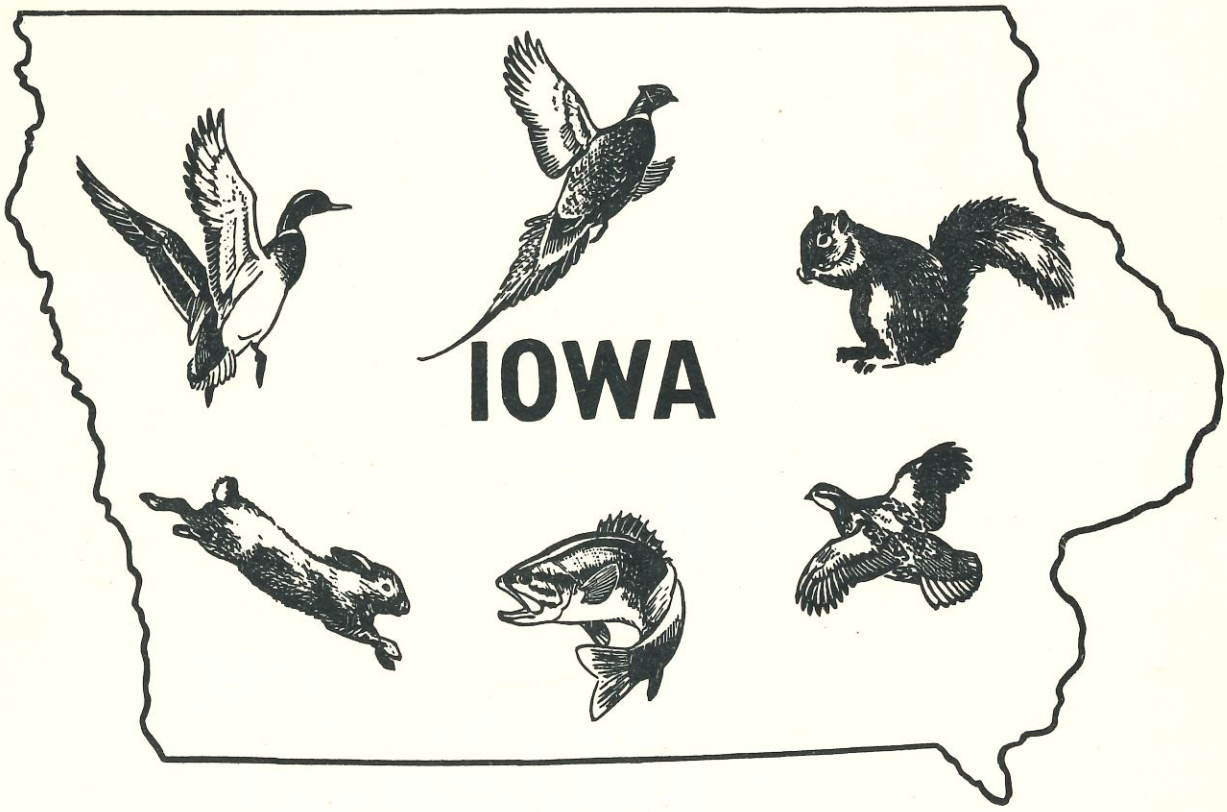
1960

QUARTERLY BIOLOGY REPORTS



FISH AND GAME DIVISION — BIOLOGY SECTION

STATE CONSERVATION COMMISSION

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by
Eldie W. Mustard
Game Biologist

The winter deer population of 1960 was estimated to number 13,101 animals, which is an 11 percent increase over the 1959 deer population. This was the largest winter deer population reported since the census was begun in 1947. Comparison of the 1960 estimate with the mean for the preceding five years indicates a 21 percent increase in the population. A fall 1960 deer population in excess of 21,000 animals is anticipated.

PHEASANT REPRODUCTION IN IOWA - 1960

by
Richard C. Nomsen
Game Biologist

Spring counts indicated that the 1960 brood stock of pheasants was 14 percent lower than the record 1959 spring population, but still above the previous five-year average. Severe late winter and early spring weather conditions delayed nesting activity again this year. Cooperating farmers reported fewer nests in hayfields, but a higher proportion of the hens were hit by the mower. Rural mail carriers reported 2.4 young per hen, which was equal to the previous 10-year average. According to the results of the Conservation Officers' survey, pheasant production for 1960 was better than 1949 and about normal when compared with the previous 10-year average of 4.2 young per hen. Production was best in the northern two-thirds of the state.

THE IMPORTANCE OF MASS FALL MIGRATION IN WATERFOWL MANAGEMENT AND IN THE HARVEST OF WILD DUCKS

by
James G. Sieh
Game Biologist

If weather conditions suitable for fall mass migration materialize in 1960, a forecast of impending migration will be relayed to Iowa observers. Published reports document the scope and magnitude of mass flights in 1955, 1956 and in 1957. The waterfowl passage on November 7, 1956, was on a front of at least 250 miles in length and was estimated to have brought 1,200,000 ducks into Louisiana within two days. During the November 7, 1956, flight the rate of passage over Iowa reached 4,000-5,000 ducks per hour. During many autumns, almost an entire flyway population of scaup may leave Canada and the Northern U.S.A. and arrive in the sanctuary of the Gulf coastal areas within 72 hours or less. Mass fall migration plays a most important role in the evaluation of the "time vulnerability factor" of a population or a species before, during and after mass fall flights occur. The knowledge and record of mass migration can focus attention on circumstances as they actually exist.

COMPARISON OF PHEASANT POPULATIONS IN IOWA COUNTIES

by
Eugene D. Klonglan
Game Biologist

Data collected from crowing counts and roadside counts over the past 10 years were analyzed to provide relative indices to the pheasant population in each of Iowa's 99 counties. The highest indices were in northern Iowa, with 10 north-central counties ranking at the top. Adair County in southwest Iowa ranked 11th, greatly exceeding all other southern counties. The highest county, Howard, had a pheasant population roughly 4½ times greater than the state average. The lowest county, Van Buren in southeastern Iowa, had so few pheasants that its index indicated a population less than 1 percent of the state average. Since one southern county, Adair, supports a relatively high pheasant population, there is hope that pheasants can be increased elsewhere in southern Iowa.

crappie, fair populations of largemouth bass and large populations of bluegill and bullheads. Age and growth studies performed on a sample of these fish showed good bass growth and fair to poor growth for the rest of the species.

THE FISH POPULATION IN A SOUTHERN IOWA WATER SUPPLY RESERVOIR

by
Jim Mayhew
Fisheries Biologist

Fairfield Reservoir No. 1, a 51 acre water supply reservoir was treated with 1.0 p.p.m. emulsified Chem-Fish to eradicate an undesirable fish population. Gross analysis of specific populations were made in regard to species composition by number and weight, age composition and growth. Seven species of fish were recovered. These were: largemouth bass, bluegill, black crappie, black bullheads, northern pike, green sunfish and orangespotted sunfish. A total of 123,785 fish weighing 5,517 pounds was removed during the project. This is a mean of 167 pounds per acre. Bluegill were the most abundant species, comprising 96.0 percent of the population by number and 87.4 percent by weight. Black bullhead, black crappie and largemouth bass ranked next in importance. No natural reproduction was evident in any species during the past two years. Plantings of largemouth bass fry also apparently failed to survive. Growth was generally slow in all species except bullhead.

PROGRESS REPORT - CHEMICAL RENOVATION OF THE MIDDLE RACCOON RIVER IN CENTRAL IOWA

by
Harry M. Harrison
Fisheries Biologist

In August 1959 the Middle Raccoon River was treated with rotenone to eradicate a large population of rough fish. The purpose was to prepare the stream for the introduction of game fish in an effort to provide a better sport fishery. Game fish, including 500 fingerling largemouth bass, 1500 smallmouth fingerlings, 80,000 fingerling catfish and 15,000 sub-adult catfish were stocked. Surveys in 1960 revealed that this stocking did not establish itself. The stream was restocked with 180,000 fingerling and 30,000 sub-adult channel catfish in 1960. Subsequent surveys have shown that the fingerling planting of 1960 have taken, but the sub-adults are disappearing.

RESULTS

REPORTED FEBRUARY 1960 DEER POPULATION

A total February deer population of 13,101 was reported by the Conservation Officers, with estimates for the individual counties ranging from a low of 0 to a high of 1,175 (Figure 1). This was the greatest winter deer population reported in the 14 years the survey has been conducted; the previous high was in 1953 when a population of 12,982 was reported.

