lake

This 1,400 acre lake had the best bullhead fishing recorded in the 15-year history of creel census of this lake. In 1960 a total catch of 484,300 bullheads weighing 146,000 pounds was recorded, or a hook and line removal of over 100 pounds per acre. Crappie were the next most important fish with a catch of 9,200 reported for the summer of 1960 as compared to a catch of 5,000 in 1959. The walleye catch remained about the same with 3,800 estimated in 1960. Other species recorded in the catch included bluegill, white bass, northern pike, largemouth bass, yellow perch, and sheepshead, contributing a combined total of 3,500 fish.

Spirit Lake

(Open Water) Although success on this lake during the open water period was the lowest of the lakes censused, the species composition and number of fish taken indicated some very satisfactory fishing. Bullheads still dominated the catch, making up 70 per cent of all the fish taken during the season. Good catches of crappie, walleye, white bass and yellow perch were recorded. Each of these species set new five-year records for total numbers caught. Walleyes increased about 100 per cent over 1959; the white bass catch jumped from an average of about 4,000 fish during the previous 5 years to 34,000 in 1960. These white bass averaged only one-half pound but the fishermen put them on the stringer and returned home happy.

A fishing pressure of 48 hours per acre during this open water period removed 46 pounds of fish per acre.

(Ice Fishing) Ice fishermen caught 6,000 walleyes and 7,300 perch, a few white bass and a few largemouth bass at a rate of 0.69 fish per hour. In spite of the shorter hours for fishing this year the winter fisherman had a 100 per cent increase in angling success over the 59-60 season when only 4,000 walleyes and 2,400 perch were taken. As usual the average weight of the walleyes taken in the winter was almost double that of walleyes taken in the summer period. The winter catch of walleyes accounted for 14 per cent of the total number and 22 per cent of the weight of walleyes taken for the entire fishing season. The winter perch catch accounted for about 24 per cent of the total catch of perch.

West Okoboji Lake

(Open Water) An extremely limited, simple contact census was in operation on West Okoboji during the open water period of 1960. Perch and bullheads made up the bulk of the 3,139 fish recorded, with bluegill of third importance. The success was above average with 2.0 fish per hour recorded.

(Ice Fishing) A quantitative census was in operation on this lake during the winter period of 1960-61. Perch and bluegill were the two most important species in the catch

with an estimated 40,000 of each caught by anglers, representing about 90 per cent of the total catch. Walleye and northern pike fishermen did not fare so well. They experienced their poorest year since winter fishing was legalized ten years ago.

APPENDIX TABLE 1. HARVEST OF FISH AS ESTIMATED FROM QUANTITATIVE CREEL CENSUS DATA FROM CLEAR LAKE, BLACK HAWK LAKE, AND NORTH TWIN LAKE, JUNE AND JULY, 1960

	Clear Lake - 3,643 acres		Black Hawk Lake - 957 acres		North Twin Lake - 569 acres	
Species	Number	Weight	Number	Weight	Number	Weight
Bluegill	1,464	406	3,220	853	0	0
Crappie	44,220	11,228	40,895	9,775	48	20
Walleye	6,607	11,298	1,092	3,379	59	93
Black Bullhead	79,533	23,685	54,378	12,395	42,847	10,070
Yellow Bass	5,912	1,736	394	146	0	0
White Bass	1,102	848	0	0	0	0
L. M. Bass	137	491	193	535	0	0
Yellow Perch	1,658	591	162	23	45	91
Northern Pike	32	164	116	637	0	0
Channel Catfish	166	510	5,099	6,639	15	4
Carp	79	710	5,527	9,087	1,482	3,096
Totals	140,910	51,667	111,076	43,469	44,496	13,284
Number of Anglers	24,775		12,893		5,514	
Total Hours of Fishing	87,556		38,644		14,887	
Hours of Fishing / acre	24.03		40.39		26.15	
Average number of fish / man	5.68		8.61		8.07	
Average number of fish caught per hour	1.61		2.87		2.98	

APPENDIX TABLE 2. TOTAL HARVEST OF FISH, AS ESTIMATED FROM QUANTITATIVE CREEL CENSUS DATA FROM SPIRIT LAKE AND EAST OKOBOJI LAKE, MAY THROUGH OCTOBER, 1960.

	Spirit Lake - 5,684 acres		East Okoboji - 1,400 acres	
Species	Number	Pounds	Number	Pounds
Bluegill	56	36	576	242
Crappie	20,700	14,243	9,285	4,906
Walleye	36,434	43,073	3,896	8,196
White Bass	33,773	15,494	690	337
Northern Pike	187	1,586	13	25
Bullhead	315,945	168,182	484,342	146,653
L. M. Bass	249	481	90	364
S. M. Bass	47	154	0	0
Yellow Perch	26,231	12,714	1,651	584
Sheepshead	6,845	8,649	541	359
Channel Catfish	0	0	0	0
Totals	433,077	264,612	501,057	161,666
Total Anglers	92,660		52,355	
Total Hours	275,241		143,703	
Fish Per Trip	4.67		9.57	
Fish Per Hour	1.58		3.49	

APPENDIX TABLE 3. TOTAL HARVEST OF FISH, AS ESTIMATED FROM QUANTITATIVE CREEL CENSUS DATA FROM SPIRIT LAKE AND WEST OKOBOJI LAKE DURING THE ICE FISHING PERIOD OF DECEMBER 1959 to FEB. 15, 1960.

	Spirit Lake - 5,684 acres		West Okoboji - 3,939 acres	
Species	Number	Pounds	Number	Pounds
Bluegill	0	0	39,283	12,532
Crappie	0	0	66	30
Walleye	6,079	12,167	1,746	5,180
White Bass	261	242	0	0
Northern Pike	0	0	78	452
Bullhead	0	0	0	0
L. M. Bass	11	34	133	217
S. M. Bass	0	0	19	28
Yellow Perch	7,390	5,637	44,699	15,048
Sheepshead	0	0	0	0
Totals	13,741	18,080	86,024	33,487
Total Anglers	6,002		14,336	
Total Hours	19,709		40,139	
Fish Per Trip	2.29		6.0	
Fish Per Hour	.69		2.14	

THE VERTICAL DISTRIBUTION OF SEVERAL SPECIES OF FISH IN RED HAW LAKE, IOWA, DURING WINTER ICE COVER

BY

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With winter ice fishing becoming evermore popular with the southern Iowa angler, basic knowledge of the vertical location of various species of fish is important. Studies relating to the depth distribution of fish during winter ice cover are almost absent from fisheries literature. It is hoped that the information from this study might be utilized by the artificial lake angler to improve his methods of winter fishing and increase his rate of success.

Initially this study was considered a secondary portion of a project designed to determine the relationship of summer vertical distribution of fish and severe thermal stratification. Winter and spring-autumn distribution was originally used for a comparison of distribution with the summer stagnation period. (See Quarterly Biology Report, April, 1961) Comparative experimental netting was completed over a three year span during all thermal phases of Red Haw Lake. Semi-monthly dissolved oxygen and temperature samples were made in winter as well as other seasons of the year. Determination of winter vertical distribution of fish in relationship to temperature levels was impossible in this study because of limited thermal gradients.

Description of the Study Area

Red Haw Lake is a typical 80-acre, state-owned, recreational impoundment located three miles east of Chariton in Lucas County. Construction of the earthen dam was started in 1935 and completed in 1936 by the Civilian Conservation Corps.

The lake is located in an elongated, narrow, steep-sided valley that divides into two arms near the median of the long axis. This forms an irregular Y-shaped lake, with the dam located at the base of the figure. Bottom contours are extremely steep in the lower segment of the lake. Approximately 85 per cent of the lake is deeper than eight feet, with a maximum depth of 40 feet. The shoreline is very irregular, and is completely covered with climax woodland. The remainder of the watershed is privately owned and is under general agricultural use.

Complete winter ice cover is present on the lake from mid-December through the latter part of March. Ice thickness ranges from six to twelve inches depending upon the severity of atmospheric temperatures and the depth of snow cover. Mean mid-January temperatures (mean of daytime high and night-time low temperature) in the vicinity of the lake is 24°F. The water is extremely clear during most of the winter.

METHODS AND MATERIALS

Vertical distribution of six species of fish was studied by using a depth-marked experimental nylon gill net. Mesh size increased from one to two and one-half inches, bar measure, in four-50-foot segments. Depth was marked at two foot intervals with colored yarn to a depth of 18 feet.

