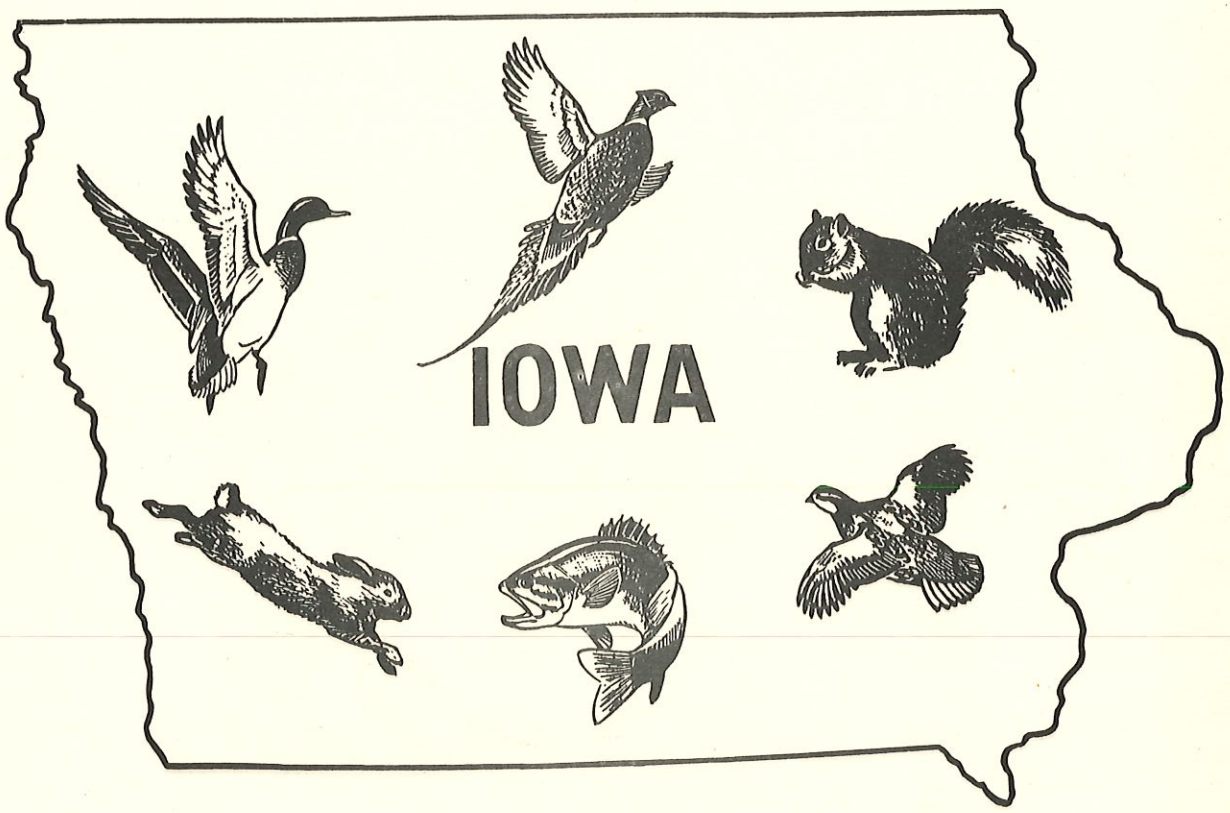
1962

QUARTERLY BIOLOGY REPORTS



FISH AND GAME DIVISION — BIOLOGY SECTION

STATE CONSERVATION COMMISSION

QUARTERLY BIOLOGY REPORTS

October, November, December

Vol. XIV 1962 No. 4

Submitted by

Biology Section

State Conservation Commission
Everett B. Speaker, Director

Fish and Game Division
Earl T. Rose, Chief

East 7th & Court Streets
Des Moines, Iowa

TABLE OF CONTENTS

ABSTRACTS

****

GAME

PAGE NO.

FISHERIES

5. AN EVALUATION OF INTRODUCING THE WALLEYE INTO A SOUTHERN IOWA ARTIFICIAL LAKE

ABSTRACTS OF QUARTERLY BIOLOGY REPORTS

RESULTS OF IOWA'S 1962 BOW SEASON FOR DEER

Eldie W. Mustard
Game Biologist

Iowa bow hunters experienced their usual excellent season in 1962 when they bagged 404 deer and had a hunter success ratio of 16.9 per cent. It required an average of 293 hours of hunting for each deer reduced to possession, with the average hunter spending 51.6 hours hunting deer. The typical hunter saw 14.5 deer during the season, at the rate of 0.28 deer per hour of hunting. Age and sex ratios, as in past seasons, favored the adult males, with an indicated age ratio of 17 fawns:100 adults and a sex ratio of 199 males:100 females. Bow hunters harvested 44.3 per cent of their deer in the morning and 55.7 per cent in the afternoon hours. Over one-half of the deer were harvested during the last one-third of the season. The percentage of the hunters who said they had hit but failed to retrieve at least one deer was 10.9 per cent, which is about the same as has been reported for the past seasons.

SUMMARY OF CONSERVATION OFFICERS' DEER KILL REPORTS - 1962

Eldie W. Mustard
Game Biologist

A new high was set in 1962 for the number of deer killed by dogs, traffic, illegal hunting, and miscellaneous causes according to reports received from Conservation Officers. Reported deer deaths due to the preceding causes totaled 939, with dogs accounting for 14 (1.5%), traffic 726 (77.0%), illegal hunting 79 (8.4%), and miscellaneous causes 120 (12.7%). Accidents on hard surfaced roads accounted for 82.8 per cent of the deer killed by traffic. Of all deer killed by traffic, 86.1 per cent were hit between the hours of 5:00 P.M. and 7:00 A.M., which coincides with the hours of twilight and darkness during much of the year, as well as with the times that deer are naturally moving.

THE 40-ACRE METHOD OF ESTIMATING QUAIL POPULATIONS

M. E. Stempel
Game Biologist

The 40-acre method of censusing quail is a pre-season count of quail in statistically selected areas. Thus, these records are gathered in a uniform manner. The data are collected by Conservation Officers and by the Biologist who record the quail seen or heard and the feathers, dusting places and tracks of quail. Presence of any of the above indicates occupancy. A report is also obtained from the farmers who are in charge of the selected areas. Results of the 1962 forty-acre census of quail indicate that quail are recovering from the heavy losses of the 1959-1960 winter. Most of this recovery was reported in the poorer-type areas.

PROGRESS REPORT - RUFFED GROUSE STUDIES, 1962

Eugene D. Klonglan
Game Biologist

A project to determine the current status of the ruffed grouse in Iowa was initiated on a cooperative basis by the Biology and Game Sections in early 1961. The three main objectives of the study are (1) to determine the present density and range of ruffed grouse in Iowa, (2) to investigate the possibility of expanding the range of the species in the state, and (3) to evaluate the harvest potential of the species. Spring roadside drumming counts were run in three northeastern Iowa counties in 1962, and a mean of 1.5 drums per stop was heard on 135 stops on ten routes. This indicated a slight, though probably not significant, increase over the 1961 counts. Seven grouse, three males and four females, were trapped in Allamakee County and released in Shimek State Forest in southeastern Iowa. Plans have been made for a more extensive trapping program next year. An evaluation of the harvest potential of ruffed grouse in Iowa is being made.