As shown in Table 1, 59 counties reported winter deer populations of 100 or less, with 11 counties reporting populations in excess of 250 animals. A mean deer population of 132 per county was indicated by the survey.

COMPARISON OF 1959 vs. 1960 DEER POPULATION ESTIMATES

The reported 1959 winter deer population was 11,705, while in 1960 this figure increased to 13,101. This represents a numerical increase in the population of 1,396 over the previous year, or over an 11 percent gain during the one-year period.

Comparison of the 1959 vs. 1960 populations, by county, shows that 70 gained or were stable, while 29 reported declining populations. The extent of these losses or gains was usually small (Figure 2).

The percent increases or decreases, by 25 percent increments, and the number of counties in each category are given in Table 2. It will be noted that the majority of the population changes occurred in the 0-25 percent change category.

COMPARISON OF 1960 ESTIMATE WITH MEAN ESTIMATE FOR PRECEDING FIVE YEARS (1955-1959)

Iowa's deer population increased rapidly from 1947 to 1953, with the population declining in 1954 and remaining relatively stable during the period 1955 through 1958 (Figure 3). In 1959 the population again began to increase, with the 1960 estimate indicating that this rise is continuing.

Comparison of the 1960 estimate of 13,101 with the mean estimate for the previous five-years-of-record (1955-1959) of 10,810 shows an increase of over 21 percent in the winter population of the Iowa deer herd. Sixty-one counties reported increased or stable deer populations during the period of comparison, while 38 reported decreased deer populations.

ESTIMATED DEER POPULATION - FALL 1960

As previously explained, fall deer population estimates are obtained by projecting the anticipated reproduction on the reported winter deer population estimates. Projection of these data indicates a fall 1960 deer population in excess of 21,000 animals. The anticipated fall deer populations, by county, are given in Figure 1.

DISCUSSION

The necessity for population estimates for use by those charged with management of our game resource is obvious. The techniques for acquiring certain population data are now sufficiently refined so that reliable estimates can be obtained for relatively small areas. When population estimates for an area the size of a county or a state are needed, however, the refined techniques must be put aside and reliance placed on the oldest technique known to game management to secure population data, namely, estimates made by qualified observers on the scene. The time and expense which would be involved if more refined techniques were used would be so great as to be impossible.

Generally speaking, the game manager can quite safely recommend deer seasons based on estimates such as those obtained in Iowa because they usually furnish a conservative estimate of the true deer population. McCutchen (1938) and other workers have noted that deer population estimates, such as those we use in Iowa, when compared to actual deer counts are usually ultra-conservative. This, I surmise, is also true in Iowa.

The primary usefulness of our deer population estimates is their utility as a means of determining population trends for the whole state, i.e., whether the population is up, down or relatively stable. This, I believe, they do quite well and I have great confidence in our data when they are interpreted in this way. They probably do not, nor should anyone expect them to, yield the exact number of deer for any given county or for the state at any given time.

Trends, however, are apparently not understood by the general public because when told the deer population is up, they still want to know how many deer we have. Until we can overcome the need to use specific numbers to convey a picture of the deer population, there will be a need to translate trend data into concrete figures for public relations purposes.

If our winter, or breeding, deer population estimates are

3. Comparison of the 1960 winter deer population estimate with the mean estimate for the preceding five-years-of-record (1955-1959) indicates an increase of 21 percent.

4. Projection of the 1960 winter population and the expected annual increment indicates a fall 1960 deer population in excess of 21,000. This is thought to be a conservative estimate of the fall deer population.

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Kelker, George Hills - 1947. Computing the rate of increase for deer. J. Wildl. Mgmt., 11(2):177-183.

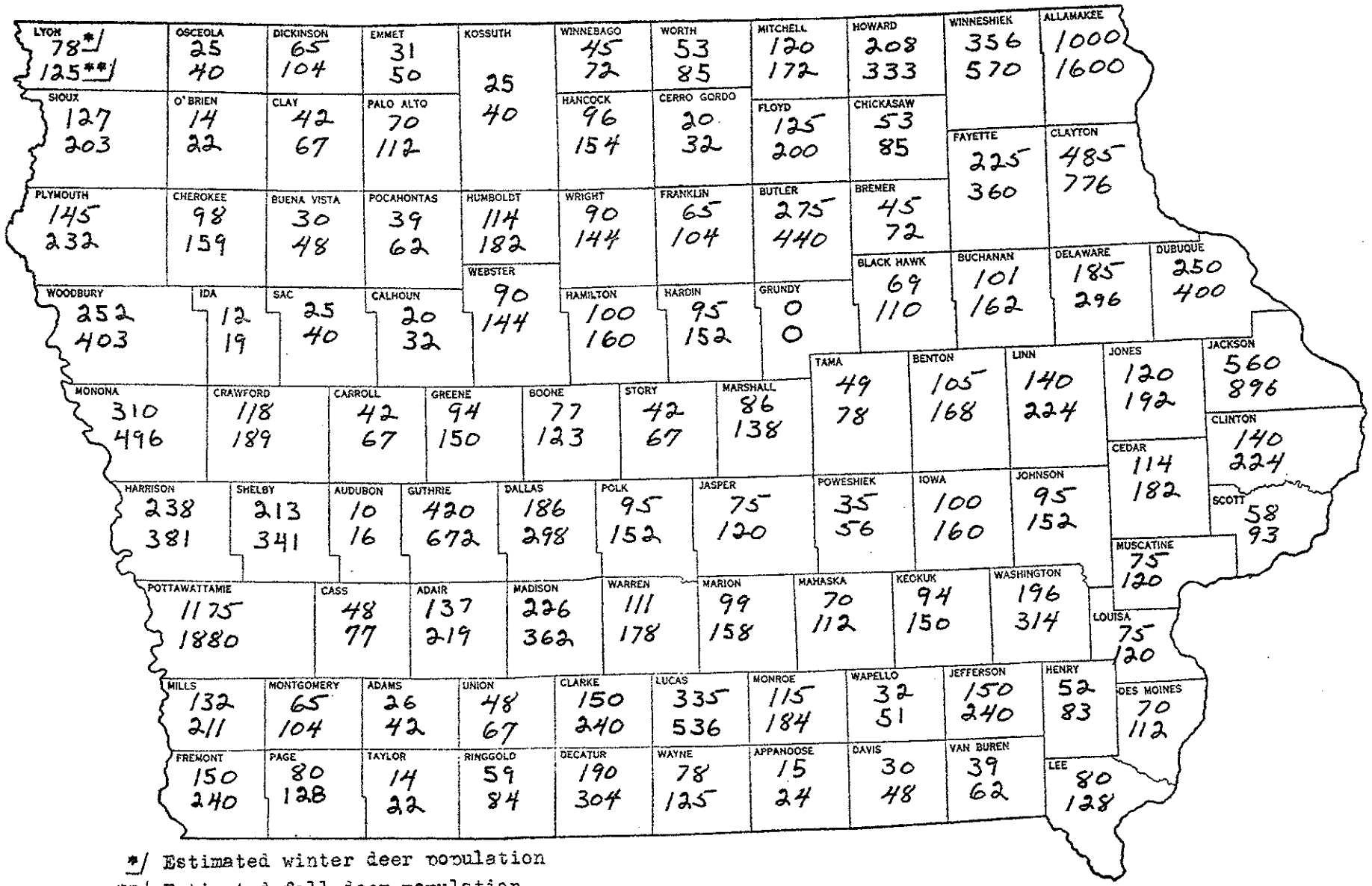
McCutchen, A. A. - 1938. Preliminary results of wildlife census based on actual counts as compared to previous estimates on National Forests, Region 2. Trans. N. Amer. Wildl. Conf., 3:407-414.