One netting station in the middle of one arm of the lake, with a maximum depth of 21 feet, was used throughout the study. The net direction parallel or perpendicular to the shoreline was varied at predetermined intervals of 14 days. Netting was started as soon as the ice was thick enough to insure safe working conditions, and continued into the late winter. Nets were inspected at intervals ranging from 24 to 72 hours. The depth at which each individual specimen was netted was recorded with color-coded pins on a styrofoam sheet with marked depth intervals. All data from the winters of 1959, 1960, and 1961 were combined for analysis.

RESULTS

During the study a total of 2,451 fish were captured in 160 net days (3,840 hours). The number of each individual species caught during the project was as follows: golden shiner, 1,067; crappie, 362; bullhead, 622; bluegill, 160; yellow perch, 124; and channel catfish, 116. Occasionally largemouth bass, green sunfish, and warmouth were also caught, but they were not taken in great enough numbers to be considered significant.

In general, winter angling in Red Haw Lake is concentrated for bluegill, crappie, and yellow perch. Infrequent catches of bullhead, largemouth bass, and channel catfish have been recorded, but these species are normally taken accidentally while the angler is fishing for other species. There is no record of golden shiners being caught by hook and line in Red Haw, and they are included only because they represented the largest percentage of the fish sampled and may be of general interest.

Bullheads were the only fish found at all depths during the study. However, there was a trend for this species to occur most frequently in the shallow strata. The largest bullhead sample was found in the first two feet of the net, with the size of the sample decreasing slightly as depth increased (Table 1). This is the exact reverse of the summer vertical distribution of bullheads when approximately 40 per cent of the sample occurred in depths exceeding 10 feet. Golden shiners were also found at shallow depths, with 81 per cent of the sample occurring within four feet of the surface.

As indicated in Table 1, crappie, yellow perch, bluegill, and channel catfish were concentrated in a narrow stratum near the bottom of the lake. All samples of these four species of fish were found below the 12-foot depth interval. Crappie were equally distributed at each stratum from 12 to 18 feet. Bluegill, channel catfish, and perch were taken most frequently in the lower two feet of the net. Bluegill and channel catfish represented the largest concentration of fish at this depth interval, with 80 and 75 per cent respectively of the sample found at this stratum.

Table 1. Vertical distribution of six species of fish during winter ice cover in Red Haw Lake, Iowa. (Individual depth distribution sample is expressed in per cent of occurrence)

Depth Interval (ft.)	Species					
	Crappie	Bluegill	Bullhead	Channel Catfish	Yellow Perch	Gold Shiner
0-2			26			61
2-4			22			20
4-6			20			2
6-8			10			6
8-10			2			11
10-12			8			
12-14	33	10	6	15	17	
14-16	33	10	2	10	33	
16-18	33	80	2	75	50	

SUMMARY

The vertical distribution of six species of fish was studied at Red Haw Lake, Iowa, during winter ice cover. A total of 2,451 fish was captured in 160 gill net days. Golden shiner, crappie, bullhead, channel catfish, bluegill, and yellow perch comprised the majority of the catch. Bullheads were the only fish found at all depths. However, the largest sample of bullheads was found in shallow depths. Golden shiners were found in shallow water more frequently than any other species, and were never found below a depth of 10 feet. Bluegill, crappie, channel catfish, and yellow perch were concentrated toward the bottom of the lake, and were never found above 12 feet. Bluegill showed the greatest tendency to inhabit the deeper stratum, with 80 per cent of the sample found in the last two feet of the experimental net.

CURRENT STATUS OF RUFFED GROUSE IN IOWA

BY

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Game Biologist

INTRODUCTION

Few Iowa hunters realize that the ruffed grouse, sometimes called timber pheasant or wood partridge, is a native Iowa game bird. Yet this bird was once present over most of the state, and it can still be found in the northeastern part. The particular area in which grouse are found does not support significant numbers of other game birds such as pheasant and quail. However, little is known about the present density and exact range of Iowa ruffed grouse, and it may be true that the existing population is capable of supporting a limited hunting season without detrimental effect.

With this in view, personnel of the Biology and Game Sections have undertaken an investigation of the current status of ruffed grouse in Iowa. The first phase of this project is to determine the present density and range of ruffed grouse in the state. Later phases will include evaluation of the harvest potential of the species under Iowa conditions and a study of the possibility of expanding the range of grouse in the state.

To date, there are no good year-to-year records of the size and fluctuations of Iowa ruffed grouse populations. A report of a single hunter killing 20 grouse in one day in Linn County in 1903 shows their former abundance in Iowa forests (Anderson, 1907). Dumont (1933) reported grouse were most numerous in Allamakee County, with a few still present in ten other counties. A 1938-1940 study near Lansing in Allamakee County by Emmett Polder, then a student at Iowa State College, was the first, and until now only, serious attempt to investigate the ruffed grouse population in their limited remaining Iowa range (Polderboer, 1939, 1940, 1942a and 1942b). He found 45 grouse on his 3200-acre study area, 1400 acres which were in forest, or about one grouse per 30 acres of timber.

METHODS

In order to obtain an idea of the density and distribution of Iowa's ruffed grouse population, a census method adaptable to the amount and type of area to be covered and limited time and personnel available for such work was needed. The most suitable technique appears to be the spring roadside drumming count (Petraborg, etal., 1953). Petraborg and his co-workers in Minnesota found this a satisfactory method of determining population trends and relative abundance of ruffed grouse, and it was one which made it possible to cover a large area with few observers and to obtain a large number of observations even in a low grouse population. Dorney, etal., (1958) in Wisconsin, using methods adapted from the Minnesota techniques, concluded that the drumming count was a simple and efficient method for obtaining an index to the breeding population.

The technique of obtaining a ruffed grouse drumming site count and thus determining the actual number of grouse present on an area, and not just an index to the population as obtained by the roadside drumming count, has been found to have many disadvantages (Frank, 1947). The principal one was the amount of time necessary to accurately determine the actual number of drumming males on a given area. Hardy (1952) felt that the drumming site count was a fairly reliable method for measuring populations on small areas in Kentucky, but the roadside drumming count offered the best means of measuring grouse populations on a region-wide basis.

The King strip census, or grid, method commonly associated with measurement of grouse populations (Leopold, 1933) was not considered suitable for purposes of this study, primarily because of the large manpower and time requirements. It has been found that reasonably accurate estimates are difficult to obtain with this method (Hayne, 1949; Palmer and Eberhardt, 1955). Also, the lower the grouse population, the less satisfactory are the results obtained.

The long-line brood census method has been used with apparent success in New Hampshire in an attempt to solve the problem of censusing the whole state with limited personnel and a small budget (Fogg, 1956). Lines 35 miles long were set up in five regions and two men using one car hiked over these lines four times between mid-June and mid-September, recording the number of broods and individuals flushed. An adaptation of this technique on a reduced scale might hold promise as a method for obtaining information on the status of Iowa's grouse population after the breeding season and prior to the hunting season.

To implement the roadside drumming count technique, several 10 to 15 mile routes were laid out along roads through typical northeast Iowa grouse habitat. Listening points were selected about a mile apart, sometimes more, but never less than half mile apart. The count was begun half hour before sunrise. The number of drums heard during a 4-minute period at each stop was recorded, and the number of individual birds drumming was tabulated as best as possible.

Four minutes is the average interval between drums by an individual grouse (Petraborg, etal., 1953), so there are times when a single grouse drums more than once during the 4-minute listening period. Thompson and Lemke (1952) in Wisconsin found that 28 percent more birds were heard in 3 minutes than in 2 minutes and 14 percent more birds in 4 minutes than in 3 minutes. Only 3 percent more birds were heard in 5 minutes as opposed to 4, so little is gained by listening an additional minute -- particularly since this is an index method. They also found that for a given time period, such as 4 minutes, the number of drums per bird appeared to remain constant irrespective of high or low populations and irrespective of whether drumming is at a seasonal peak or not -- a further advantage of this technique.

Dorney, etal. (1958) recommended starting the counts when the first willow leaves begin to develop, or May 1, whichever occurs first. Petraborg, etal. (1953) indicated the drumming peak should usually occur about the last week of April and first week of May. Transects are best run on clear, still mornings; wind over 3 m.p.h. will cut down audibility appreciably. In Wisconsin, transects have 15 stops and two runs are made 5 to 10 days apart. The higher of the two counts is used for year-to-year comparisons. This general method will be followed during the current study.

RESULTS

A few preliminary counts were made in 1956 and 1960 by Conservaiton Officers in some northeastern Iowa counties. Twenty individual grouse (26 total drums) were heard on a 10-stop route along the Upper Iowa River in northern Allamakee County in 1956. However, none were heard on two similiar routes in Clayton and Winneshiek Counties, though both Officers indicated they knew some grouse were present in their counties. In 1960, 24 drumming grouse were heard on two Allamakee routes, 14 on one route in Winneshiek, and none on two in Fayette and one in Dubuque (Table 1).