NOTES ON WINTER PHEASANT COVER IN IOWA

Richard C. Nomsen
Game Biologist

A preliminary survey of the distribution and quality of farm windbreaks was conducted last winter in north central Iowa. There was an obvious decrease in the quality of windbreaks south of Hancock County and a corresponding decrease in the number of pheasants counted. If we are to encourage the planting and improvement of farm windbreaks, we must have more information on the relationship between windbreaks and pheasant populations. One important factor appears to be the density of ground cover.

A PRELIMINARY REPORT ON WEATHER INFLUENCES AFFECTING SUMMER ROADSIDE RABBIT ACTIVITY

Paul D. Kline
Game Biologist

Partial evaluation of 180 early morning roadside counts of cottontails taken during all seasons on a single 30-mile route in Benton County are presented in this paper. Data indicate rabbits are seen in the greatest abundance in June and July. The data from 52 counts conducted during these two months are evaluated separately from all other data.

Correlation coefficients between weather factors and rabbits seen were computed. These indicated strong relationships exist between numbers of rabbits seen and wind velocity, cloudiness, light intensity, and change in temperature from 12 hours previous to the time each survey was run. These correlations were all highly significant (at the .01 probability level). Relationships between numbers of rabbits seen and barometric pressure changes, temperature at time of survey, relative humidity, and moon phase were not statistically significant. The influence of wind and cloudiness each was to decrease numbers of rabbits seen. Light intensity and notable declines in temperature overnight each increased numbers of rabbits seen.

Evaluation of these summer surveys indicates cloudiness and wind velocity are the controlling weather factors and should be considered when summer roadside surveys of cottontails are conducted. Since light intensity, one of the other significant factors, is controlled by cloudiness, it can be eliminated as a factor to be considered, provided cloudiness is considered. The same can be said for the temperature differentiation between time of survey and 12 hours previous. Cloudiness and wind both control radiation which in turn determines the relative drop in temperature overnight.

MUSKRAT POPULATION INCREASES IN NORTHWEST IOWA 1959-63

James G. Sieh
Game Biologist

The rapid return of muskrats within the food-rich marshes in northwestern Iowa is illustrated by the increase of the species within the 25 acre "Northeast Marsh" of the Jemmerson Slough complex. In the fall of 1960 approximately 5 muskrat houses plus attending feeders were counted. The following autumn this muskrat population had increased to approximately 125 animals. By the fall of 1961 the marsh contained 125 muskrat houses, many feeders, and numerous rat runs indicating a minimum population of 500-600 muskrats. Approximately 50-60 per cent of this fall population of muskrats was taken from this area by trappers. It is possible that too many breeders will survive their offspring seriously damaging the remaining stands of emergent vegetation upon which the muskrat population depends.

RESULTS OF A VOLUNTARY CREEL CENSUS ON SOME NORTHEAST IOWA RIVERS IN 1962

Roger Schoumacher
Fisheries Biologist

A voluntary creel census of better than average fishermen was conducted on northeast Iowa rivers. One hundred eight (53%) of the contacts reported 1,109 trips, 3,688 hours of fishing, and 3,634 fish, for an average of 10.3 trips per angler, 3.3 hours per trip and about one fish per hour success. Seventy-four per cent of the trips were successful - at least one fish was caught. Catfish, crappies, bullheads, and carp were the primary species caught, with most of the fishing effort directed towards catfish. Data on four large rivers indicated, when compared with some previous years, better than average fishing on two of the rivers, about average fishing on one, and below average fishing on the fourth.

FALL FISH POPULATIONS BY SHOCKING CENTRAL IOWA STREAMS 1959 THROUGH 1962

Harry M. Harrison
Fisheries Biologist

Surveys conducted on five central Iowa streams by electrical shocking techniques indicate that rough fish continue to dominate. They make up in excess of 90 per cent of all fish living in the streams surveyed. Channel catfish are the principal game species. Walleye pike are second in importance and are presently at high levels in the West and East Forks of the Des Moines River. Flathead catfish rank third. Other game fish include crappie, smallmouth bass, bullheads, northern pike and bluegill. At present, these species occur in very low numbers.

CREEL CENSUS OF FIVE NATURAL LAKES IN 1961-62

Tom Moen
Fisheries Biologist

Data are presented on the results of a comprehensive type creel census conducted on three natural lakes in Dickinson County during the period of May, 1961 through February, 1962. These three lakes, totaling 11,000 acres, yielded an estimated 708,000 fish that weighed 446,000 pounds. A total of 147,000 trips was estimated averaging 2.7 hours per trip. Bullheads comprised 47 per cent of the total catch, reaching a high of 92 per cent of the total catch from East Okoboji Lake.

Clear Lake in Cerro Gordo County was censused during June, July and August by two methods that indicated excellent fishing during June followed by very poor fishing in July and August. Bullheads were the most important species during each of the three months with crappie, bluegill and yellow bass of lesser importance.

A contact type census was conducted on Black Hawk Lake over the 5-month period of June through October. Fishing success was excellent throughout the entire census period, averaging 1.4 fish per hour and approaching two fish per hour in August and September. Bullheads, crappies, channel catfish and carp were the four most important species in the creel.

PROGRESS REPORT ON COMPARISONS OF CHANNEL CATFISH POPULATIONS IN STRAIGHTENED AND UNSTRAIGHTENED SEGMENTS OF THE LITTLE SIOUX RIVER

Bill Welker
Fisheries Biologist

During 1962, a study was initiated to compare the catch of channel catfish by hoop nets between straightened and unstraightened sections of the Little Sioux River in Monona County, Iowa. Since this project was just getting under way this year, the sample size (number of hoop-net days fished) was too small to warrant any presentation of the limited data collected to date. This is the initial progress report describing the ecology of the study areas.

AN EVALUATION OF INTRODUCING THE WALLEYE INTO A SOUTHERN IOWA ARTIFICIAL LAKE

PART I: HISTORY, STOCKING AND POPULATION

Jim Mayhew
Fisheries Biologist

Walleye fry, fingerling, and yearling walleye have been stocked in Green Valley Lake since 1954. No natural reproduction of this species has been found in the lake. In order that the population will continue to furnish angling, a minimum of 3 million fry must be stocked annually. Tagging studies in 1960 and 1961 indicated a resident population of 1,600 to 6,900 adult walleye in excess of 12 inches. Anglers annually harvest between 8.1 and 10.2 per cent of this population each year. Five years after the original planting the walleye has become the most abundant predatory species of fish in the lake. Only bullhead, crappie, and bluegill are caught in greater number by the fishermen. Creel censuses revealed the walleye comprised between 1.5 and 4.5 per cent of the fishery each year. There is a substantial egress of walleye from Green Valley Lake into Summit Lake. During the study there was a 4.4 per cent loss of tagged fish over the spillway and into the lower impoundment.