Table 1. NUMBER OF COUNTIES REPORTING VARIOUS NUMBERS OF DEER BY INCREMENTS OF 50 ANIMALS, IOWA, FEBRUARY 1960

Number of Deer	Number of Counties Reporting
0 - 50	27
51 - 100	32
101 - 150	19
151 - 200	4
201 - 250	6
Over 250	11

Table 2. PERCENT CHANGES IN REPORTED FEBRUARY DEER POPULATIONS, IOWA, 1959 vs. 1960, SHOWING NUMBER OF COUNTIES REPORTING CHANGES AND EXTENT OF CHANGES (25 PERCENT INCREMENTS)

Number of Counties Reporting Increased or Stable Populations	Percent Change	Number of Counties Reporting Decreased populations
40	0 - 25	20
15	26 - 50	6
8	51 - 75	2
4	76 - 100	1
3	Over 100	0
Totals 70		29



*/ Estimated winter deer population

**/ Estimated fall deer population

Figure 1. Estimated winter deer populations and estimated fall deer populations, Iowa, 1960.

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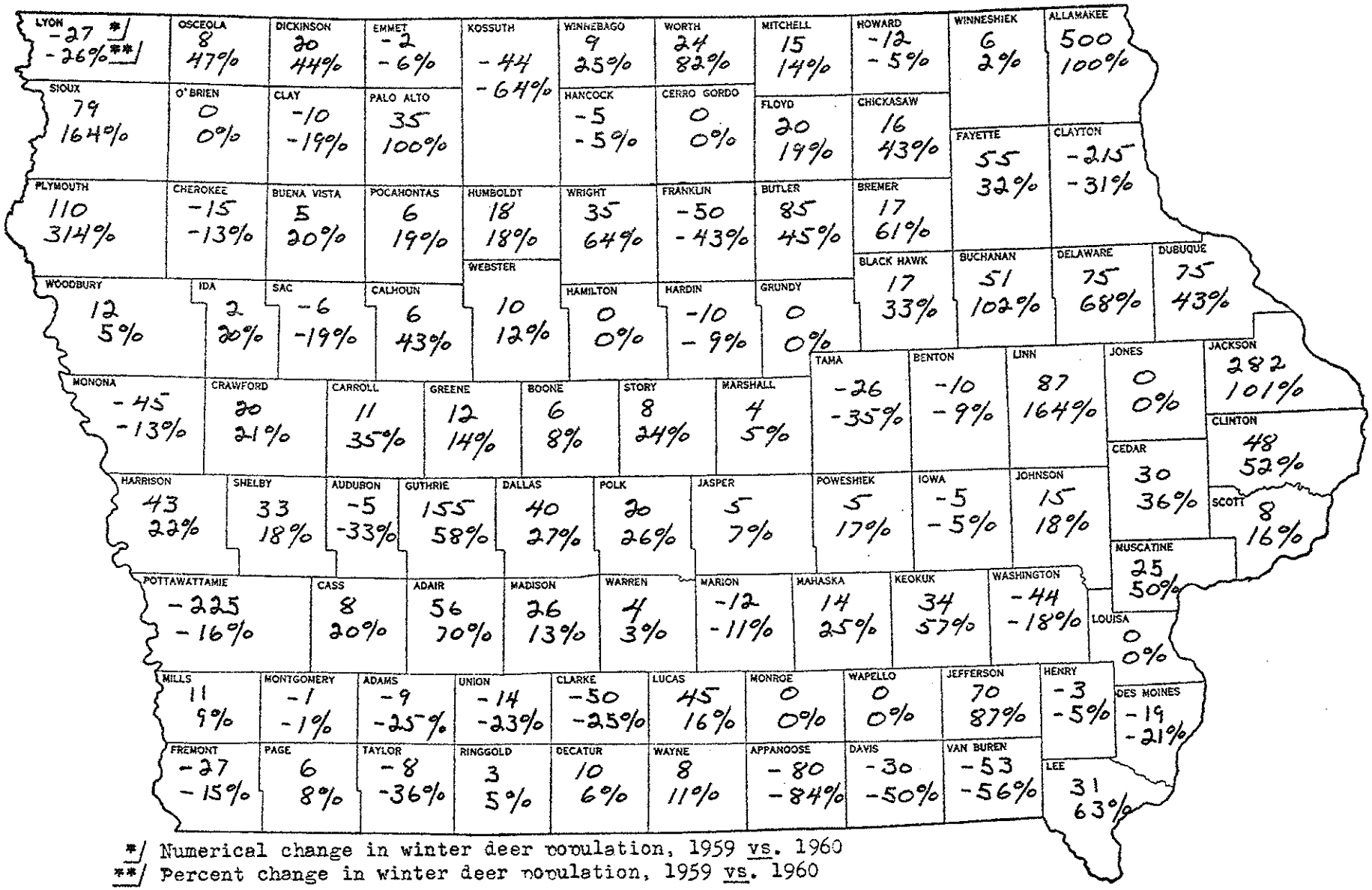

*/ Numerical change in winter deer population, 1959 vs. 1960
**/ Percent change in winter deer population, 1959 vs. 1960

Figure 2. Numerical and percent changes in estimates of winter deer populations, Iowa, 1959 vs. 1960.

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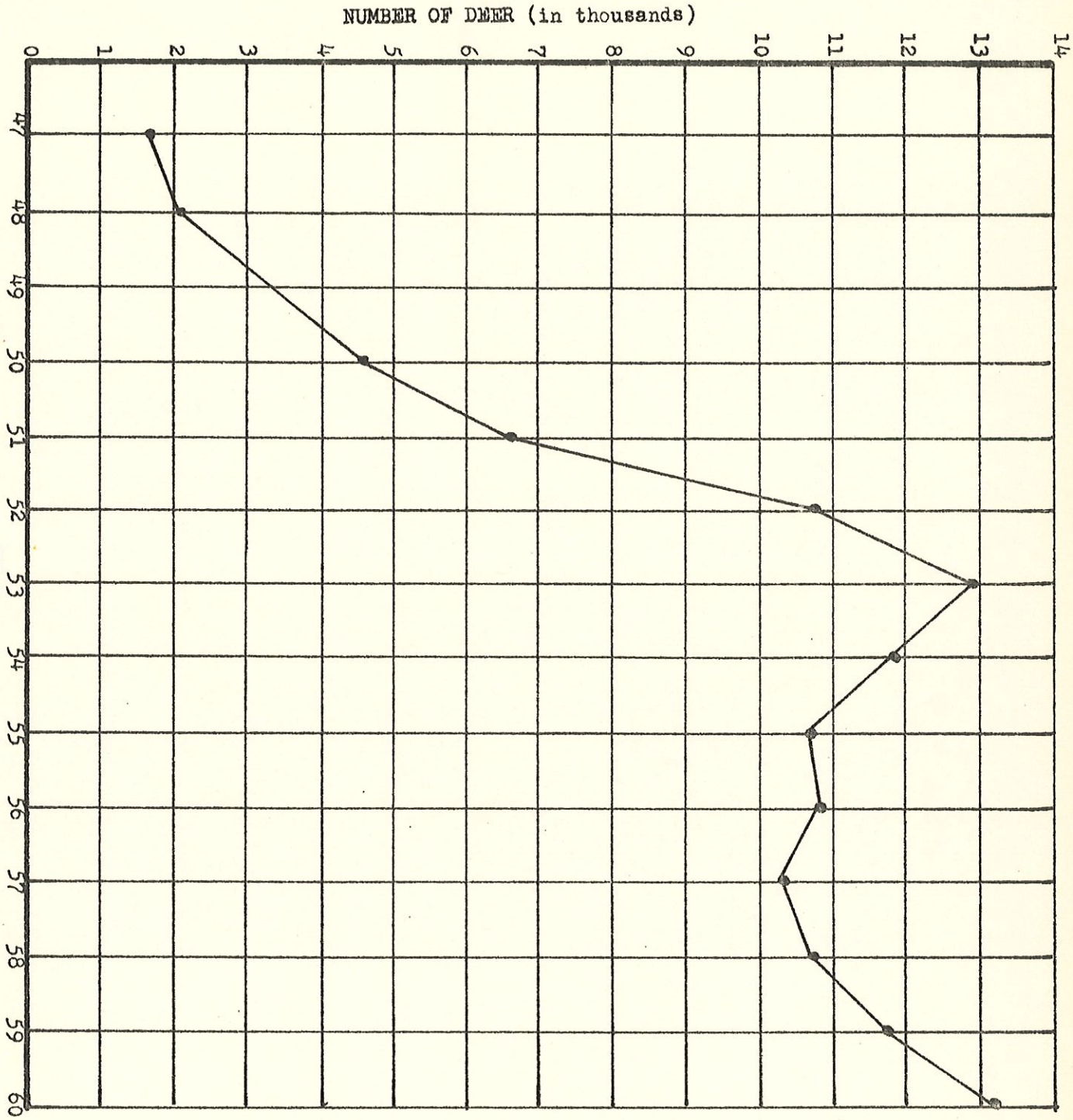

Figure 3. Winter deer population estimates, Iowa, 1947 - 1960.