In 1961, a more intensive census was conducted. Fifteen routes in six counties were run. A total of 192 drums from 179 individual grouse was heard on 201 stops, an average of nearly one per stop (Table 2). The highest single count occurred in northeast Winneshiek County, where 40 drums were heard on a 14-stop route--an average of nearly 3 per stop. However, Allamakee County had the most grouse, since here they occur throughout most of the county. In the other counties their distribution is more spotted, since

Table 1. Results of 1956 and 1960 Spring Ruffed Grouse Drumming Counts in Northeastern Iowa

County	Part	Route	Date	No. of stops	Individual birds drumming	Total drums heard	Drums per stop
				1956			
Allamakee	N	Upper Iowa River	May 7	10	20	26	2.6
Clayton	NE	Sny-Magill Creek	May 16	10	0	0	0.0
Winneshiek	?	?	May 12	10	0	0	0.0
				1960			
Allamakee	N	Upper Iowa River	April 29	10	9	9	0.9
" "	EC	Wexford	May 1	10	15	15	1.5
Winneshiek	NE	Highlandville-N. Bear	May 17	10	14	14	1.4
Fayette	NC	St. Lucas Timber	May 14	10	0	0	0.0
" "	EC	Volga River	May 13	10	0	0	0.0
Dubuque	SE	Miss. River Bluffs	May 13	10	0	0	0.0

Table 2. Results of 1961 Spring Ruffed Grouse Drumming Counts in Six Northeastern Iowa Counties.

County	Part	Route	Date	No. of stops	Individual birds drumming	Total drums heard	Drums per stop
Allamakee	SE	Yellow River State Forest	April 19	15	25	29	1.9
"	EC	Wexford-Harpers Ferry	April 21	15	25	26	1.7
"	N	Upper Iowa River	April 21	15	22	24	1.6
"	NE	Lansing	April 27	9	14	14	1.6
"	SE	Paint Creek	May 3	14	16	17	1.2
"	NE	Hwy. 182	April 25	10	10	10	1.0
"	SE	Luster Heights	May 3	14	10	10	0.7
"	C	Village Creek	April 27	13	6	6	0.5
		Totals--		105	128	136	1.3
Winneshiek	NE	Highlandville-North Bear	May 4	14	36	40	2.9
"	SE	Frankville-Yellow R.	May 4	15	5	6	0.4
"	NW	Bluffton-Upper Iowa R.	May 4	12	0	0	0.0
		Totals--		41	41	46	1.1
Clayton	NE	Sny-Magill--Bierbaum	April 22	15	5	5	0.3
"	EC	Buck Creek - Garnavillo	May 3	18	5	5	0.3
		Totals--		33	10	10	0.3
Fayette	NC	St. Lucas Timber	May 2	10	0	0	0.0
Dubuque Delaware	N	White Pine Hollow	May 2	12	0	0	0.0
Grand totals----		15 Routes		201	179	192	1.0

less timber is present.

Eight Allamakee routes averaged 1.3 drums per stop, compared to 1.1 on three Winneshiek routes and 0.3 on two Clayton routes. No grouse were heard in Fayette, Dubuque or Delaware Counties. In the last four counties mentioned, the best grouse habitat often could not easily be reached by road, particularly along the river bluffs, and grouse are known to be present even though not heard. Unverified reports of grouse being seen in some bordering counties have also been received.

An average of more than one drum per stop indicates that parts of northeast Iowa have a grouse population comparable to that found in much of nearby sections of Wisconsin and Minnesota. However, any attempt to convert the data at hand into a "grouse-per-square mile" or "acres per grouse" figure is subject to many complications.

Petraborg, etal. (1953) gave a formula for computing the number of grouse per square mile by using a 1/8-mile radius of audibility and the number of drummings heard per stop. With this formula, an average of one drumming bird per stop means a population of 20 drumming cocks per square mile, or 1 per 32 acres. If a 1:1 sex ratio is assumed, the spring population on such an area would be 40 grouse per square mile, or 1 per 16 acres. On the Winneshiek County route averaging 2.9 per stop, there would be 58 males per square mile (1 per 11 acres), or 116 grouse (1 per 5.5 acres).

However, Dorney, etal. (1958) believed that a 1/4-mile radius of audibility was more nearly correct. Since a circular plot with a 1/4-mile radius is four times as large as one with a 1/8-mile radius, the figure used in the formula for radius of audibility is a critical one. If the 1/4-mile radius is used in the formula, an average of one drum per stop gives a population of 5 drumming males per section instead of 20, or per 128 acres and not 1 per 32--all estimates being decreased by a factor of 4. Hardy (1952) indicated that the effective range of audibility was slightly less than 1/4 mile in the type of topography occupied by grouse in Kentucky. The picture in Iowa would probably be similar. The rough terrain may result in decreased audibility, or, conceivably, may at times result in reverberation of the drumming sound with the valleys in which some stops are located.

In the uneven country typical of northeast Iowa there is considerable variability between the character of the different stops. Some are in flat areas with forest all around; others in quite hilly terrain, again with forest immediately adjacent to both sides of the road. Many of the roads follow valleys. Here random stops would often not sample enough wooded area, so the listening points were pre-selected to be close enough to timber so drumming grouse could be heard--usually at a point where the road passed along the edge of the valley. This meant that, in effect, only a half-circle of grouse habitat was being sampled, since there was forest on only one side of the road. The other timbered slope of the valley was frequently too far away for drumming grouse to be heard.

Thus if a grouse-per-square mile estimate were computed from such stops, it would be necessary to double the figures obtained from the previously mentioned formula. (Remember that in speaking of square miles and acres, it is forested area only that is being considered). A good example was the route along the Upper Iowa River, where the road followed the base of the north bluff of the river and the south bluff was nearly always too distant for grouse to be heard. The 1.8 drums per stop indicated a grouse population of 36 birds per square mile, or 1 grouse per 18 acres of forest along these bluffs, using a 1/4-mile audibility radius. Yet it is certain that it was not possible to hear this far at some of the stops because the hills were so steep. The Winneshiek route with the high count was primarily of this one-sided character and doubling the computed figures, using a 1/4-mile radius, would indicate a grouse population of about 60 birds per square mile (30 drumming cocks, 1:1 sex ratio). If the 1/8 mile radius was used, a figure of 116 males or 232 grouse, per square mile would be obtained--obviously an unrealistic estimate!

Any attempt to extrapolate the 1961 spring drumming count data into an estimate of the total number of grouse in a particular county, or the entire Iowa grouse range, would be fraught with danger. Allamakee County, for example, contains 132,000 acres of forest land, or 32 percent of its total area (Morgan and Compton, 1956), but how much of this is grouse habitat is an unknown quantity. An intensive study of aerial photos combined with on-the-ground surveys would be necessary before such a figure could be given with any confidence.

The important thing to remember is that if a suitable census technique is used, any errors involved will apply in the same manner each year, and thus the method will still be adequate for showing population trends. If more intensive management of the grouse (for example, a limited hunting season) is undertaken, it is the population trend resulting from the management that is of most significance.

DISCUSSION

In view of the increased interest in exotic game bird species evident recently, not only in Iowa but in many other states as well, it would perhaps be well to pause and reflect on what might be done with species already at hand. When an exotic species is introduced, the major unanswered question is whether it is adapted for survival in the area at all. What may look like a promising species may prove to be a complete failure, perhaps because the climate was unfavorable in some respect or the amount and types of cover and food was unsuitable for meeting the species' particular requirements.

Some of these stumbling blocks can be eliminated, or at least more properly evaluated, when considering a species native to the area. Thus, since ruffed grouse previously existed over much of Iowa and still persist in a small part of the state, we can be confident that, for example, climate is not going to result in elimination of the species. If we were to transplant grouse to other areas of the state and they failed to become established, climate per se would not be the cause.

Neither then could climate have been the cause of ruffed grouse disappearing from most Iowa counties. This disappearance resulted from clearing of timber and heavy pasturing of woodlands, which apparently began having a noticeable effect during the late 1800's and early 1900's. Thus it would be futile to try to re-establish grouse throughout most of the state since the conditions that caused them to vanish still exist and, for the most part, are becoming even more unfavorable.

Only if an area can be found where the trend toward timber clearing and woodland pasturing is, or can be, reversed, will it pay to attempt to expand the current range of ruffed grouse in Iowa by a re-stocking program. With this in mind, an evaluation of the potential for grouse of the Shimek State Forest and surrounding area in Lee and Van Buren Counties in the southeastern corner of the state is underway. State control over much of the land concerned and the reforestation program in action may swing the habitat balance enough that ruffed grouse could again maintain themselves in this area--an area in which they managed to hang on until about 30 years ago.