RESULTS OF IOWA'S 1962 BOW SEASON FOR DEER

Eldie W. Mustard
Game Biologist

INTRODUCTION

The 1962 bow season for deer marked the tenth consecutive year bow hunters have been permitted to hunt deer in Iowa. Interest in the sport of bow hunting for deer is dynamically exhibited by comparison of the number of permits issued the first year and the tenth; 10 permits the first and 2,404 the tenth season (Table 1).

Bow hunters were allowed a 51-day season, extending from October 13 to December 2 inclusive. Hunting was permitted from 6:30 A.M. - 5:30 P.M. hours daily, with basic regulations unchanged from those of 1961.

RESULTS

Card Returns

The data presented in this report are taken from the hunt report cards submitted by 2,305 (95.9 per cent) holders of the 2,404 permits which were issued in 1962. Ten of the permittees indicated they did not use their permits. For the purpose of calculating the hunter success ratio, the 99 who did not report were assumed to have hunted.

Total Kill and Success Ratio

Bow hunters again broke all previous records with a total kill of 404 deer (Table 1). The hunter success ratio of 16.9 per cent was slightly lower than the 17.1 per cent reported in 1961, however, this is still an excellent record. The success ratios of the bow hunters have not varied more than 1.0 per cent for the past four seasons (Table 1).

So far as national averaged are concerned, Iowa bow hunters have an enviable success record, both numerically and success-wise. In the face of changing weather conditions, crop harvest conditions, general cover conditions, and varying season lengths, I am somewhat at a loss to fully explain the almost static hunter success record established by Iowa bow hunters since 1959.

Bow Kill by County

The number of deer reportedly killed in each county is given in Table 2, as is the number of hunters who said they hunted in the county. Pottawattamie County again had the greatest number of kills with 41, followed by Sioux County with 17. Eighteen counties had 8 or more deer killed by bow; these 18 counties had a composite kill of 216, or 53.5 per cent of the total state kill of 404.

TABLE I. Summary of Data from Bow Seasons for Deer, Iowa, 1953 - 1962

	1953	1954*	1955	1956**	1957	1958	1959	1960	1961	1962
Number of permits issued	10	92	414	1280	1228	1380	1627	1772	2191	2404
Deer kill	1	10	58	117	138	162	255	277	367	404
Hunter success ratio (%)	10.0	10.9	14.0	9.1	11.4	12.4	16.2	16.0	17.1	16.9
Hours hunted/deer bagged	-	-	-	432	370	363	252	311	283	293
Deer observed/hour hunted	-	-	-	0.12	0.29	0.34	0.33	0.27	0.30	0.28
Length of season (days)	5	12	23	31	31	30	31	44	48	51

* First extended bow season for deer.

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

TABLE 2. Number of deer killed and number of bow hunters hunting deer, by county, Iowa, 1962

County	Deer Killed	No. Hunters
1. Adair	4	17
2. Adams	1	20
3. Allamakee	0	43
4. Appanoose	1	7
5. Audubon	1	4
6. Benton	2	22
7. Black Hawk	14	111
8. Boone	8	42
9. Bremer	3	34
10. Buchanan	3	37
11. Buena Vista	3	19
12. Butler	7	58
13. Calhoun	0	3
14. Carroll	1	13
15. Cass	3	24
16. Cedar	0	5
17. Cerro Gordo	3	21
18. Cherokee	3	39
19. Chickasaw	3	35
20. Clarke	3	18
21. Clay	6	34
22. Clayton	9	91
23. Clinton	8	85
24. Crawford	2	18
25. Dallas	1	31
26. Davis	0	2
27. Decatur	0	13
28. Delaware	10	84
29. Des Moines	10	55
30. Dickinson	6	21
31. Dubuque	2	50
32. Emmett	10	36
33. Fayette	1	34
34. Floyd	2	59
35. Franklin	2	10
36. Fremont	1	20
37. Greene	1	12
38. Grundy	0	0
39. Guthrie	10	48
40. Hamilton	3	33

TABLE 2. (Con't.)

County	Deer Killed	No. Hunters
41. Hancock	0	7
42. Hardin	7	40
43. Harrison	13	41
44. Henry	0	12
45. Howard	5	26
46. Humboldt	3	21
47. Ida	0	2
48. Iowa	2	49
49. Jackson	5	71
50. Jasper	4	25
51. Jefferson	0	2
52. Johnson	2	59
53. Jones	5	60
54. Keokuk	0	18
55. Kossuth	4	26
56. Lee	9	40
57. Linn	5	109
58. Louisa	1	16
59. Lucas	9	41
60. Lyon	11	46
61. Madison	8	49
62. Mahaska	0	13
63. Marion	2	28
64. Marshall	3	22
65. Mills	5	26
66. Mitchell	1	48
67. Monona	10	23
68. Monroe	5	23
69. Montgomery	5	27
70. Muscatine	5	20
71. O'Brien	2	16
72. Osceola	1	12
73. Page	1	15
74. Palo Alto	1	14
75. Plymouth	4	29
76. Pocahontas	0	2
77. Polk	5	95
78. Pottawattamie	41	159
79. Poweshiek	2	9
80. Ringgold	0	7
81. Sac	5	31

TABLE 2 (Con't.)

County	Deer Killed	No. Hunters
82. Scott	4	52
83. Shelby	5	20
84. Sioux	17	37
85. Story	2	22
86. Tama	0	10
87. Taylor	0	8
88. Union	3	18
89. Van Buren	0	7
90. Wapello	2	26
91. Warren	8	50
92. Washington	0	11
93. Wayne	1	8
94. Webster	0	42
95. Winnebago	5	30
96. Winneshiek	4	40
97. Woodbury	11	68
98. Worth	4	47
99. Wright	0	16

Hours of Hunting and Hours Hunted Per Deer Bagged

Collectively, bow hunters spent 118,435 hours hunting deer in 1962, or an average of 51.6 hours per hunter. The mean number of hours of hunting required to bag a deer in 1962 was 293 hours, which compares favorably with the same figure for past seasons (Table 1).

Deer Observed

An average of 14.5 deer was sighted per hunter in 1962 at the rate of 0.28 deer per hour. The number of deer sighted per hour has remained relatively stable since 1957 (Table 1). The bow hunters said they observed a total of 33,375 deer in 1962 compared to 31,684 in 1961.

Sex and Age Ratio of Harvested Deer

Archers reported harvesting 269 males and 135 females for a sex ratio of 199 males:100 females. This greatly unbalanced sex ratio in harvested deer is interpreted to mean that bow hunters are quite selective as to sex of the deer they kill. They also appear to be selective as to the age of deer they take, with an indicated age ratio of 17 fawns:100 adults for the 55 fawns and 317 deer on which data were received.

Time of Day and Part of Season Deer Were Harvested

Successful bow hunters were asked to indicate whether they killed their deer in the morning hours (6:30 A.M. - 12:00 Noon) or afternoon hours (12:01 P.M. - 5:30 P.M.). They reported that 44.3 per cent were taken in the morning and 55.7 per cent in the afternoon. This is similar to past seasons where typically more deer are taken in the afternoon than in the morning hours.