PHEASANT REPRODUCTION IN IOWA - 1960

by
Richard C. Nomsen
Game Biologist

The annual summer pheasant surveys were continued in 1960 to determine reproductive success. Surveys were made by conservation officers, rural mail carriers, cooperating farmers and biologists.

Spring counts indicated that the 1960 brood stock of pheasants was 14 percent lower than the record 1959 population, but still above the previous five-year average. The decrease was most noticeable in the eastern third of Iowa, while populations remained stable in the western districts.

Late winter and early spring weather conditions delayed nesting activities again this year. The delay was most serious in southern and eastern Iowa. The U. S. Weather Bureau reported that March 1960 was the coldest on record in Iowa with temperatures averaging 15 degrees below normal. Two March snowstorms increased the total snowfall for the season to record proportions in the southern half of Iowa. April temperatures averaged near normal for the state, but May was cool and wet in the eastern half of the state. As usual, several severe storms caused local damage during the critical nesting period.

Spring weather conditions also delayed farm field work. The Weekly Weather and Crop Bulletin reported that 30 percent of the alfalfa had been cut by June 15th compared with nearly 50 percent in 1959. Hay cutting progressed rather slowly during June because of cool wet weather.

The delay caused by unfavorable weather probably allowed more hayfield nests to hatch in some areas. Cooperating farmers reported fewer nests in hayfields, but a higher proportion of the hens was hit by the mower (Table 1). This indicates that incubation was nearing completion, as hens seem more reluctant to leave the nest as incubation progresses.

Rural mail carriers conducted their annual summer brood count during the week of July 25 - 30. According to this survey, pheasant reproduction was normal in 1960. Carriers reported 2.4 young per hen, which was equal to the previous ten-year average (Table 2).

Table 1. RESULTS OF FARMER COOPERATOR NESTING SURVEY, 1959-1960

	1959	1960
Acres of hay cut	2,188	1,162
Number of nests seen	195	84
Nests seen per 100 acres	8.9	7.2
Average number of eggs per nest	8.7	8.7
Number of nests hatched	23	12
Number of hens reported injured	72	39
Hens reported injured per 100 acres	3.3	3.4
Number of hens reported killed	54	32
Hens reported killed per 100 acres	2.5	2.8
Number of broods reported	3	4
Average number in each brood	7.8	9.5

Table 2. RURAL MAIL CARRIERS BROOD COUNTS, 1955-1960

	1955	1956	1957	1958	1959	1960
Average brood size	6.1	6.0	5.6	5.8	5.2	5.5
Percent of hens with broods	43%	38%	43%	43%	30%	42%
Young per adult hen	2.7	2.3	2.4	2.5	1.8	2.4

Conservation officers conducted their annual summer brood counts from August 1st - 15th. They reported 2,037 broods with 11,475 chicks and 770 hens without broods. According to this survey, pheasant production for 1960 was better than 1959 and about normal when compared with the previous ten-year average of 4.2 young per hen. The state-wide average this year was 4.1 young per hen compared with 3.5 young per hen in 1959 (Table 3). The percentage of hens reported with broods increased this year while the average brood size remained constant.

Results of the state-wide surveys indicated better production in the northern two-thirds of the state but somewhat below

CALLING QUAIL IN IOWA - 1960

by
M. E. Stempel
Game Biologist

This is a report on calling quail in Iowa as it reflects survival and reproduction. There are also comments on quail in six other states. Information is based on (1) climatological data, (2) crop bulletins, (3) observations by the biologist, (4) conservation officers' reports and (5) letters from game departments in six other states that have quail shooting seasons.

METHOD

In early July, letters, instructions and maps for making the counts of whistling quail were mailed to officers in the Iowa quail range. Dates for making the counts were July 10 to July 23.

Each officer in the Iowa quail range was asked to make at least two calling cock quail counts. Two routes, based on soil type and totaling about 24 miles, were indicated in each county selected. The censuses were to be made on clear calm days at sunrise. The checker was asked to stop at one end of a route, write the mileage on the data sheet, then drive one-half mile along the chosen road. At this point the car was stopped and the motor shut off. The officer then got out to listen for three minutes and if no quail calls were heard, it was recommended that the listening time be extended to five minutes. This process was repeated at the end of each succeeding mile. Mileage was again noted at the final stop. Temperature and wind velocity were recorded.

This year, on some routes, additional counts were made in June, August and September. This yielded data on the volume of calling during each of the three months mentioned.

RESULTS

STATE-WIDE

Preceding the count, the precipitation varied from near normal to wet and temperature was normal to below normal. Planting of field crops was delayed because of the wet season.

COUNTIES

Outside the main quail range, quail are usually shot by parties who primarily seek rabbits or pheasants. Among such counties are: Black Hawk which had a bird per mile decline from 1.3 in 1959 to 1.0 in 1960; Buchanan 1.4 in 1959 to 0.7 in 1960; Dubuque 0.4 to 0.2 in 1960; Woodbury 1.6 down to 0.3 in 1960. Conversely, in Boone County there was an increase from 0.1 to 1.1; Marshall 1.9 to 2.8 and Jasper 0.5 to 0.8.

More extensive cover exists in some other counties: here, in Adams there was a decline from 1.5 in 1959 to 0.4 in 1960; Fremont 2.2 to 1.4; Linn 0.9 to 0.7; Johnson 1.5 down to 0.7.

In the above counties which are beyond the best quail range, there was a general decline. However, in some of these the 1960 count was better than it had been during at least one summer since 1953. For example, in Warren County the 1960 count was 0.9 compared to a low of 0.5 in 1953, while in Ringgold the 1.8 count was higher than the 1956 average of 1.5.

In opposition to data in the above paragraph, some of the lowest counts in recent years did occur in 1960. For instance, in Clarke County, the low of 0.5 birds per mile of route in 1960 was less than the low of 2.1 birds per mile for 1955. In Wayne, the count of 1.6 birds per mile was below the recent 1957 low of 2.3.

Best quail range is in the southeastern section of Iowa; here, the 1960 lows in some counties were higher than some of the previous low counts of recent years. Examples are: in Wapello County where in 1960 the average of 0.6 per mile is better than the 1953 count of 0.4 per mile; Jefferson 3.3 in 1960 is better than the 0.7 of 1953; Henry County averaged better than in 1957; Davis was 4.6 compared to 2.8 in 1956.

Less birds were heard in other areas where checks were made. In these southeastern areas, in three counties; there were, in Mahaska 0.5 callers per mile for 1960 compared to 1.0 in 1956; Louisa was 0.3 for 1960 and 1.0 in 1959 with Lee at 2.0 compared to 2.1 in 1957. These latter three counties are not as heavily hunted as some counties which lie farther west.

SPECIAL COUNTS OF CALLING QUAIL

The long 1960 winter, plus a wet spring and the resulting late farm crop planting, caused changes in quail activity. Since the quail did not seem to be calling at a normal rate by June 1, additional counts were made in June, July, August and

Millerton where most of the land is tilled. Nevertheless, counts made nearby in good cover, south of Russell, revealed good local distribution of quail throughout the high quality quail cover.

A similar finding was made in Wapello County where in corn land the checker heard only six cocks compared to the 1959 count of 16. Along another route in high grade cover, south of Ottumwa, there were 44 callers this year compared to 50 in the highly productive season 1958.

WAPELLO-DAVIS CHECK ROUTE

In Wapello County from a point just south of Ottumwa to near Lake Wapello in Davis County, the number of calling quail was recorded one or more times during each two weeks from May through September. On this route, calling reached a high point by June 15 and fell off during the period June 16 to 30. The peak was reached between July 1 and 15. It remained high into the period August 16 to 31 and continued into October.

In 1959, calling began about the same time and was extensive by June 15. Calling in 1959 peaked during the period June 16 to 30, was high in July and diminished at an earlier date than in 1960. Spot checks indicated that the 1960 quail calling pattern was similar to the 1959 pattern.