Aldo Leopold (1931) felt that the persistence of ruffed grouse in small remnants of ungrazed woodland along the river bluffs of Iowa, Illinois and Indiana was strongly suggestive of a special affinity for this cornbelt range. He believed that an equal degree of deforestation in central Wisconsin would have exterminated the species. He further held the opinion that the center of the north central region was the optimum range of the ruffed grouse and that the bulk of its present distribution occurs on marginal, or adverse, environments. Not only did he feel that evidence indicated the ruffed grouse was once abundant in the agricultural belt, but that it did not fluctuate in abundance in the manner commonly associated with the cyclical changes it undergoes in its more northern environs.

It would thus appear that there is reason for encouraging further study of ruffed grouse in Iowa. More information is needed, both on the status of the grouse in its currently occupied range, particularly with respect to its harvest potential, and on the potential of areas being considered for transplanting efforts. Field studies on both aspects will be continued during coming months.

SUMMARY

1. Ruffed grouse were formerly present over most of Iowa, but now can be found only in the northeastern counties of the state.

2. A project has been initiated to determine the present density and range of ruffed grouse in Iowa, evaluate the harvest potential of the species, and examine the possibility of expanding their range in the state.

3. The spring roadside drumming count was used as a census technique to determine their current density and range.

4. An average of nearly one drumming bird was heard per stop on 15 routes in 6 northeastern counties.

5. Allamakee County had the most grouse, averaging 1.3 drums per stop compared to 1.1 in Winneshiek and 0.3 in Clayton.

6. Grouse are also known to be present in Fayette, Dubuque and Delaware Counties, and unverified reports have been received from other nearby counties.

7. The grouse population in good forest cover probably varied between 10 and 40 birds per square mile, with marginal areas having fewer and some optimum habitats containing more.

LITERATURE CITED

Anderson, Rudolph M.

1907 The Birds of Iowa. Proc. Davenport Acad. Sci., 11: 125-417.

Dorney, Robert S., Donald R. Thompson, James B. Hale, and Robert F. Wendt.

1958 An Evaluation of Ruffed Grouse Drumming Counts. J. Wildl. Mgmt., 22(1): 35-40.

Dumont, Phillip A.

1933 A Revised List of the Birds of Iowa. University Iowa Studies Nat. Hist., 15: 1-171.

Fogg, Forrest F.

1956 Results of a Study of Ruffed Grouse Population Trends in New Hampshire for the Past Eight Years. N. H. Fish and Game Dept., Concord, New Hampshire. Mimeo. p. 9.

Frank, William John

1947 Ruffed Grouse Drumming Site Counts. J. Wildl. Mgmt., 11(4): 307-316.

Hardy, Frederick C.

1952 Adaptability of Northern Techniques for Ruffed Grouse Census in Kentucky. Sixth Southeastern Wildl. Conf., Mimeo. p. 13 and appendix.

Hayne, Don W.

1949 An Examination of the Strip Census Method for Estimating Animal Populations. J. Wildl. Mgmt., 13(2): 145-156.

Leopold, Aldo

1931 Report on a Game Survey of the North Central States. Sporting Arms and Ammunition Manufacturer's Institute. Madison, Wisconsin. p. 299.

1933 Game Management. Charles Scribner's Sons. New York. p. 481.

Morgan, J. T. and L. F. Compton

1956 Iowa Forest Statistics. Central States Forest Exp. Sta., Columbus, Ohio. Forest Survey Release 20. p. 57.

Palmer, Walter L. and Lee Eberhardt

1955 Evaluation of the Strip Census Method for Ruffed Grouse. Mich. Dept. Cons., Lansing, Mich., Game Div. Rpt. No. 2067. p. 9.

Petraborg, Walter H., Edward G. Wellein, and Vernon E. Gunvalson

1953 Roadside Drumming Counts a Spring Census Method for Ruffed Grouse. J. Wildl. Mgmt., 17(3): 292-295.

Polderboer, Emmett G.

1939 The Summer Habits of the Ruffed Grouse in Iowa. Iowa Bird Life, 9(3): 38-41.

1940 The Cover Requirements of the Eastern Ruffed Grouse, Bonasa umbellus L., in Northeast Iowa. M. S. Thesis. Iowa State College. Ames, Iowa. p. 50.

1942a Seasonal Food Preference Trends of Eastern Ruffed Grouse in Iowa as Shown by Dropping Analysis. Iowa State College. J. Sci., 26 (3): 331-335.

1942b Cover Requirements of the Eastern Ruffed Grouse in Northeast Iowa. Iowa Bird Life, 12(4): 50-55.

Thompson, Donald R. and Charles W. Lemke

1952 Audio Census of Some Wisconsin Game Birds. 14th Midwest Wildl. Conf. Mimeo. p. 11.

AGE OF QUAIL TAKEN BY HUNTERS IN 1960

BY

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Under the supervision of the biologist, both Conservation Officers and hunter-cooperators have collected a sample of wings from quail shot during each Iowa hunting season since 1946. Originally the data from this study was used to find the young to adult ratio. Since 1952 a total of 14,638 wings was collected, and a more intensive study of these has shown the time of brooding and the percentage occurring in different age groups. The study illustrated production and survival during good, average and poor seasons. The 1960 collection of wings depicts the age of birds harvested following the 1959-1960 winter, which was one of the severest experienced in Iowa.

Data now on hand is sufficient to enable us to compare hatching to summer calling by males. We can use the calling pattern to make good forecasts of nesting success since calling patterns correspond to hatching. As pointed out in the Biology Seminar Report of April 1956, an early hatch is a welcome addition to later summer hatching. This early production is reflected in the percentage of birds over 150 days old in the hunter's bag.

METHOD

Before the quail hunting season, letters of instruction for collecting wings were mailed to Officers in the Iowa quail range, and each was instructed to ask for one wing from all quail seen in the possession of the hunters. Either the right or the left wing was acceptable provided the primary flight feathers were not badly damaged. Envelopes for the wings were also supplied to each Officer. On the envelopes were spaces for writing the county, date of kill and sex of birds. The wings were to be mailed to me by the end of the shooting season.

The biologist also contacted experienced quail shooters in Albia, Bloomfield, Centerville, Chariton, Corydon, Fairfield, and Ottumwa. The purpose of the project was explained. Each gunner was shown a graph which illustrated the ages of quail and the hatching dates of quail shot in previous years. All were asked to save wings which the biologist picked up at least once each week during the hunting period. Previous to 1960 an effort was made to collect wings during November (the open season was 45 days in length, and began about November 1). After December 1 most quail bore matured plumage and it was not possible to determine the days of age since this is depicted by the stage of primary feather growth.

The 1960 season was preceeded by the unusually severe 1959-1960 winter when the breeding bird loss was high. A light kill by hunters was anticipated; therefore, wings were sought during the entire shooting period, November 5 through December 4.

Methods of classifying wings are mentioned in the Quarterly Biology Reports of July 1959. Essentially there are five categories. These divisions are; wings from quail up to 150 days old, those of quail over 150 days old, wings of adults, wings having characteristics of both old and young, and those which are damaged and cannot be classified. Hatching dates for those under 150 days old were determined by stage of primary feather growth. Stage of wing moult was recorded for adults.

RESULTS - STATEWIDE

During and following the 1960 quail hunting season a total of 671 wings was collected. Of these, 591 were young and 65 were adults. In addition, nine wings had characteristics of both old and young, while six wings were so badly damaged that they could not be aged, and a small number was delivered in airtight bags or cans in which the wings decayed.

O the total number, 204 wings were taken on unknown dates, while date of kill was recorded for 452. By back-dating we can assign an age in days to quail under 150 days old. Data from wings of quail under 150 days old indicated a hatch of these beginning in late June. It peaked in July, fell off thereafter, but came to a lesser peak in August. Production ceased in September. When we consider that many were over 150 days old, an earlier hatch is indicated.

A summary of statewide data for 1959 which was an average production year, and 1960 a low production season, indicates that during 1959, 1,432 wings were received. The sex ratio was 100 cocks: 77 hens and 85 per cent were juvenile birds.

In 1960 with 671 wings contributed, the sex ratio was 100 cocks: 75 hens and 90 per cent were juveniles. Median age groups for the two years are listed below in Table 1.

Table 1. Median age of Iowa quail, 1959 - 1960.