The 51-day season was divided into three 17-day periods: October 13 - 29, October 30 - November 15, and November 15 - December 2. As in past seasons, the kill became progressively better as the season advanced, with 19.3 per cent of the kills occurring in the first period, 27.6 per cent in the second, and 53.1 per cent in the third.

Some plausible explanations for the great number of kills which are reported during the third period were given by Mustard (1961). Briefly, they include: (1) changes in cover conditions, (2) shooting hours more closely coincide with periodicity of deer movements, (3) hunters may be less selective as season wanes, and (4) hunters may falsify their report so they can continue hunting with their partners.

One possible reason for the low percentage of deer taken during the first period in 1962 was undoubtedly the heavy infestation of mosquitoes which kept all but the most ardent bowmen out of the field early in the season. I doubt if even the ardent ones spent much time hunting early in the 1962 season because of these pests.

Deer Wounded But Not Retrieved

Approximately 10.9 per cent of the bow hunters said they had hit but failed to retrieve at least one deer in 1962. The percentage of hunters who wounded deer closely agrees with

similar data from 1960 and 1961 when 11.3 and 10.8 per cent respectively reported they had wounded at least one deer and lost it.

Bow permittees in 1962 indicated they had wounded a total of 307 deer which they failed to recover.

DISCUSSION

Iowa bow hunters experienced a very good season in 1962 in spite of mosquitoes and lack of snow cover. This sport seems to be undergoing a slow but steady growth, and it is a sport we have tried to encourage through long attractive seasons. Probably no sport hunting in Iowa provides more recreation with a minimum impact on the wildlife resource than does bow hunting for deer.

There are, however, two areas of bow hunting toward which some thought and consideration should be directed. The first is the perpetually high success ratio, with the accompanying rumors that some bow hunters are using firearms to take their deer. As a means of preventative law enforcement, it has been my suggestion that all bow-killed deer be inspected by Conservation Officers.

The second item is the high wounding to recovered ratio reported by bow hunters. In 1962 bow hunters said they wounded 307 deer for a ratio of wounded:100 recovered of 76:100. This, I feel, is too high. As a possible step in reducing this ratio, I shall recommend that the hunting hours be changed from 6:30 A.M. - 5:30 P.M. to one-half hour before sunrise to sunset for the 1963 season. This is recommended so bow hunters will not be legally shooting deer in failing light, with the hope that this will somewhat reduce the wounding losses.

SUMMARY

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

2. Permits were issued to 2,404 bow hunters; the 2,394 hunters who participated bagged 404 deer and had a hunter success ratio of 16.9 per cent.

3. Hunters averaged 51.6 hours of hunting and collectively spent 118,435 hours on deer hunting. They spent an average of 293 hours for each deer they reduced to possession.

4. A total of 33,375 deer were observed at the rate of 0.28 per hour of hunting, with the average bowman sighting 14.5 deer during the season.

5. Bow hunters again showed their preference for adult male deer when they reported bagging deer in the ratio of 17 fawns:100 adults, and 199 males:100 females.

6. Hunters reported taking 44.3 per cent of their deer in the morning and 55.7 per cent in the afternoon hours.

7. Hunting became better as the season advanced, with bow hunters indicating they took 19.3 per cent of their deer during the first third of the season, 27.6 per cent in the second, and 53.1 per cent the third portion of the season.

8. A total of 260 bow hunters (10.9 per cent) said they had wounded one or more deer and failed to retrieve it. A wounded:100 recovered ratio of 76:100 was indicated.

LITERATURE CITED

Mustard, Eldie W.

1961. Results of Iowa's 1961 bow season for deer. Iowa Conserv. Comm., Quart. Biol. Repts. 13(4): 34-39.

SUMMARY OF CONSERVATION OFFICERS' DEER KILL REPORTS - 1962

Eldie W. Mustard
Game Biologist

Deer kills due to dogs, traffic, illegal hunting, and miscellaneous causes were greater in 1962 than in any previous year, with a total of 939 deer. The previous high of 839 occurred in 1961; however, the annual total has increased each year since 1958 (Table 1). These totals are at best minimums because dead deer may not be reported by the Conservation Officers for a variety of reasons.

Reported kills ranged from 0 to 117 for the several counties, with Pottawattamie County receiving the dubious honor of being high (Table 2).

Traffic accounted for 77.0 per cent, miscellaneous causes 12.7 per cent, illegal hunting 8.4 per cent, and dogs 1.5 per cent of the reported deer deaths (Table 3). The 726 deer involved with traffic is about 6.0 per cent greater than the 683 killed by traffic in 1961.

Estimates of damage was received for 423 of the vehicles involved in deer accidents and totaled $61,333, or an average of $145 per accident. Damages ranged from none to $3,000 according to the Officers' estimates.

Data on the type of road on which 610 deer-traffic accidents occurred indicated 82.8 per cent were on hard surface roads, 12.0 per cent on gravel roads, and 5.2 per cent on other or unimproved roads.

Time of occurrence is also an important factor in deer-traffic accidents. Approximate times were received for 610 of the deer-traffic involvements. As shown in Table 4, 56.6 per cent of the accidents were between the hours of 5:00 P.M. and 11:00 P.M., or during 29.0 per cent of the available time in a 24-hour period during 1962. Table 4 also indicates that 86.1 per cent of the deer-traffic accidents took place between the hours of 5:00 P.M. and 7:00 A.M., which are the approximate hours of twilight and darkness during much of the year. These times also closely coincide with the natural movements of deer.

As in previous years, the deer kill started climbing in September, peaked out in November, and then began to taper off (Table 3). During November of 1962, 245 deer were reported, with 200 of these the victims of traffic.

TABLE 1. Annual deer losses to traffic, illegal hunting, miscellaneous causes, and dogs as reported by Conservation Officers, 1951 - 1960

Year	Number of Deer Reported
1951	192
1952	256
1953	393
1954	310
1955	306
1956	419
1957	345
1958	438
1959	508
1960	753
1961	839
1962	939
Total	5698

TABLE 2. Summary of Conservation Officers' dead deer reports, 1962

County	Cause				Total
	Dog	Traffic*	Illegal	Miscellaneous**	
1. Adair					0
2. Adams		9			9
3. Allamakee		4	3		7
4. Appanoose	1	4		2	7
5. Audubon		6			6
6. Benton		2		1	3
7. Black Hawk		5	1	3	9
8. Boone		4		1	5
9. Bremer		2	2	1	5
10. Buchanan		2		1	3
11. Buena Vista		3			3
12. Butler		9	1	2	12
13. Calhoun		3			3
14. Carroll		4			4
15. Cass		20	2		22
16. Cedar		1	2		3
17. Cerro Gordo		1			1
18. Cherokee		5	2	1	8
19. Chickasaw		6	2	1	9
20. Clarke		15		2	17
21. Clay		3	1	1	5
22. Clayton	1	1			2
23. Clinton		3		4	7
24. Crawford		7	1	1	9
25. Dallas		11		2	13
26. Davis		3	4		7
27. Decatur		13			13
28. Delaware		1		1	2
29. Des Moines		3	2	3	8
30. Dickinson		5	3		8
31. Dubuque		5			5
32. Emmet		6	1	2	9
33. Fayette		7		7	14
34. Floyd		4			4
35. Franklin		3		1	4
36. Fremont	1	8	1		10
37. Greene		6			6
38. Grundy					0
39. Guthrie		1		1	2
40. Hamilton		5			5

TABLE 2 (Con't.)