Peak of calling in the summer of 1960 lasted for two weeks. The 1958 production and the breeding population were high. Peak of calling lasted from four to six weeks. However, calling was at or above the 40 percent level for a longer period in 1960. This also indicated good production.

1960 SUMMER QUAIL POPULATIONS IN OTHER STATES

Letters received from six other states that have quail range resembling Iowa's point out some population conditions similar to our own.

Illinois: From this state we have a report that the population is down from 1959. The south and southwest are near normal. Low hatching success is reported. Losses occurred during late winter and extent of loss was proportionate to availability of good cover.

Indiana: Thirty-five percent down in the north, 15 to 25 percent down in other sections, with least decline in the south.

RESULTS OF THE JULY 1960 ROADSIDE RABBIT SURVEYS

by
Paul D. Kline
Game Biologist

INTRODUCTION

The annual July roadside count was continued in 1960. The survey has been conducted with slight modification every summer beginning in 1950. It is made by conservation officers and biologists who drive predetermined routes 30 to 40 miles long on gravelled roads. Participants drive 25 miles per hour starting at sunrise and count and record all rabbits seen along the routes. The July counts were developed for use in surveying cottontail populations. However, starting in 1958, jackrabbits were counted as well as cottontails.

For each survey, beginning in 1958, records were kept of temperature, wind velocity, percent cloudiness and date of last rain. It was hoped that recording these weather factors might aid in evaluation of weather influence on early morning roadside rabbit activity. Use of dew blocks to measure dewfall was discontinued in 1960 after five years of trial. Dewfall, as measured along the survey routes, was not found to correlate with cottontail roadside activity. Each participant in the roadside survey was asked to record numbers of adult and juvenile cottontails observed during the survey period (July 10-20). The age ratio surveys have been conducted annually in conjunction with the roadside surveys.

RESULTS

Sixty-four routes totaling 2,293.5 miles were surveyed. In all, 1,032 cottontails were seen, for an index of 4.5 cottontails per 10 miles of route (Table 1). Cottontails were most abundant in the southern loess area where they were also most abundant every year since 1956 (Table 2). The Wisconsin drift area had an index higher than all other areas except the southern loess. Lowest index was obtained from the driftless area of northeast Iowa. That area has consistently had low rabbit populations for years. Low indices were obtained also from the Mississippi loess and Iowan drift areas.

Table 1. RESULTS OF JULY ROADSIDE RABBIT SURVEYS FOR 1960

Area	Number of Routes	Total Miles	Cotton-tails Observed	C-Tails Observed/ 10 Miles	Jack-rabbits Observed	J-Rabbits Observed/ 10 Miles
Tazewell Drift	3	110.0	45	4.1	24	2.2
Missouri Loess	8	283.3	134	4.7	12	0.4
Wisconsin Drift	16	597.5	320	5.4	32	0.5
Iowan Drift	16	553.2	199	3.6	4	0.1
Driftless Area	1	37.0	7	1.9	0	---
Mississippi Loess	8	279.7	77	2.8	4	0.1
Southern Loess	12	432.8	250	5.8	0	---
State-wide	64	2,293.5	1,032	4.5	76	0.33

Table 2. COMPARISONS OF JULY ROADSIDE RABBIT SURVEYS FOR YEARS 1956 THROUGH 1960

Area	Cottontails Seen per 10 Miles of Route				
	1956	1957	1958	1959	1960
Tazewell Drift	3.5	3.8	6.5	5.4	4.1
Missouri Loess	3.1	4.0	9.4	8.6	4.7
Wisconsin Drift	2.8	2.9	4.6	4.5	5.4
Iowan Drift	3.5	4.4	4.5	3.6	3.6
Driftless Area	2.6	2.6	2.7	1.5	1.9
Mississippi Loess	4.3	5.3	6.7	6.1	2.8
Southern Loess	6.2	8.5	13.6	10.9	5.8
State-wide	3.94	4.89	6.86	6.21	4.5

THE IMPORTANCE OF MASS FALL MIGRATION IN WATERFOWL MANAGEMENT AND IN THE HARVEST OF WILD DUCKS

by
James G. Sieh
Game Biologist

In the high latitudes of the North American Continent (above 60° N.) both ice and permanent snow cover have already driven wild geese from their ancestral nesting grounds. North of the Canadian border about 900 to 1000 miles, a wide band of snow extended eastward from the Rockies almost to the Atlantic ocean on October 7, 1960. The recent influx of wild geese into Iowa warns that winter has already established a foothold in the sub-arctic. Deep low pressure ridges stalemated in northern Canada, with strong high pressure areas over the great plains region, have stabilized our pleasant early October weather. As fall progresses, the permanent snow line will move southward tending to concentrate most species of ducks in southern Canada and in the northern U.S.A.

Weather conditions suitable for mass fall migration will be scrutinized via direct contact with the U. S. Weather Bureau in Sioux City, Iowa (Sieh, 1958). If weather conditions suitable for fall mass migration materialize, a forecast of impending migration will be relayed from teams of observers in Canada to observers throughout the Mississippi Flyway. Iowa observers will then be notified of impending migration. Briefly, this constitutes the arrangements to record the mass fall migration of waterfowl down the Mississippi Flyway in 1960.

Published reports document the scope and magnitude of mass fall waterfowl flights in 1955, 1956 and in 1957 (Bellrose, 1957 and Bellrose and Sieh, 1960). The flight of November 7, 1956, is estimated to have brought at least 1,200,000 ducks into Louisiana within two days (loc. cit.), and the rate of passage over Iowa reached 4,000-5,000 ducks per hour. The waterfowl passage on November 7, 1956, was on a front of at least 250 miles in length, extending north-northeastward from Omaha to Minneapolis and probably projected well beyond these points in both directions. It is reasonable to assume that the majority of the flyway population passed over many of the Mississippi Flyway states in about 24 hours.

COMPARISON OF PHEASANT POPULATIONS IN IOWA COUNTIES

by
Eugene D. Klonglan
Game Biologist

A major objective of wildlife management is to increase the populations of different game species so that sportsmen will have a better chance of achieving success than before management principles were applied. The 1955 hunting and fishing survey showed that the pheasant was Iowa's most important game species. Yet there are areas in the state which support a very low population of birds and where the hunter's chance of bagging a cock is almost nil. If the pheasant population could be increased throughout these areas, which are primarily in southern Iowa, the resultant increased hunting opportunities might exceed, on a state-wide basis, anything obtainable by any other feasible means of game management presently contemplated.

However, before we can determine whether our management program has resulted in an increased population of a particular species, we must have available a reliable measure of the status of the population prior to our efforts. Fortunately, we have available suitable information on the pheasant populations in Iowa's 99 counties over the past several years. The fall roadside census and the spring crowing count have been taken annually on a county basis, and from these data it was possible to construct relative indices to the pheasant populations in each of the counties (Figure 1).

The spring crowing count was initiated on a state-wide basis in 1950. The roadside count has been taken in August since 1954; prior to that time it was conducted in September or October. Since the August roadside counts are not directly comparable with the September and October counts, only the former were used in this analysis. Data through 1959 have been analyzed, thus including 10 years of crowing counts and 6 years of roadside counts. With this amount of data, the small number of atypical counts that may have occurred because of unfavorable weather or other conditions would not be particularly important in the final comparisons. The suitability of the data for the proposed comparisons is further enhanced by the continuous supervision of the pheasant inventory program by the same personnel throughout the period (particularly Richard Nomsen, Biologist, and Everett Speaker, Supt. of Biology).