Median Age in Days	Per cent of Quail	
	1959	1960
60	13	6
90	11	8
120	35	25
150	27	50
Adults	15	10

It must be remembered that a large portion of our wing sample is from experienced hunters who kill only birds that are full grown. These hunters report that they scout the quail ranges before the shooting season, and they return first to areas where birds were most advanced in age, or where early hatching occurred. Thus the true ratios of birds in the field may not be represented in the bag by hunters.

RESULTS - DISTRICT

Quail are hunted in two-thirds of the state, however most of the wings are from two areas. In 1960 a total of 481 wings was collected in south-central and south-eastern Iowa while a total of 614 was gathered in the same areas in 1959. In south-central Iowa the data from ageable wings (up to 150 days old) indicated a peak hatch early in July in 1960. The peak was somewhat later in the southeast.

In 1959 in the south-central the ageable wings (less than 150 days old) indicated a hatch peak in late July and a smaller August peak. When the 150 day old birds are added to the above (which are under 150 days old) the hatching peak is earlier. In addition, a record of 16 coveys seen in summer and fall 1959, indicates that hatching began in May. Wings in various age groups are listed in Table 2.

Table 2. Quail wings in different age groups - 1959 - 1960

District	Year	Total	Young	Adults	Young over 150 days old	Per cent over 150 days old
South-C	1960	334	301	33	216	72
	1959	473	387	86	308	80
South-East	1960	147	122	25	86	70
	1959	141	119	22	25	21

RESULTS - COUNTY

The contributions of wings from southern Iowa were low in 1960. Counties represented were: Appanoose, Cass, Clarke, Davis, Decatur, Des Moines, Greene, Henry, Jasper, Lee, Lucas, Monroe, Montgomery, Page, Poweshiek, Ringgold, Taylor, Union, Van Buren, Wapello, and Wayne. Most wings came from the counties of Ringgold, Appanoose, Davis, Lucas, Monroe, Poweshiek, Van Buren, and Wayne. Collections from some key counties are summarized in Table 3.

Table 3. Sample of wings from the 1960 bag of Iowa quail.

Age in * Days	County: Davis	Ringgold	Van Buren	Wayne	
	Number of Wings				Per Cent
150	43	61	28	38	58
127	3	22	9	22	20
119	3	7	2	1	4
111		9	1	1	4
101		5	4	4	4
93	3	2	4	1	3
83		3	2	8	4
53		3			1

* The age arrangement conforms to the revised chart based on work of Petrides and Nestler (1943).

The pattern for wing ages would undoubtedly change if we had more wings collected on a single day early in the season. Also the hatching pattern changes when we add the 150 day old birds. The above chart indicates that within some key counties there is a trend toward a decrease in hatching as summer progresses. (There are few quail 50 to 100 days old). As stated before, this is controlled to an unknown extent by preference of shooters. However, the same hatching pattern is indicated by age of quail, by data from coveys seen and by the calling quail pattern, Stempel (1952 and 1955). Further evidence of this may be found in stage of moult of adults and in young, Stempel (1959 and 1960).

ADULT QUAIL

In 1960 a total of 65 identifiable wings was collected from adult quail shot during the hunting period. None of the adults taken early in the season had mature primary feathers. One of eleven collected between November 16 and 30 had mature primaries. Three of eight colledted the latter part of the season had mature primaries. Birds taken early in November were most retarded in wing feather development.

Just as there are more of the mature-size young with matured flight feathers when winter arrives, also more of the adult quail have mature flight plumage when winter comes. Moult in adults follows brooding, therefore, late re-growth of flight feathers indicates late nesting activity. In 1960 the adult moult was **comparatively** late. This could follow comparitively late brooding, or it may follow late summer re-nesting.

SUMMARY

1. The 1960 collection of 671 quail wings was smaller than any collection for recent years.

2. Some hunters prefer to shoot only full grown quail. Therefore, the age groups in the field may not be proportionate to age groups in the hunter's bag.

3. A July peak of hatching is shown for quail under 150 days old. An earlier hatching peak is indicated by the large percentage of quail that are over 150 days old.

LITERATURE CITED

Petrides, George A. and Nestler, Ralph B.

1943 Age Determination in Juvenial Bob-White Quail. American Midland Naturalist, 30(3): 774-782.

Stempel, M.E.

1952 A Late Spring and a Late Quail Hatch. Proceedings of the Iowa Academy of Science, 67: 619.

1955 Age of Quail in the Hunter's Bag, 1954. Iowa Conservation Commission Quarterly Biology Reports, 7(1): 33.

1959 Age of Quail Shot by Hunters. Iowa Conservation Commission Quarterly Biology Reports, 11(2): 16.

1960 Quail Hatching and Primary Feather Moult in Adults. Proceedings of the Iowa Academy of Science, 67: 619.

ANALYSIS OF DATA OBTAINED FROM DEER CHECKING STATIONS - 1960

BY

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INTRODUCTION

The primary objectives of the deer checking project are to gain information pertaining to the physical condition of the Iowa deer herd and to determine the reproductive success of the herd. Other pertinent data are also obtained which aid materially in the formulation of management plans for the Iowa deer herd. Personnel from the various Sections of the Fish and Game Division were located in 15 localities around the state in 1960 to gather the necessary data.

I wish to extend my heartfelt thanks to those individuals who aided so effectively in the 1960 deer checking operation. It is this type of unselfish cooperation which makes the management program of our Iowa deer herd one of the finest and most successful in the nation.

RESULTS

Complete or partial data were obtained from 791, or 18.5 percent, of the 4,269 deer harvested during the 1960 deer season. This was the greatest number of deer ever sampled and is undoubtedly an adequate sample, at least for age and sex ratio data. The following data were collected: age, sex, weight, number of antler points, beam diameter, general physical condition, and hind foot length. Reproductive tracts, blood samples, and stomach samples were also collected whenever possible to do so.

For comparative purposes, most data are presented separately for each of the primary deer regions and collectively for the state as a whole. The primary deer regions, outlined in Figure 1, are based on ecological differences among the various portions of the state (Kline, 1958).

Sex Ratios

The sex was determined for 785 of the 791 deer checked during the 1960 deer season; 438 males comprised 55.8 percent and 347 females 44.2 percent of the deer sampled (Table 1). A ratio of 126 males: 100 females was found, which was quite similar to the observed sex ratio of 132 males: 100 females in 1959.

The sex ratio in the fawn class was 144 males: 100 females, while a sex ratio of 116 males: 100 females was noted for the adult class.

Comparison of the sex ratios determined by Conservation Commission personnel with those submitted by holders of gun permits indicates that the hunters again reported biased data (Table 2). This situation has prevailed since 1958 when permit holders were first asked to save reproductive tracts from female deer for a reproductive study. Possible reasons for this bias were given earlier (Mustard, 1960).

Gun hunters reportedly harvested deer in the ratio of 195 males: 100 females in 1960; this is quite different from the ratio of 126 males: 100 females observed by out technical personnel.

This apparent bias renders useless the sex ratio information obtained from deer hunter report cards.

Age Ratios

A fawn: adult ratio of 70: 100 was found in the deer sampled during the 1960 deer season with fawns comprising over 41 percent of the deer checked. Assuming an adequate sample was obtained and there was no bias on the part of the hunters concerning age of the deer they shot, this can be interpreted to mean that about 70 fawns were produced for each 100 adult deer in 1960 This is very good reproduction.

The fawns: 100 adults ratio has ranged from a low of 38: 100 in 1953 to a high of 83: 100 in 1958, with a mean ratio of 63: 100 for the 8-year period (Table 3). The excellent reproduction in the Iowa herd is one reason Iowa can continually harvest a relatively large number of its deer each year and still maintain an adequate base herd to perpetuate the species.

The fawns: 100 adult females (1.5 years or older) ratio was 152 fawns: 100 adult females, or 1.52 fawns: 1 adult female. This would include those does which bred as fawns and which dropped their young about their first birthday.

Comparison of age ratio data taken in 1959 with that of 1960 was very revealing. The 1959 deer season was the second poorest Iowa has experienced, while the 1960 season was the best on record. The harvest for the 1960 season was 56 percent greater than that for 1959, however, the age composition of the deer sampled was almost identical for the two years. Table 4 shows the percentage composition the various age classes comprised and the cumulative percentage. As previously stated, the similarity between the data for the two years is most striking.

During both seasons, deer 1.5 years or younger comprised over two-thirds of the deer sampled, with deer 4.5 years or older furnishing only about 5 percent. It is apparent from these data that, even with a kill which was 56 percent above that of the previous year, the base herd was not decimated. If this had been the situation, older deer would have contributed a greater percentage of the kill sample in 1960.