County	Cause				Total
	Dog	Traffic*	Illegal	Miscellaneous**	
41. Hancock		1			1
42. Hardin		4		2	6
43. Harrison		9	1	1	11
44. Henry		2		1	3
45. Howard		2	2		4
46. Humboldt		3		1	4
47. Ida		4	2		6
48. Iowa		18	1		19
49. Jackson		11			11
50. Jasper					0
51. Jefferson		6			6
52. Johnson		15			15
53. Jones	1	9	1		11
54. Keokuk		4	3		7
55. Kossuth		6			6
56. Lee		9		2	11
57. Linn		1	1		2
58. Louisa		5	1		6
59. Lucas		13		1	14
60. Lyon	1	11		3	15
61. Madison		15	1	6	22
62. Mahaska		7	3	1	11
63. Marion		8		1	9
64. Marshall		6			6
65. Mills		23	1	2	26
66. Mitchell		5			5
67. Monona		1	2		3
68. Monroe		15	4	2	21
69. Montgomery		10		3	13
70. Muscatine		4	1	3	8
71. O'Brien					0
72. Osceola		1			1
73. Page		2	1		3
74. Pale Alte		8	1		9
75. Plymouth		15	4	1	20
76. Pocahontas				1	1
77. Polk		28		1	29
78. Pottawattamie	1	83	9	24	117
79. Poweshiek		1			1
80. Ringgold		7			7
81. Sac	1	2		2	5

TABLE 2. (Con't.)

County	Cause				Total
	Dog	Traffic*	Illegal	Miscellaneous**	
82. Scott		5	2		7
83. Shelby		3	1	1	5
84. Sioux		18	1	3	22
85. Story		3	2	5	10
86. Tama		3		1	4
87. Taylor		1			1
88. Union		11		1	12
89. Van Buren		3	3	2	8
90. Wapello		5			5
91. Warren		23		1	24
92. Washington		1			1
93. Wayne		7	1		8
94. Webster		8	1		9
95. Winnebago		1			1
96. Winneshiek		23		2	25
97. Woodbury		24		4	28
98. Worth	7	4	1	2	14
99. Wright		9		2	11
TOTALS	14	726	79	120	939

* Includes auto, truck, and train-caused fatalities.

** Includes fatalities due to farm operations, wounding, unknown, etc..

TABLE 3. Reported deer deaths by month and cause, Iowa, 1962

Month	Cause				Monthly Total	Per Cent of Total
	Dog	Traffic	Illegal	Misc.		
January	1	17	4	3	25	2.6
February	1	27	6	1	35	3.7
March	7	49	1	1	58	6.1
April	0	59	0	0	59	6.2
May	1	64	1	5	71	7.5
June	1	38	0	17	56	5.9
July	0	21	0	2	23	2.4
August	0	21	0	4	25	2.6
September	2	55	1	5	63	6.7
October	0	75	7	8	90	9.5
November	0	200	28	17	245	26.0
December	1	85	15	17	118	12.5
Unknown	0	19	19	32	70	7.4
TOTAL	14	726	79	120	939	--
Pct. Annual Total	1.5	77.0	8.4	12.7	--	--

TABLE 4. Approximate times when deer-traffic accidents occurred, Iowa, 1962

Time	Number of Deer	Per Cent of Total
1:00 A.M.	22	3.6
2:00	21	3.4
3:00	16	2.6
4:00	17	2.8
5:00	18	3.0
6:00	38	6.2
7:00	21	3.4
8:00	12	2.0
9:00	9	1.5
10:00	6	1.0
11:00	11	1.8
12:00	4	0.7
1:00 P.M.	14	2.3
2:00	11	1.8
3:00	5	0.8
4:00	13	2.1
5:00	21	3.4
6:00	57	9.3
7:00	76	12.4
8:00	66	10.8
9:00	60	9.8
10:00	39	6.4
11:00	41	6.7
12:00	12	2.0

THE 40-ACRE METHOD OF ESTIMATING QUAIL POPULATIONS

M. E. Stempel
Game Biologist

Bobwhite quail are seldom seen in large numbers. Therefore, some population estimates must be based on the amount of potential range containing quail. This type of census is made during autumn when cover is less dense than in summer. Also, in autumn the young travel widely and they leave feathers, droppings, and other signs in many places. Thus, it is not necessary to find the birds to make sure that quail occupy a given "40".

By this method we learn that in 1956 and 1957 the use of selected areas was fairly high, it was higher yet in 1958, 1959 usage was fairly good and in 1960 the population was low. Recovery began in 1961, and it continued in 1962 but the increase was not shown in all steps of the census.

CENSUS

This census is based on utilization of statistically selected areas. These were first chosen from aerial photos. The places are classed as: (A) best, (B) good, (C) fair to poor. Data were obtained by officers and the biologist. One record was made for the farmers in charge of the land. Another was made by the checker. The checker wrote down whether or not he saw quail, dusting places, roosts, tracks, droppings or feathers, or if he heard quail. After completing the census the "40" was again rated according to its appearance. A more detailed explanation of the process is in the October - December 1960 Quarterly Biology Report.

RESULTS

General

There have been extreme variations in the fall quail populations since the census began in 1956. Numbers of areas checked from year to year also varied; the most being in 1956 when 77 were censused in 13 southern Iowa counties and the fewest in 1957 when 5 counties were censused. Data for the past 3 years, including that from officers, biologists and farmers, are in Table 1.

TABLE 1. Counties, areas and occupied areas, 1960, 1961, 1962

Year	No. of Counties	No. of Areas	No. of Occupied Areas
1960	10	57	25
1961	10	55	31
1962	8	42	17

Since a different number of areas was checked each year, the changes are represented by percentage figures. For the entire period, 1956 through 1962, officer and biologist reports combined indicated the average usage for all types of fields was 46 per cent. There was about 40 per cent utilization of all areas in the very poor year of 1960 followed by a slight increase in use in 1961, but an overall decrease to only 32 per cent in 1962. Nevertheless, from 1960 to 1962 while there was a decrease in occupied A-class fields, there was an increase of 15 per cent in occupied C-type fields.

In 1962 data were obtained in the following counties: Appanoose, Monroe, Jefferson, Union, Davis, Taylor, Wayne and Clarke. No quail were found in the latter two. Others are arranged in descending order as indicated by number of occupied areas.

The above section of general information may be summarized thus: 1. Percentage figures best represent changes. 2. Recovery was not uniform. 3. Gain was noticeable in B- and C- type 40-acre fields since 1960. 4. A-grade fields showed a decrease.