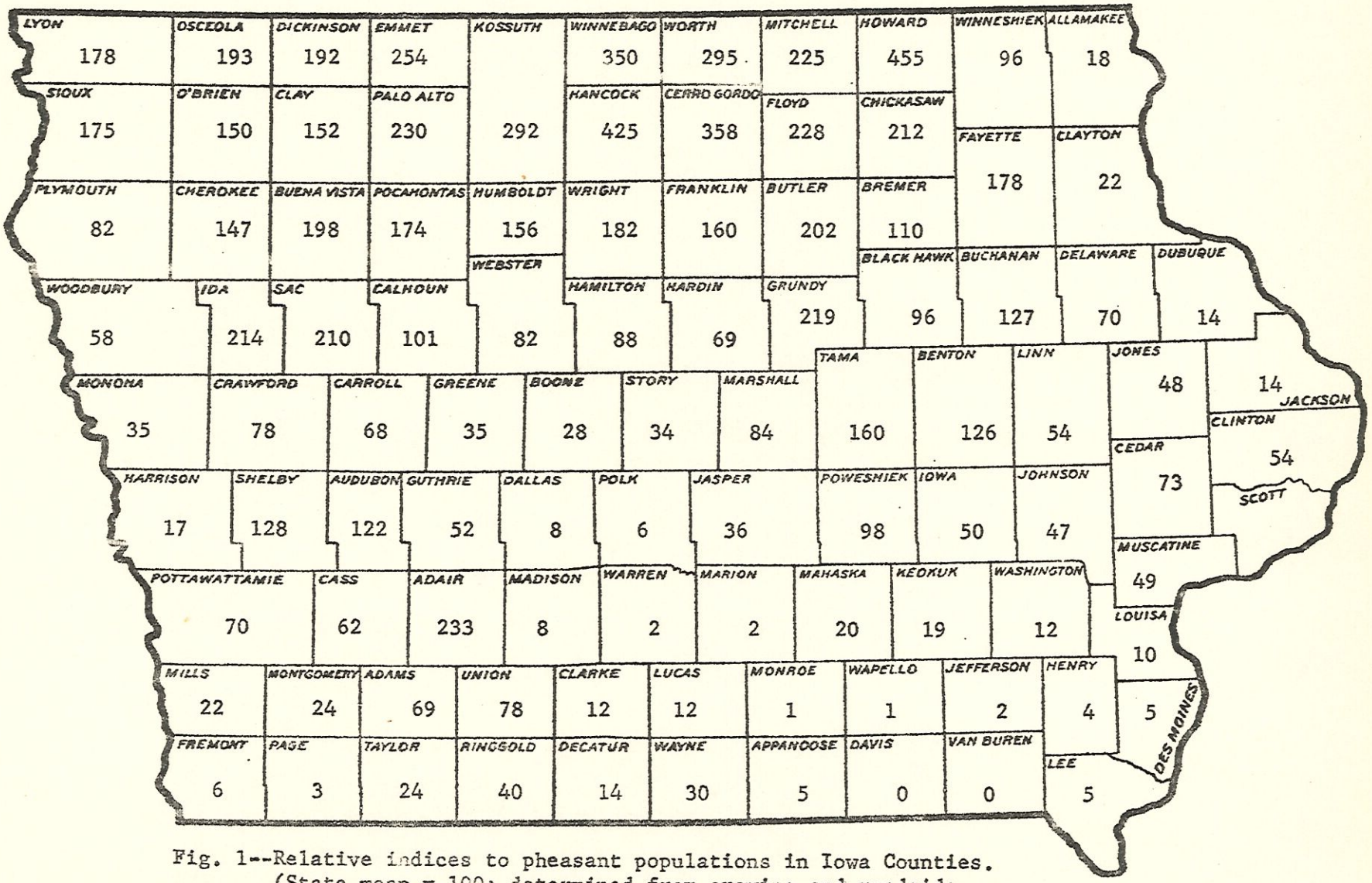

Fig. 1--Relative indices to pheasant populations in Iowa Counties. (State mean = 100; determined from crowing and roadside counts; see text for explanation of method of calculation.)

This would help insure that the same methods were used each year.

The calculation of the relative percentage index to the pheasant population in each county during this 10-year period is explained below. First, a summation was made of the number of cock calls heard per 2-minute listening period over all 20-mile crowing count routes censused in each county over the 1950-59 period. From this, the mean number of cock calls heard per stop was computed for each county for the 10-year period, and an over-all summation was then made to obtain a state-wide mean for the entire period. The state-wide mean was found to 9.2 cock calls per stop; the county means ranged from 0 to 42 per 2-minute stop.

Similar calculations were carried out with the fall roadside count data for the 6-year period, 1954-59, on a pheasants-observed-per-mile basis on all 30-mile routes censused in each county during this interval. The over-all state mean for the 6 years was 1.76 birds per mile, with individual county means ranging from 0 to 7.25 pheasants per mile.

Then the relationship of each county mean to the state mean was computed on a percentage basis. For example, Story County had a mean of 3.2 calls per stop on the crowing count census, which was 35 percent of the state mean of 9.2 calls per stop. Grundy County had a mean of 22.2 calls per stop, which was 241 percent of the state mean. Similar percentage comparisons of the county roadside count means with the state roadside count mean of 1.76 pheasants per mile were made. Here, for example, Story County had a mean of 0.57 per mile, which was 32 percent of the state mean, and Grundy County had a mean of 3.47 birds per mile, or 197 percent of the state mean.

The single number depicting the relative pheasant population in each county, as shown in Figure 1, was then determined by averaging the two indices from the roadside and crowing counts. This was done to minimize the effect of any possible bias in either type of count. It must be recognized that these counts are not strictly comparable between counties on a state-wide basis. For example, differences in terrain and cover can have an effect on the number of birds heard or seen, and this could account for some of the wide spread between the northern and southern Iowa indices. However, considering the magnitude of differences between counties shown in the gross analysis presented here, such influencing factors could hardly have a significant effect on the general relationships between counties shown in Figure 1.

Thus, continuing the earlier example, the over-all relative

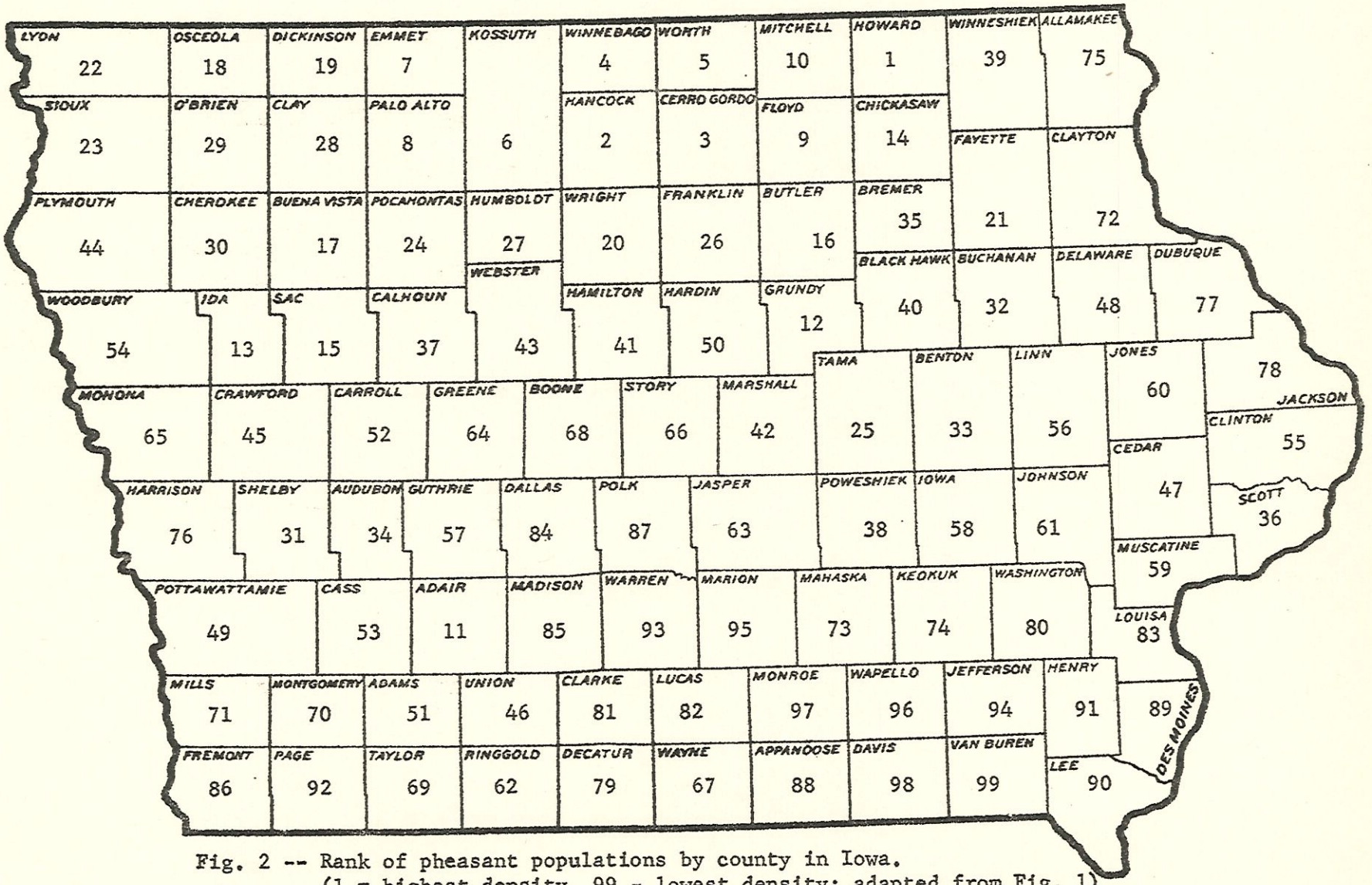

Fig. 2 -- Rank of pheasant populations by county in Iowa.
(1 = highest density, 99 - lowest density; adapted from Fig. 1)