It is apparent that the Iowa herd can stand somewhat heavier harvesting and still maintain an adequate base herd to perpetuate the species. The Conservation Commission took appropriate steps in 1960 to allow for a greater harvest and I hope it will see fit to take further action to achieve a still greater harvest in the current year.

Deer were aged by Conservation Commission personnel using the technique developed by Severinghaus (1949). This technique is based on tooth replacement and wear and is quite accurate enough for management purposes.

Weights

Weights were obtained for 207 of the 791 deer checked during the 1960 deer season. Most of the deer weighed were hog-dressed, i.e., the body cavity was empty. Allowances were made for the heart, lungs, and/or liver left in some animals in accordance with Park and Day (1942).

The average calculated liveweights, by age, sex, region, and for the state are given in Table 5. Liveweights were calculated from hog-dressed weights using the formula 1.272 X hog-dressed weight as given by Hornaday (1935). Weights are given to the nearest whole pound in the text and in the table.

The average calculated liveweight for all deer, 137 pounds, while not the heaviest

on record, compared favorably with the averages of the other seasons. Average liveweights for 1953-1959 were as follows: 130, 132, 140, 139, 136, 137, and 143 respectively.

Male deer averaged 148 pounds, while the average for all female deer was 122. Both of these averages are slightly below the 1959 weights. Male fawns averaged 103 pounds and female fawns 92 pounds in 1960. These weights are slightly greater than the 101 pounds for males and 89 pounds for female fawns in 1959. Adult males averaged 183 pounds, with a mean liveweight of 146 pounds for adult females.

Points Per Antler

The number of points per antler is a condition factor which is related closely to nutrition. All males, 1.5 years and older, averaged 3.88 points per antler in 1960 compared to the 1959 average of 3.94. Region I males had fewer points per antler than did deer from other regions, while deer from Region IV had more points (Table 6).

Differences in the mean number of points per antler among the regions were slight and statistical analysis is needed to determine if true differences exist.

A total of 367 antlers was included in the analysis.

Beam Diameter

Beam diameter measurements were obtained from 303 antlers and averaged 1.12 inches in 1960 compared with 1.10 in 1959. Deer from Region I had slightly smaller beam diameters than did deer from the other regions, but differences were so small they are probably inconsequential (Table 7).

General Physical Condition

Much of the data obtained from deer checked during the hunting seasons has utility in the determination of physical condition. However, some of these data tend to be of an abstract nature so, in 1960, a technique for assessing the physical condition of deer, based on general appearance, was implemented into our program. This technique, described by Riney (1960), is based on the tendency of deer to become thin due to losses of fat reserves as their condition decreases. Losses of fat from certain areas of the body are reflected in the general conformation of the animal. Deer are rated as good, fair, or poor condition.

Of the 582 deer on which data were obtained, 568 (97.6%) were rated good, 10 (1.7%) as fair, and only 4 (0.7%) poor. Because of the preponderance of good ratings, no attempt was made to analyze these data on a regional basis.

SUMMARY

1. Technicians obtained data from 791 of the 4,269 deer killed in the 1960 Iowa deer season. Deer checkers were located in 15 localities and operated deer check stations and checked deer in locker plants.

2. To facilitate comparison, much of the data were analyzed on a regional basis in which the state is divided into four regions based on ecological differences.

3. Males comprised 55.8 percent of the deer checked and females 44.2 percent, with a males: 100 females ratio of 126: 100. As has been the case for the past several years, gun hunters repprted a sex ratio which was obviously biased to favor the males.

4. Fawns comprised 41.2 percent of the deer checked for a fawn: 100 adults ratio of 70: 100. The data indicated excellent reproduction in the Iowa herd during 1960. A fawn: 100 adult females (1.5 and older) ratio of 152: 100 was found.

5. The average calculated liveweight for all deer in 1960 was 137 pounds. Adult males averaged 183 pounds and adult females 146 pounds. Male fawns averaged 103 pounds, while female fawns had a mean weight of 92 pounds.

6. Region I deer had fewer points per antler than did deer from other regions of the state, while Region IV had more points. The mean number of points per antler for the state was 3.88 in 1960 compared to 3.94 in 1959. Differences among the regions were small.

7. Deer from Region I had smaller beam diameters than did deer from other regions, but differences among the regions were so small that they are probably not significant. The average beam diameter in 1960 was 1.12 inches compared to the 1959 average of 1.10 inches.

8. The general physical condition of 582 of the deer checked was rated as good, fair, or poor: 97.6 percent rated good, 1.7 percent fair, and only 0.7 percent were rated as poor. This only serves to verify what our more technical data have already indicated.

LITERATURE CITED

Hornaday, W. T.

1935 American Natural History. Charles Scribner's Sons, New York, 16th edition, revised. pp. 449.

Kline, Paul D.

1958 A Report of the 1958 Deer Season Based on Data from Checking Stations. Iowa Conservation Commission, Quarterly Biology Reports, X(4): 19-26.

Mustard, Eldie W.

1960 Results of the 1959 Shotgun Season for Deer. Iowa Conservation Commission, Quarterly Biology Reports, XII(1): 1-9.

Park, B. C. and Day, B. B.

1942 A Simplified Method for Determining the Condition of White-tailed Deer in Relation to Available forage. USDA, Technical Bulletin 840. pp. 60.

Riney, Thane

1960 A Field Technique for Assessing Physical Condition of Some Ungulates. Journal of Wildlife Management, 24(1): 92-94.

Severinghaus, C. W.

1949 Tooth Development and Wear as Criteria of Age in White-tailed Deer. Journal of Wildlife Management, 13(2): 195-216.

TABLE 1. SEX, AGE COMPOSITION, AND NUMBER OF DEER CHECKED, IOWA, 1960

	REGION													
	I		II		III		IV		UNKNOWN		T O T A L S			
	M	F	M	F	M	F	M	F	M	F	M	F	ALL	
Fawn	2	2	3	4	1	1	-	1	-	-	6	8	14	
4-7 Mo.	12	16	19	12	39	23	23	10	6	5	99	66	165	312
7-9 Mo.	13	12	12	8	26	12	25	19	4	2	80	53	133	
Adults	4	1	9	4	2	2	4	1	2	-	21	8	29	
1.5 yrs.	20	6	29	19	27	33	24	27	11	7	111	92	203	
2.5 yrs.	10	4	19	18	15	19	15	17	3	3	62	61	123	
3.5 yrs.	5	11	11	4	11	8	8	3	-	-	35	26	61	
4.5 yrs.	3	4	3	3	4	4	1	3	-	-	11	14	25	
5.5 yrs.	1	-	1	-	1	1	-	-	-	-	3	1	4	
6.5 yrs.	-	1	-	-	-	2	-	2	-	-	-	5	5	
+ 6.5 yrs.	-	-	-	-	-	2	-	-	-	-	-	2	2	
Age Unk.	-	1	3	-	1	2	5	1	1	7	10	11	21	
Sub. Total	70	58	109	72	127	109	105	84	27	24	438	347	785	
Sex Unk. 1/	-		-	-	1		3		2				6	
Total	128		181		237		192		53				791	

1/ Includes 5 fawns and 1 adult

Table 2. COMPARISON OF SEX RATIO DATA OBTAINED FROM DEER HUNTER REPORT CARDS AND DEER CHECK STATIONS, IOWA, 1953-1960

Year	Sex Ratio Data Based on [1]		Difference
	Hunter Card Returns	Check Stations	
1953	115	116	1
1954	120	137	17
1955	133	110	23
1956	132	118	14
1957	120	113	7
1958 [2]	177	112	65
1959	280	132	148
1960	195	126	69
Means	159	120	43

1/ Data presented as males: 100 females.

2/ First year permit holders asked to save reproductive tracts from harvested female deer.

Table 3. NUMBER OF DEER CHECKED, BY AGE, AND FAWNS: 100 ADULTS RATIOS, FROM DEER CHECK STATION DATA, IOWA, 1953-1960

Year	Number of Deer Checked 1/			Fawns 100 Adults
	Fawns	Adults	Total	
1953	135	358	493	37.9
1954	125	175	300	71.4
1956	59	111	170	54.0
1957	77	135	212	57.0
1958	153	222	375	69.0
1959	231	279	510	82.8
1960	198	318	516	62.3
Totals & Mean	317	453	770	70.0
	1295	2051	3346	$\bar{x}$ = 63.1

1/ Includes only deer on which age data were obtained.