Officers and Biologist Checks

Two 40-acre fields of each of three categories (A, B, C) were assigned for each chosen county. A few classification changes were made necessary by agricultural disturbances. After these changes in 1961 there were 18 A-type fields, 20 B-type, 18 C-type. In 1962 there were 11 A-type. 12 B-type, 19 C-type.

Commission personnel found that in 1956, 53 per cent of places checked were occupied compared to 49 in 1961. The average since 1956 was 50 per cent. This was considerably under the highest recorded rate of 64 per cent in 1957 and 1958.

All areas in one class did not vary in the same manner; for instance, average occupancy of A- areas was 70 per cent since 1956, B- was 61 per cent and C- was 22. In contrast, the 1962 rate for the A-grade was 27, for B- it was 42 and for C- it was 16.

Highest rates for use in the three categories (A, B, C) were: for the A- group, 85 per cent use in 1958; for the B- 87 per cent in 1959; and for C-, 36 per cent in 1958. Opposed to these are the low figures which were: A-27 per cent in 1962, B- 42 in 1962, C-, 5 per cent in 1960.

For the above reports of commission personnel, a summary is: 1. Average occupancy rate was 50 per cent. 2. Greatest utilization was 58 per cent in 1958. 3. Lowest use was 5 per cent of C- areas in 1960. 4. In C-type areas the 1962 rate was higher than for 1961.

Farmers

Farmer observations indicated lower utilization rates than did those of officers. However, farmers reported only on quail seen, while officers and the biologists recorded both quail and quail sign. Average rate of occupancy of all classes of fields as indicated by farmers for the period since 1956 was 33 per cent. Lowest was 23 in 1960. In 1962 there was a gain in B- and in C-type areas.

In each of three area types, since 1956, the average rate of utilization was 45 per cent for A-grade cover (A- 40s); for B- 39; for C- 17. The 1962 rate for the A- was 25 per

cent; for B-, 36; for C-, 20.

Highest rate of occupancy reported for the A-class was 86 per cent in 1959; B- was highest in 1956 with 55 per cent; and the highest occupancy rate for C- was 22 per cent in 1958. Lowest per area record for A-class fields was 25 per cent in 1962; for B- it was 25 in 1960 and C- was only 5 per cent in 1960.

A summary of the above section is: 1. Farmers reported a lower rate of occupancy than did the officers. 2. Highest rate was 86 per cent for the A-grade 40s in 1959. 3. There was some 1962 gain in B- and C-grade fields.

DISCUSSION

The 40-acre method of estimating quail populations has been used during the past 7 years. Originally the counts were made early in the fall or in late summer, while recently they were made in October. This may influence the data gathering since there would be less vegetation in late October, thus more sign could be located in the more scanty fall cover. However, reports of commission personnel should always be comparable to reports of farmers since both are recorded at the same time each year.

The period 1958 through 1962 included a high, a low and a beginning of recovery. In this period the census was made during October. Officers found that 64 per cent of areas checked were occupied in the high population year of 1958; but this fell to 26 per cent in 1960. In A- or B-class 40-acre plots the officers reported a downward trend from 1960. Through 1962 only the C-type fields showed an increase.

Farmers indicated high populations in 1958 with 48 per cent of fields occupied; 23 per cent were used in 1960; 29 in 1962. Occupancy of A-types increased between 1956 and 1958; it decreased in 1960 and was down again in 1962. In the B-quality areas, the indicated population was up in 1959, down in 1960, but noticably higher in 1962. In C-type fields the use rate fell in 1959 and continued down in 1960; however, it was higher in 1962.

In October 1962 much rain fell in southern Iowa. Rains may have destroyed enough sign that some areas appeared to have no quail. In Monroe, Wapello and Davis Counties I checked many areas, and sign was scarce, though farmers and I did see quail.

A one sentence summary of this paper would be: Judging by results of this census, recovery in the 1962 quail population is most noticable in low-grade cover.

PROGRESS REPORT - RUFFED GROUSE STUDIES, 1962

Eugene D. Klonglan
Game Biologist

In 1961 a cooperative project was begun by the Biology and Game Sections to learn more about the status of the ruffed grouse in Iowa. Little detailed data are available from earlier years, only general information on the main occupied range of the species. Little was known about the exact range and present density of the population, and it may be true that this species could support a limited hunting season.

The first step in this investigation is to determine the present density and range of the ruffed grouse in the state. The primary method used to accomplish this is the spring roadside drumming count. A few exploratory counts had been made in northeastern Iowa in 1956 and 1960, and more intensive censuses were initiated in 1961 (see April - June 1961 Quarterly Biology Reports for detailed data on the results of these counts). Fifteen routes were run in portions of six counties in the spring of 1961.

The number of routes was reduced to ten in 1962 (Table 1). Nine of these were repeats from 1961 and one was new. A mean of 1.5 drums per stop was heard on the 135 stops on the ten routes (Table 1). The 125 stops on the nine routes run in both 1961 and 1962 indicated a 15 per cent increase in the total number of drums heard per stop, 1.5 in 1962 vs. 1.3 in 1961 (Table 2). However, a comparison of the number of individual birds heard drumming indicated only a 9 per cent increase (1.2 vs. 1.1). This difference may have occurred because three of the routes were run by different personnel in 1962, and differences in interpretation of drums heard could easily occur. A large share of the increase in both individual birds and total drums can be attributed to the Village Creek Route, and this was believed to be due primarily to the change in observer in 1962. The general picture of the ruffed grouse population status in the spring of 1962 appears to show a trend toward a slight increase, though not a significant one. It appears that the grouse population in northeastern Iowa is holding its own at the present time.

The second phase of the ruffed grouse study involves the possible expansion of the range of the species in Iowa, where it once was found in almost all counties except perhaps in the northwestern corner. At the present time there appear to be at least two areas in the state with considerable potential for re-establishment of grouse. These are the Shimek State Forest in Lee and Van Buren Counties in southeastern Iowa and the Stephens State Forest in Lucas and Monroe Counties in south central Iowa. Both contain about 4000 acres under state control and are surrounded by considerable forested area on private lands. The trend toward clearing of timber and heavy pasturing of woodlands has been arrested on the state lands and to some extent on private lands - especially around the Shimek Forest where many Tree Farms have been set up for pulpwood production. Reforestation programs on the state lands should continue to improve the habitat for grouse.