SUMMARY OF HATCHERY STUDIES, SPRING 1960

by
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Fisheries Biologist

This is an annual report concerning certain phases of walleye and northern pike hatchery operations. Each spring routine data are collected during the hatching season and experimental studies are conducted. The discussion that follows presents a summary of the basic data on hatchery production and the results of experimental work at the Spirit Lake, Clear Lake and Lansing hatcheries. The data concerning each station and the experimental work will be discussed under separate headings.

SPIRIT LAKE HATCHERY

NORTHERN PIKE

Although there has been some recovery in the water levels in the northwest Iowa lakes region, it was not sufficient to bring about any sizable run of northern pike into the carp traps. Decreasing populations of northern pike over the past five years of low water also contributed to a poor spawning run of adult northerns.

Eleven and one-half quarts of eggs were secured from 20 females. Carp pituitary injections for 15 of these females were necessary to bring about satisfactory stripping conditions. These eggs averaged about 60,000 per quart. Approximately 50 percent of the eggs hatched, resulting in 690,000 fry, all of which were stocked in Dickinson County waters.

WALLEYE

Gill-netting for walleyes started on April 14 in Spirit Lake and East Okoboji Lake, and on April 19 in West Okoboji Lake. The netting was completed on April 22 and 25 respec-

* The author wishes to express his appreciation for the help and data provided by Fay Fronk, Robert Cooper and John Spinner, Superintendents of the Spirit Lake, Clear Lake and Lansing Hatcheries respectively.

The Clear Lake walleye eggs averaged 130,000 per quart. A total of 212 quarts were brought through to the hatching stage for an 80 percent hatch and 27,560,000 fry. Slightly over 19 million of these fry were stocked in Clear Lake with the remaining eight million placed in nursery ponds, rivers and other fishing waters.

LANSING HATCHERY

Most of the work at the Lansing station consisted of routine checks on egg size and fertility, both for walleye and northern pike. Final results of hatchery production in walleyes and northern pike are not included in this report. Some time was spent in getting up a standard procedure for carp pituitary injections as described below.

EXPERIMENTAL STUDIES

CARP PITUITARY INJECTIONS

This procedure as it pertains to female northern pike is no longer in the experimental stage, but is described in this section for convenience.

All female northerns that were not ripe when brought into the hatchery were given an injection of one carp pituitary gland in 5 cc of distilled water. These fish were examined twenty-four hours later, and those not ripe were given the second injection. Most of these fish were ripe and stripable within 48 hours following the second injection; a third injection was given to a few fish. Three injections were considered maximum. Only three fish among slightly more than 400 females brought into the hatchery failed to produce eggs under this routine.

The same general procedure was used for the female northerns at the Spirit Lake hatchery except that injections were not started until after several days of holding and it was apparent that they would not ripen.

NORTHERN PIKE FRY FEEDING

The northern pike nursery pond program in Iowa has been rather unpredictable as far as production is concerned, with a wide range of returns obtained from the same pond from one year to another. Biologists and fish culturists agree that any one of several factors could be responsible for the erratic results. One such factor concerns the ability of the fry to

PROGRESS REPORT - EVALUATION OF CERTAIN PHASES OF IOWA'S TROUT PROGRAM

by
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In an attempt to substantiate or disprove some of the "theories" concerning the Iowa trout program, a total of 2,700 trout were tagged and placed in three "test" streams in northeast Iowa in 1959.

The major objectives of this two-year study are to determine, through analysis of tag returns: (1) the utilization of stocked trout; (2) the best time of year to stock; (3) what size and what species give the best returns; (4) the source and intensity of angling pressure, by stream; and (5) the amount of weekly removal to aid in fixing a restocking schedule.

On trout in the 7 to 10-inch class, a #1 jaw tag was used; and on those over 10 inches, a #3. The trout were sedated with a solution of 30 ppm of chlorobutonal to facilitate handling and to prevent undue injury. After tagging, the fish were placed in raceways to recover and were not stocked for at least 24 hours to check against tag losses or mortality of tagged fish.

The project called for the release of 300 tagged fish in each of three streams: Elk Creek, Big Mill Creek and French Creek. At each of the three periods of the stocking year (spring, summer and fall), 100 7 to 9-inch browns, 100 7 to 9-inch rainbows and 100 10 to 15-inch rainbows were tagged and stocked in each stream.

Signs requesting the return of tags with date of catch were posted at intervals on each stream, and an active radio and press campaign for the return of the tags was instigated locally. Despite the publicity, tag returns indicated a rather low utilization of tagged fish (Table 1).

It has been determined that Iowa anglers turned in only 55 percent of the walleye tags that they recovered (unpublished data). Perhaps trout fishermen have the same reticence about turning in tags. However, the utilization picture is clear as it presents comparative success between streams.

It was also quite apparent that each of the test streams had a separate and distinct clientele with very few anglers fishing more than one of the three streams.

Rainbow trout in their second and third growing season (10 to 15-inch, T. L.) gave the best return to the angler of any other size or species (Table 3). It has been the general opinion of most trout managers and anglers that brown trout are harder to catch than rainbows; our data do not bear out this contention. Brown trout were 18 percent more vulnerable to angling than rainbows of the same size.

Table 3. UTILIZATION OF TAGGED TROUT BY SPECIES AND SIZE

Species	Size Class	Number Tagged & Released	Number Returned	Percent of Utilization
Rainbow	7"-10"	889	160	18%
Brown	7"-10"	886	184	21%
Brook	7"-10"	9	2	22%
Rainbow	10"-15"	895	233	26%
Rainbow	Brood	10	1	10%
Brown	Brood	10	3	30%

The time interval between successive stockings of a given stream is a very important consideration in a trout program. Most tag returns were dated as to when the fish were retaken, and from these data it would seem that a bi-weekly stocking of streams during their major use period would be the most practical program (Table 4).

Table 4. UTILIZATION, BY WEEKS, OF TAGGED TROUT IN NORTHEAST IOWA STREAMS

Week	Cumulative Percent of Utilization
1st	63%
2nd	79%
3rd	86%
4th	89%
5th to 8th	95%
9th to 12th	99%

ROADSIDE IMPOUNDMENT STUDIES IN FREMONT AND MILLS COUNTY, IOWA

by
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INTRODUCTION

The sharply rolling topography of the extreme southwestern Iowa counties of Mills and Fremont, combined with extensive agricultural practices, has caused many deep, steep-sided gullies in rural areas. Located in these gullies are a series of unique roadside impoundments. County engineers, faced with a steel shortage in World War II and many county bridges over these gullies needing repair or replacement, devised an ingenious plan. Instead of bridging the gully with a costly steel span, an earth dam was built across the gully and the road bed built on the top. A small concrete spillway or a large steel culvert was added to take care of the overflow water and the structure was complete. Named "Greenwood Dams", after their originator, these dams and the small impoundments created by them dot the rural landscape of these two southwestern Iowa counties. One resident estimated that 180 of these impoundments had been created in Fremont County alone.

The Iowa Conservation Commission quickly recognized the sport fishing potential of these areas and with the cooperation of the counties and adjacent landowners many of them were stocked with combinations of largemouth bass, bluegill, crappie, bullhead and channel catfish.

This report includes the first comprehensive inventory of these areas undertaken by the Biology Section to check the success of the fish management efforts to date.