Table 4. COMPARISON OF AGE CLASSES REPRESENTED IN DEER SAMPLED DURING TWO IOWA DEER SEASONS, CHECK STATION DATA, 1959 and 1960 1/

Age Class	Percent of Deer Sampled 1959	1960	Cumulative Percent 1959	1960
Fawn	38.3%	41.2%	38.3%	41.2%
1.5 yrs.	28.9	26.4	67.2	67.6
2.5	17.8	16.0	85.0	83.6
3.5	7.5	8.0	92.5	91.6
4.5	3.3	3.2	95.8	94.8
5.5	0.8	0.5	96.6	95.3
6.5	0.2	0.5	96.8	95.8
Over 6.5	0.4	0.2	97.2	96.0
Unk. Adults	2.7	3.7	99.9	99.7

1/ Deer harvest for 1959 was the second lowest on record, while the harvest for 1960 was the highest: kill for 1959 was 2,731 and was 4,269 in 1960, a 56 percent difference.

TABLE 5. CALCULATED LIVEWEIGHTS OF DEER CHECKED, BY AGE, SEX, REGION, AND STATE, IOWA, 1960
1/ (to nearest whole pound)

Age Class	REGION I M	I F	II M	II F	III M	III F	IV M	IV F	UNKNOWN M	UNKNOWN F	STATE M	STATE F
Fawns	2/ 103 (23)	88 (21)	109 (7)	99 (4)	108(13)	94 (7)	92 (8)	89 (5)	102(2)	111(1)	103(53)	92 (38)
1.5	159 (15)	134 (6)	167 (5)	142 (4)	164 (4)	135(6)	155(2)	120(3)	- -	- -	160(26)	134(19)
2.5	191 (5)	140 (2)	187 (4)	160 (3)	206 (3)	151(3)	155(1)	137(2)	- -	- -	188(11)	149(10)
3.5	197 (5)	154 (7)	211 (5)	159 (1)	204 (2)	- -	267(1)	150(2)	- -	- -	209(13)	153(10)
4.5	206 (2)	167 (3)	177 (2)	178 (1)	281 (1)	176(1)	235(1)	184(1)	- -	- -	214(6)	173(6)
5.5	210 (1)	- -	- -	- -	- -	153(1)	- -	- -	- -	- -	210(1)	153(1)
6.5	- -	145 (1)	- -	- -	- -	- -	- -	- -	- -	- -	- -	145(1)
Unk. Adults	191 (3)	141 (1)	163 (3)	141 (1)	218 (2)	149(1)	- -	- -	153(1)	- -	183(9)	144(3)
All Adults	178 (31)	148(20)	183(19)	153(10)	198(10)	145(12)	193(5)	140(8)	153(1)	- -	183(66)	146(50)
All Deer, by sex	146 (54)	117(41)	163(26)	137(14)	148(23)	126(19)	131(13)	121(13)	118(3)	111(1)	148(119)	122(88)
All Deer	134 (95)		154 (40)		237 (42)		126 (26)		117(4)		137 (207)	

1/ Calcuated liveweight equals 1.272 X hog-dressed weight (Hornaday, 1935).

2/ Number in parenthesis ( ) indicates sample size.

Table 6. AVERAGE NUMBER OF POINTS PER ANTLER, BY AGE, REGION, AND FOR STATE, IOWA, 1960

Age Class	Region I	II	III	IV	Unknown	State Mean
1.5 yrs.	2.97 (39) [1/]	3.32 (38)	3.56 (43)	3.34 (35)	2.88 (8)	3.28 (163)
2.5	4.31 (16)	4.12 (28)	3.65 (20)	4.18 (28)	- -	4.06 (92)
3.5	4.90 (10)	4.40 (15)	4.56 (18)	4.86 (14)	- -	4.65 (57)
4.5	4.67 (6)	4.00 (2)	4.43 (7)	5.75 (4)	6.50 (2)	4.90 (21)
5.5	3.00 (2)	- -	6.50 (2)	- -	- -	4.75 (4)
Age Unk.	5.00 (6)	4.00 (10)	3.75 (4)	4.38 (8)	4.00 (2)	4.27 (30)
Mean	3.77 (79)	3.82 (93)	3.90 (94)	4.04 (89)	3.67 (12)	3.88 (367)

1/Number in parenthesis ( ) indicates sample size.

Table 7. AVERAGE BEAM DIAMETER MEASUREMENTS, BY AGE, REGION, AND FOR STATE, IOWA, 1960 (in inches)

Class	Region I	II	III	IV	Unknown	State Mean
1.5	0.87 (36) [1/]	0.89 (24)	0.97 (45)	0.90 (27)	0.78 (6)	0.91 (138)
2.5	1.28 (14)	1.20 (20)	1.20 (19)	1.31 (26)	- -	1.25 (79)
3.5	1.24 (9)	1.30 (14)	1.33 (18)	1.50 (8)	- -	1.33 (49)
4.5	1.38 (6)	1.25 (2)	1.56 (7)	1.10 (2)	- -	1.40 (17)
5.5	1.25 (2)	- -	1.50 (2)	- -	- -	1.38 (4)
Age Unk.	1.35 (5)	1.11 (4)	1.18 (3)	1.03 (2)	1.42 (2)	1.21 (16)
Mean	1.08 (72)	1.10 (64)	1.14 (94)	1.15 (65)	0.94 (8)	1.12 (303)

1/Number in parenthesis ( ) indicates sample size.