A preliminary attempt to trap and transplant grouse to Shimek Forest was made in the fall of 1962 by the Game Section. Seven grouse, three males and four females, were trapped in Allamakee County and successfully released in Shimek. Ten grouse were trapped, but three were lost before release could be accomplished. It is intended to enter a full-time trapping program in the coming year, and it is hoped at least 50 grouse can be stocked in

TABLE 1. Results of 1962 spring ruffed grouse drumming counts in three northeastern Iowa counties

County	Part	Route	Date	No. of stops	Individual birds drumming	Total drums heard	Total drums heard per stop
Allamakee	SE	Yellow River State Forest*	May 2	15	34	52	3.5
"	C	Village Creek	May 3	13	25	30	2.3
"	E	Harpers Ferry-Wexford*	May 2	15	29	30	2.0
"	N	Upper Iowa River	May 3	15	22	30	2.0
"	NE	North of Lansing	May 7	9	11	12	1.3
		Totals -		67	121	154	2.3
Winneshiek	NE	Highlandville-North Bear	May 3	14	23	25	1.8
"	SE	Frankville-Yellow River	May 15	14	2	3	0.2
"	NW	Bluffton-Upper Iowa River	May 4	15	1	1	0.1
		Totals -		43	26	29	0.7
Clayton	NE	Sny Magill-Bierbaum	May 2	15	6	9	0.6
"	NE	Bloody Run (new route)	May 4	10	9	10	1.0
		Totals -		25	15	19	0.8
Grand Totals		Ten Routes		135	162	201	1.5

* Slightly revised from 1961 - include some stops from Paint Creek and Luster Heights routes of 1961; thus figures are not directly comparable to table in April - June 1961 Quarterly.

TABLE 2. Comparison of 1962 spring ruffed grouse drumming counts with 1961 counts on same route

Route	No. of stops	Individual birds heard drumming		Total drums heard		Total drums per stop	
		1962	1961	1962	1961	1962	1961
Allamakee County							
Yellow River State Forest*	15	34	29	52	36	3.5	2.4
Village Creek	13	25	6	30	6	2.3	0.5
Harpers Ferry-Wexford*	15	29	24	30	26	2.0	1.7
Upper Iowa River	15	22	22	30	24	2.0	1.6
North of Lansing	9	11	14	12	14	1.3	1.6
Totals -	67	121	95	154	106	2.3	1.6
Winneshiek County							
Highlandville-North Bear	14	23	36	25	40	1.8	2.9
Frankville-Yellow River	14	2	5	3	6	0.2	0.4
Bluffton-Upper Iowa River	15	1	0	1	0	0.1	0.0
Totals -	43	26	41	29	46	0.7	1.1
Clayton County							
Sny Magill-Bierbaum	15	6	5	9	5	0.6	0.3
Grand Totals -	125	153	141	191	157	1.5	1.3

* Slightly revised from 1961 - include some stops from Paint Creek and Luster Heights routes of 1961; thus figures are not directly comparable to same route in table in April - June 1961 Quarterly.

each of the two forests.

The third aspect of the project is concerned with evaluating the harvest potential of ruffed grouse in northeastern Iowa. The drumming counts indicate a population density that compares favorably with those found in many other states where hunting is allowed. The rugged terrain of northeastern Iowa grouse range would certainly be to the bird's advantage, since it should make hunting them relatively difficult in most places. Thus it seems certain that a limited hunting season to remove some of the annual surplus of birds produced would not harm the species. This fall it is intended to make several flushing counts, or "simulated hunts", in typical grouse range. This should give us some idea of what hunters could expect during an open season.

SUMMARY

1. A mean of 1.5 drums per stop was heard on 135 stops on ten routes during the 1962 spring ruffed grouse roadside drumming survey in northeastern Iowa.

2. A slight, though probably not significant, increase was indicated over the 1961 drumming counts.

3. Seven grouse, three males and four females, were trapped in Allamakee County and released in Shimek State Forest in southeastern Iowa. Plans have been made for a more extensive trapping program next year.

4. An evaluation of the harvest potential of ruffed grouse in Iowa is being made.

NOTES ON WINTER PHEASANT COVER IN IOWA

Richard C. Nomsen
Game Biologist

One of the basic requirements for the welfare of Iowa's ringneck pheasant population is adequate winter cover. Pheasants need a windbreak during severe winter weather to protect them from strong winds and blowing snow. Modern mechanized farming usually strips the fields bare of winter cover. In most areas of the primary pheasant range, farmstead windbreaks offer the only available winter cover.

The quality and distribution of this primary cover type has declined rapidly. As the average size of Iowa farms increases, the number of possible winter cover areas decreases. The average number of farmsteads in 1937-1946 was 209,360 -- in 1962, there were less than 180,000 reported by the Iowa Department of Agriculture. This trend will most likely continue.

The quality of most remaining windbreaks has also declined. The large farm groves are no longer needed for firewood, so are removed as they mature. Many others are being thinned so that they offer no protection from the sub-zero winds and blowing snow.

A preliminary survey of the distribution and quality of farm windbreaks was conducted last winter in north central Iowa. Areas sampled were King Township, Winnebago County; Orthel Township, Hancock County and Blairsburg Township, Hamilton County. Blocked roads prevented the survey in Lake Township, Wright County. One-fourth of the farmsteads were checked in each township with the assistance of Conservation Officers Wilfrid Macheak, Jack Edwards and Duane Wilson.

There was an obvious decrease in the quality of windbreaks south of Hancock County and a corresponding decrease in the number of pheasants counted (Table 1).

TABLE 1. Pheasants checked in windbreaks - north central Iowa, 1962

	King Township Winnebago	Orthel Township Hancock	Blairsburg Township Hamilton
Number of windbreaks	30	24	21
Number of windbreaks that sheltered pheasants	10 (33%)	14 (58%)	3 (14%)
Number of pheasants	265	471	25

Acreages of farm crops were very similar in each county (Table 2). Therefore, the nesting cover should be similar in each area sampled. Land on each area was flat or very gently rolling and intensively cultivated.

Previous work has indicated that adequate ground cover is necessary to attract and protect pheasants during severe winter weather. Each windbreak was rated as having good, medium, or light ground cover (Table 3). Of all windbreaks checked, only 16 per cent

were rated as having good ground cover and these 12 windbreaks contained two-thirds of the total birds checked. Groves with medium ground cover protected 22 per cent of the pheasants while those with light cover held only 11 per cent.

TABLE 2. Per cent of land in various crops - north central Iowa

County	Row Crops Corn and Beans	Hay	Oats	Pasture
Winnebago	54%	9%	15%	10%
Hancock	53%	9%	16%	11%
Hamilton	56%	8%	17%	10%

TABLE 3. Density of ground cover in farm windbreaks

Township	County	Density of ground cover		
		Good	Medium	Light
King	Winnebago	3	6	21
Orthel	Hancock	9	7	8
Blairsburg	Hamilton	0	2	19
	TOTALS	12	15	48
		(11 occupied)	(10 occupied)	(6 occupied)

If we are to encourage the planting and improvement of farm windbreaks, we must have more information on the relationship between windbreaks and pheasant populations. Densities of existing windbreaks could be checked to help determine which species of trees or shrubs are best suited for safe winter cover. One important factor appears to be the density of ground cover.

The distribution of winter cover areas also should be studied to learn more about how large a territory can be supplied with adequate breeding stock from a single area. In other words, how far can birds be expected to disperse from winter cover. Henry Weston, Jr. (1950) found that, with few exceptions, marked pheasants dispersed no more than 4.5 to 5 miles from Birge and Grass Lake Game Areas in northwest Iowa. The mean distance travelled by birds during the peak of dispersal in April was about 1 mile. It appeared from his results that birds were distributed uniformly and in sufficient numbers within a radius of 1 mile. However, birds thinned out rapidly beyond that distance. For example, starting with a population of 100 hens in the winter cover, the population within the zone between 1 mile and 1.5 miles would be one hen per 180 acres.