CHARACTERISTICS OF THE IMPOUNDMENTS

Because all of the impoundments are located in steep-sided gullies, they are similar in nature. A typical impoundment has very steep bottom contours with very little of the water area less than 4 feet deep. Water depths range from 10 to 15 feet with maximum depths to 20 feet. The impoundments are all narrow and elongated, often winding up the course of a gully for one-half mile. Most of the impoundments are in the 3 or 4 acre

in good physical condition and apparently doing well in that habitat.

BLUEGILL

Bluegills were the most numerous of any fish taken in this survey. Almost one-half of the total fish collection was composed of bluegills. Bluegill were taken in all impoundments studied. The bluegills appear to be growing slowly, although age studies show they are not badly stunted in any of the impoundments. Most of the bluegills collected were in the 5.0 to 6.5 inch total length range.

CRAPPIE

Very few crappie were collected, but this may be due to species selectivity of the equipment rather than a low population of crappie. Local Conservation Officers report good catches of large crappie in certain of the impoundments, but these fish were not obtained with either the electric shocker or the trap nets. A small sample of crappie was obtained for age-growth studies and these appeared to be growing normally.

BULLHEAD

Although the electric shocker is not considered an ideal inventory tool for bullheads, 20 percent of the catch with that device was bullheads. All impoundments contained bullheads of good size and in excellent condition. Conservation Officers for that area indicated that most local interest was centered on the bullhead and that many local fishermen were quite successful in their pursuit of them.

CHANNEL CATFISH

Channel catfish have been stocked in some of the impoundments, but no catfish were taken in this work. It is known that a few catfish are taken on rod and reel from some of the areas.

CARP

Only two adult carp and no young-of-the-year or yearling carp were taken in the entire survey.

MISCELLANEOUS

A limited number of green sunfish, orangespotted sunfish and bluntnose minnows were collected.

THE FISH POPULATION IN A SOUTHERN IOWA WATER SUPPLY RESERVOIR

by
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Fairfield Reservoir No. 1, a 51 acre municipally-owned water supply reservoir, was chemically treated to eradicate the fish population in August, 1960. An abundance of small, stunted pan-fish accompanied by poor angling success made total renovation necessary for proper fisheries management.

The impoundment was constructed in 1934 by the Fairfield Water Department for municipal and commercial water supply. Total water capacity of the reservoir is approximately 245 acre-feet, with a mean commercial consumption of six acre-feet of water per 24 hour period. Maximum depth is 20 feet. At the time of chemical treatment a thermocline was located between 10 and 16 feet. The water was oxygenless below 14.5 feet.

One of the major problems of fisheries management in the vast network of surface reservoirs in southern Iowa is the chemical prophylactic control of filter-clogging algae. Introduction of copper sulfate as a routine method of control was used in Fairfield No. 1. Many of these treatments were considered excessive for adequate algae control, and certainly cannot be considered advantageous to fish management. Up to the date of this project three treatments were completed this year in which a total of 1,200 pounds of granular copper sulfate was used. These treatments were calculated in excess of 10 parts per million by volume.

METHOD OF TREATMENT AND POPULATION ESTIMATE

Prior to treatment the lake bottom was contour mapped at three-foot intervals. Marker buoys were located around the perimeter of the eight-foot contour. This separated the lake into three different areas. Total water volume was computed for each of the three areas. Each of these segments was treated individually with a concentration of 1.0 p.p.m. of emulsified Chem-Fish (synergized).

As part of their interest in the introduction of fish toxicants into municipal water supply reservoirs, the Iowa

LARGEMOUTH BASS

Only 51 adult largemouth bass were found during the project. Twenty-four of these fish were salvaged by placing them in aerated fresh water immediately after they were affected by the toxicant. There was no evidence of reproduction for the past two years, and only limited survival resulted from fingerling stockings or natural reproduction during the past four years. Age groups V and VI comprised 90 percent of the bass population (Table 2). Largemouth bass growth was excellent after the fish reached four years of age, but the younger age groups grew slowly for waters of this classification. This would indicate an interspecific stress from food shortages during the younger years of life, but as size increased the stress was minimized due to the abundance of larger sized forage fish, such as bluegills. Further evidence to support this premise is indicated in the lack of reproduction and survival of young fish, both by natural reproduction and fingerling plantings. Table 3 lists the mean total length attained at the end of each year of life.

Table 2. AGE COMPOSITION OF THE MAJOR FISH POPULATIONS IN FAIRFIELD RESERVOIR NO. 1

Species	No. in Sample	Age Group (Percent) 0	I	II	III	IV	V	VI	VII	VIII
Lm. Bass	27	-	-	(T)	(T)	8.5	68.1	22.4		
Bluegill	154	(T)	(T)	3.0	9.9	84.9	2.0			
Crappie	53	-	1.2	15.6	21.5	45.2	7.8	2.0	3.9	3.9

(T) Less than 0.1 percent of total population

Table 3. GROWTH OF THE MAJOR SPECIES OF FISH IN FAIRFIELD RESERVOIR NO. 1 (MEAN WEIGHT IN PARENTHESIS)

Species	No. in Sample	Age Group 0	I	II	III	IV	V	VI	VII	VIII
Lm. Bass	27	-	-	7.4 (10.0)	12.2 (1.2)*	14.4 (2.8)*	16.0 (3.8)*	19.1 (5.3)*		
Bluegill	154	1.2 (-)	2.5 (-)	3.2 (0.5)	4.1 (0.6)	4.7 (0.8)	5.2 (1.2)			
Crappie	53	- (-)	3.4 (0.5)	5.0 (1.0)	6.5 (2.0)	7.2 (2.5)	8.0 (2.9)	9.5 (3.9)	12.1 (11.5)	15.7 (2.4)*

* Largemouth bass and crappie weights in tenths of pounds, all other weights in tenths of ounces.

3. Bullheads were second in importance followed by crappie and largemouth bass.

4. Other species found included northern pike, green sunfish and orangespotted sunfish. These species were not significant to the total population.

The river averages about 50 feet in width at base flow.

Biotic conditions are characterized by a rarity of aquatic vegetation and most invertebrates, in contrast to the quantitative richness of the fish fauna. Rooted aquatic vegetation is non-existent, but some filamentous algae occurs on rocks in the riffle areas. Some floating algae is apparent in warm weather. The bottom fauna, prior to our chemical treatment, was very scanty; it was composed largely of insects. Crayfish and a variety of minnows were abundant. Thirty-one species of fish have been collected from the river, but no more than twenty of these occur in significant numbers. Channel catfish, carp, black bullheads and northern creek chubs are the only species sought by hook and line fishermen.

The renovation of the Middle Raccoon in August 1959 was initiated by requests from individual fishermen and sportsmen's groups, and was carried out only after a careful survey of the stream prior to the treatment. A creel census was not conducted, but many anglers had reported poor fishing. Our surveys, employing rotenone to kill out short reaches at various places along the length of the stream, revealed a fish population composed of only four percent by weight of game fish.

The kill made in August 1959 was followed by a restocking program which included the introduction of 1,500 smallmouth and 500 largemouth bass fingerlings, 80,000 channel catfish fingerlings and 15,000 sub-adult catfish. The sub-adult catfish were taken from the Mississippi River and hauled by truck to the stocking area. They ranged from 6 to 16 inches in total length with the large majority being just under 10 inches. The bass were stocked in the impoundments at Redfield and Panora, while the catfish were distributed along the entire length of the stream.

It should be emphasized that our restocking far exceeded, both by numbers and weight, the game fish killed by the eradication program.

It was anticipated that the sub-adult catfish would furnish some fishing in 1960, and the bass and catfish fingerlings would provide a year class for the future. However, reports from fishermen and from our Conservation Officers in the spring of 1960 stated that the sub-adult catfish stocked the previous fall were not being caught. Subsequent surveys employing sub-lethal dosages of rotenone revealed that our fish plantings had failed to establish themselves. In fact, a check of 13 of the best water areas along the Middle Raccoon produced only four channel catfish, all approximately seven inches long, and believed to be remnants of our fingerling stock.

Whatever is involved in this phenomenon is not presently understood. It is hypothesized that something in the capture, holding or hauling procedures may produce a shock of some sort that takes longer than the captive period to manifest itself. However, there is also the possibility that the totally new environment may be the critical factor. Be as it may, it seems quite apparent that the use of sub-adult catfish for stocking purposes needs a careful appraisal.