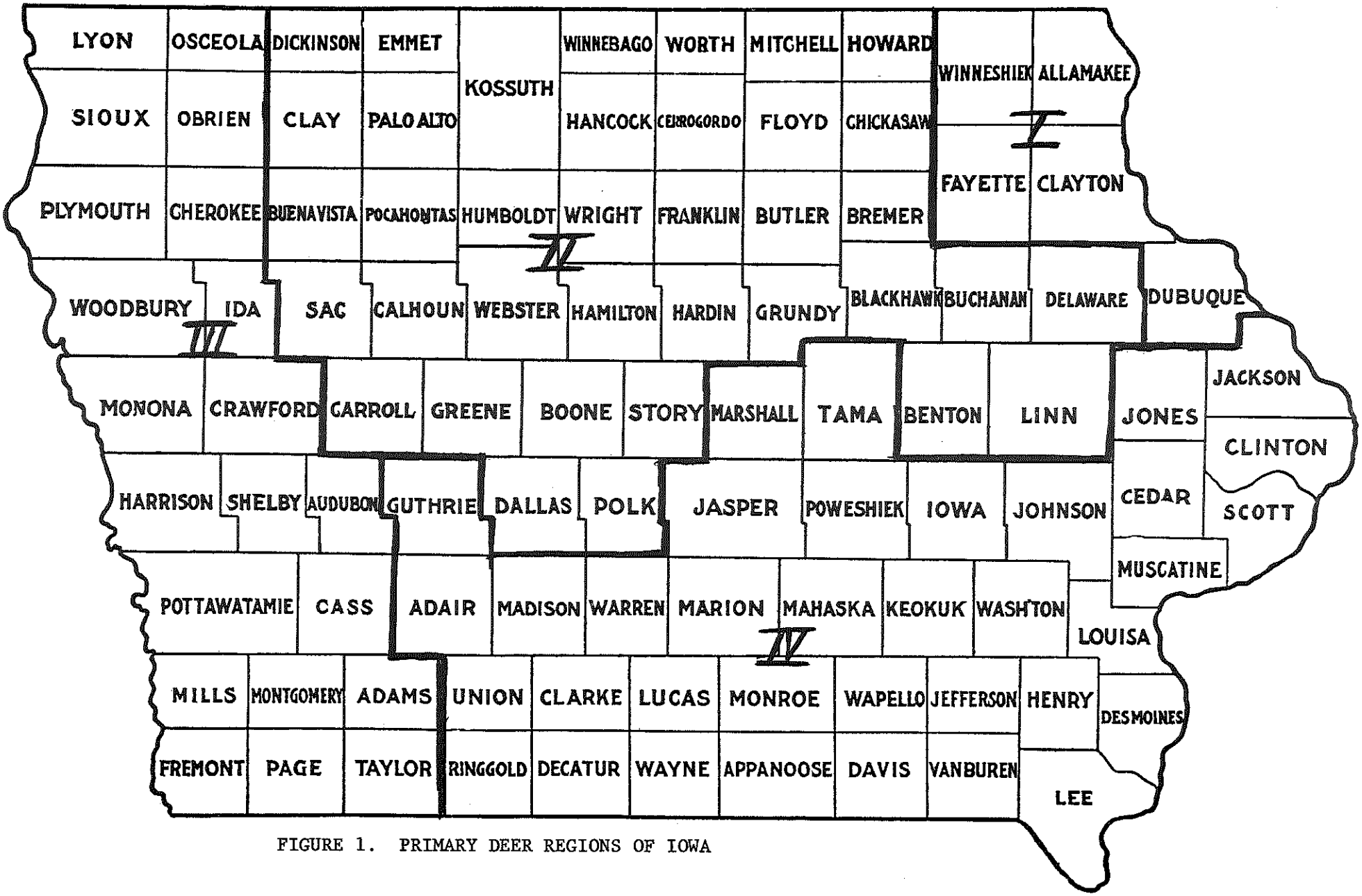

FIGURE 1. PRIMARY DEER REGIONS OF IOWA

WATERFOWL NESTING POPULATIONS AND BREEDING CONDITIONS IN IOWA - 1961

BY

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Game Biologist

INTRODUCTION

Waterfowl production trends in Iowa have been evaluated annually from on-the-spot observations of breeding pairs plus brood counts on productive areas in northwestern Iowa since 1949. The three major waterfowl producing areas studied include the Ruthven Area, Estherville Area, and the Spirit Lake-Okoboji Area. Five additional nesting study units were initiated in 1961 in central, western, and north-central Iowa to provide a more detailed evaluation of waterfowl production state-wide. Stream surveys to determine wood duck production trends via breeding pair and brood counts have been discontinued as has been done in many of the other Mississippi Flyway States. The methodology of making and analyzing wood duck counts along the Mississippi River in Iowa appears practicable according to the results of the Cooperative Wildlife Unit at Ames. It is hoped this method will be permanently initiated in Iowa in 1961 along the Mississippi River.

RESULTS

A few migrating mallards moved northward across much of interior Iowa during early March. A larger mallard flight was reported along the Missouri River in western Iowa and preceeded the advance of ducks through the eastern part of the state. Peak concentrations of mallards occurred in the lakes region of northwestern Iowa from April 7-20th. The flight of mallards into and through Iowa during the spring of 1961 appeared to be one of the smallest migrations observed or reported during the last 12 years.

A moderate sized blue-winged teal concentration materialized in the lakes region from April 20-30th. Concentrations of lesser scaup were not spectacular, but this is to be expected during a late spring in Iowa, which often gives a westward shift in the migratory pattern of divers. There were no large concentrations nor build-ups of diving species observed or reported in this state.

Wood duck numbers reported from eastern Iowa indicated a large influx of this species into Iowa during the spring of 1961.

Coot appeared numerous throughout the state during migration, and the trend of this species was upward.

The spring concentrations of blue and snow geese in the Missouri River Valley were exceptionally large in 1961, but of normal proportions in that the flocks were delayed slightly in their northward advance by inclement weather. Insignificant numbers of Canada geese were reported in Iowa during spring migration, but there are no concentrataion points of this species in the state comparable to that of the blues and snows.

Water, Weather, and Phenological Conditions

Most of Iowa's prairie marshes and shallow lakes were dry or almost dry during 1957, 1958, and 1959.

This drought period caused rapid re-vegetation of these areas with emergent aquatic plant species. Heavy run-off and above normal rainfall during the spring of 1960 inundated many sloughs, ponds, and potholes which had been dry. Run-off during the spring of 1961 increased the water levels in many areas and inundated additional dry habitats. These circumstances have caused optimum nesting and survival conditions for waterfowl in Iowa during 1961. Habitat and phenological conditions suitable for waterfowl production and survival appear the best observed during 12 years of continuous study in northwest Iowa, and conditions are likewise excellent throughout the entire state.

Nesting Success and Brood Survival

Iowa is producing unusually large numbers of blue-winged teal, wood duck, ruddy duck, and redhead. The nesting effort and success of each of these four species appears of such magnitude that total production should be of significance to the flyway in 1961. Both mallards and pintails are abundant for Iowa but their total numbers are to few to be of importance on a flyway basis. Other miscellaneous species of waterfowl are present, but their aggregate numbers are also insignificant.

Coot production is far above normal. The nesting densities of this species in recently flooded habitats is tremendous and production is greater than expected.

Broods are beginning to appear, and nesting success based upon a few early observations looks encouraging (Table 1). Vegetation is so dense in many of the sloughs and marshes that it is impossible to make satisfactory brood counts and many broods are obviously present but cannot be seen or counted.

Water conditions in Iowa are excellent and brood success is expected to be above normal. Dense stands of emergent cover and ample supplies of food and water assure brood survival in 1961.

Table 1. Waterfowl broods observed and reported in northwestern Iowa in 1961

Species	Number of Females	Young	Average Brood Size
Wood Duck	8	69	8.6
Blue-winged Teal	15	99	6.6
Mallard	6	39	6.5
Ruddy	3	21	7.0
Pintail	1	5	5.0

PHEASANT CROWING COUNT AND HEN INDEX
SPRING 1961

BY

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The annual spring pheasant crowing count was taken by Conservation Officers during the month of May. Results of this survey indicated changes in the spring breeding population and pheasant distribution.

Special routes were checked by biologists to determine the seasonal peak of crowing activity. This peak occurred during the last few days of April in southern Iowa and during the first week of May in the northern range. Officers were notified to begin counts and were requested to complete them as soon as weather conditions permitted.

A total of 152 routes was completed with Officers recording 32,173 calls at 3,363 stops (Table 1). They heard an average of 9.6 calls per stop, statewide, compared to 10.4 calls per stop in 1960. Results indicated that crowing intensity decreased in the eastern third of the state, and increased or remained stable in the western two-thirds of the pheasant range. Winter sex ratio counts had indicated adequate populations of roosters in all areas of the range.

The spring hen index was determined by multiplying the observed sex ratio from winter counts by the average number of calls heard per stop. The statewide hen index was 14 per cent lower than in 1960 and slightly below the previous five-year average (Table 2). A portion of this decrease was due to poor census conditions during the winter sex ratio count. It was reported at the April Seminar that unfavorable checking conditons during the winter caused an undetermined amount of error in the pheasant sex ratios. Hen per cock ratios in east central and southern Iowa were noticeably low and were due to poor checking conditions.

The spring pheasant population appeared to be stable or slightly higher in the western two-thirds of the state while the population declined in the eastern third of the range. Results of this survey indicated a substantial population increase in the central district and slight increase in western and southwestern Iowa (Table 3).

The highest spring population was recorded in northcentral Iowa where counts indicated a stable population. Although a slight decrease was noted in the northwest district, the population remained very good in this area.

The pheasant population declined in eastern Iowa. The decrease was moderate in the east central district but only slight in the northeast part of the state. Reproduction success in 1960 appeared to be near normal but apparently was not high enough to maintain a stable population.

Table 1. Statewide Results of the Crowing Count and Hen Index

Year	Average Number of Calls per Stop	Sex Ratio Hens per Cock	Spring Hen Index
1956	8.4	3.3	27.7
1957	7.9	3.3	26.1
1958	12.1	2.3	27.8
1959	11.7	3.1	36.3
1960	10.4	3.0	31.2
1961	9.6	2.8	26.9

Table 2. District Results of the 1961 Crowing Count and Hen Index

District	Number of Calls Heard	Number of Stops	Average Number of Calls Per Stop	Sex Ratio	Spring Hen Index
1. Northwest	7,590	351	21.6	2.4	51.8
2. North Central	8,024	346	23.2	2.9	67.3
3. Northeast	3,172	387	8.2	4.7	38.5
4. West Central	4,787	340	14.1	2.4	33.8
5. Central	4,310	440	9.8	4.2	41.2
6. East Central	1,784	371	4.8	2.0	9.6
7. Southwest	1,502	339	4.4	2.6	11.4
8. South Central	841	440	1.9	2.6	4.9
9. Southeast	163	349	0.5	2.6	1.3
State	32,173	3,363	9.6	2.8	26.9

Table 3. Comparison of Crowing Count Results and Spring Hen Index 1959 - 1960.

District	Year	Average Number of Calls Heard	Spring Hen Index
1. Northwest	1959	24.0	60.0
	1960	22.1	641.1
	1961	21.6	51.8
2. North central	1959	30.7	92.1
	1960	25.6	66.6
	1961	23.2	67.3
3. Northeast	1959	15.3	75.0
	1960	11.7	42.1
	1961	8.2	38.5
4. West central	1959	12.9	38.7
	1960	11.8	36.6
	1961	14.1	33.8
5. Central	1959	9.0	27.0
	1960	8.1	22.7
	1961	9.8	41.2
6. East central	1959	8.6	28.4
	1960	6.1	20.1
	1961	4.8	9.6
7. Southwest	1959	2.6	10.9
	1960	2.9	8.1
	1961	4.4	11.4
8. South central	1959	2.0	6.0
	1960	2.5	8.2
	1961	1.9	4.9
9. Southeast	1959	0.8	1.6
	1960	0.5	1.0
	1961	0.5	1.3