[2]

C. R. Grondahl (1953) found that the mean distance travelled by birds on the Winnebago research area during the peak of dispersal was 0.58 miles. A summary of all his observations showed that 86 per cent of all records of marked birds were taken within 0.75 miles of the place where marked.

LITERATURE CITED

Weston Jr., Henry G.

1950. Spring movements of the ringnecked pheasants in northern Iowa. Twelfth Midwest Wildlife Conference, Columbus, Ohio.

Grondahl, C. R.

1953. Winter behavior of the ringnecked pheasant, as related to winter cover in Winnebago County, Iowa. Iowa State College Journal of Science, Vol. 27, No. 4, July, 1953.

A PRELIMINARY REPORT ON WEATHER INFLUENCES AFFECTING SUMMER ROADSIDE RABBIT ACTIVITY

Paul D. Kline
Game Biologist

INTRODUCTION

Roadside surveys of cottontail populations have been used by various state agencies and researchers throughout the eastern half of the United States during the past 15 years. The method has sometimes succeeded; and if not, oftentimes discarded as another unreliable method of census. Admittedly, the technique as an indicator of rabbit populations oftentimes fails. These failures may be due to improper understanding of cottontail habits, the necessity for using inefficient or disinterested personnel, and a failure to understand effects of climatic factors on cottontail roadside activity. This paper will discuss partial evaluation of a study of weather influences on summer roadside activity of cottontails.

This line of study has been pursued previously by (Voris, John C., 1956 . Factors influencing the summer roadside count of the cottontail rabbit (Sylvilagus floridanus mearnsi) in south-central Iowa. M. S. Thesis, Iowa State Univ. Library, Ames, Iowa). Voris analyzed statistically a mass of data he gathered during two summers work in southern Iowa. According to his conclusions wind was the only weather factor that consistently affected cottontail roadside activity, and it acted as a deterrent - fewer rabbits were seen during periods of high winds. He also stated, "Nebulosity had consistent partial correlation coefficients and thus may have had a greater association (with numbers of rabbits observed) than dew or barometric pressure". Although his data analysis did not prove him right, Voris stated his belief that dew fall was a controlling factor. This seems to the present writer a prejudicial statement.

METHODS

For the present study a survey route 30 miles long, on gravelled roads , was set up in Benton County. In all respects the route was similar to most of those in use for the regular statewide July roadside censuses. This route was travelled during early morning hours starting 1/2 hour before sunrise at a speed of 20 m. p. h. , 1 1/2 hours being required to complete the route. Time of start was changed to sunrise during the last summer of study. Surveys were conducted as often as possible, at least eight times monthly starting in February 1957 and continuing for 1 year. Often the first year most of the effort was expended only during those months when rabbits were seen in greatest abundance. The route was run in opposite directions during alternate surveys; this was to demonstrate differences in observations due to time and varying rabbit populations along the route if they existed.

Temperatures 12 hours previous and at completion, wind velocity and direction at beginning and end, relative humidity, barometric pressure 12 hours previous and at beginning and end, dew fall, light intensity, rainfall, and moon phase all were recorded for every survey. Nebulosity was estimated at the completion of each survey. Dew fall records were

discontinued after the first summer because it became obvious dew reading varied considerably along the route during any one survey and because of technical difficulties in securing trustworthy measures.

Over a 2 1/2-year period, from February 1957 to August 1959, the route was surveyed 180 times. Data from fifty-two completed during June and July are presented in this paper.

RESULTS

During the first year of study it became apparent there existed considerable variation in numbers of cottontails seen during different seasons (Table 1). These variations could be separated into two periods of high numbers, winter and summer, and two periods of low numbers, spring and fall. More cottontails were observed during June and July than during all other months, with July giving the peak.

Numbers of rabbits seen during spring and fall months, specifically April, May, August, September, and October were so low that it was deemed advisable to eliminate these months from consideration. Data collected during them was not considered nor evaluated. Also, it seemed differences in weather influences existed between winter and summer on roadside rabbit activity. Data from these seasons has been analyzed separately and the winter data will be presented in a separate paper.

Correlation coefficients between numbers of rabbits seen and the various recorded weather factors were computed and are presented in Table 2. Strong correlations were found between rabbits seen and average wind velocity, cloudiness (nebulosity), light intensity, and change in temperature from 12 hours previous to the time each survey was run. These correlations were all significant at the .01 level. The influence of wind and nebulosity each was to decrease numbers of rabbits seen as indicated by the negative correlation sign. Increased light intensity and notable declines of temperature overnight each increased numbers of rabbits observed. Voris (op. cit.) apparently failed to record the overnight temperature drop.

Relationships between numbers of rabbits seen and barometric pressure changes, temperature at time of survey, relative humidity, and moon phase were not statistically significant.

DISCUSSION AND SUMMARY

From a practical standpoint it is necessary to reduce the findings of this study to the simplest terms. Their application to our annual, statewide roadside survey is, after all, the principal justification for the considerable effort in completing this investigation.

Data presented herein indicate cloudiness and wind velocity are the controlling weather factors and should be considered when summer roadside surveys of cottontails are conducted. The R^2 values from Table 2 for these two factors would indicate 43.1 per cent of the variation in numbers of cottontails seen along the road early on summer mornings is due to these two factors.

TABLE 1. Rabbits observed by month for all surveys

Month	Number of Routes	Number of Rabbits	Average Number Rabbits/ Route
January	14	81	5.79
February	19	119	6.26
March	18	46	2.56
April	11	16	1.45
May	10	26	2.60
June	24	184	7.67
July	28	303	10.82
August	13	38	2.92
September	10	1	0.10
October	9	2	0.22
November	9	8	0.89
December	15	41	2.73
Totals	180	865	4.81

TABLE 2. Correlation coefficients between number of rabbits seen and various weather factors

Weather Factor	Correlation Coefficient (r)	R^2
Average Wind Velocity	-0.448	0.201
Temperature Change from 12 Hours Previous	0.478	0.228
Nebulosity	-0.480	0.230
Barometric Pressure Change from 12 Hours Previous	0.169	0.029
Light Intensity	0.476	0.226
Temperature at End of Route	-0.171	0.029
Relative Humidity	-0.125	0.016
Moon Phase	-0.085	0.007

For significance: .05 level = 0.273, .01 level = 0.354

Since light intensity, one of the other significant factors, is controlled largely by cloudiness, it can be eliminated from consideration, provided cloudiness is considered. True, incident light can be measured more accurately than can cloudiness be estimated. But cost of providing adequate instruments for light measurement make estimates of cloudiness more practical.

The temperature differentiation between time of survey and 12 hours previous can be eliminated also, but for a somewhat different reason. Cloudiness and wind both control radiation which in turn determines the relative drop in temperature overnight. On cloudy nights loss of heat through radiation from the earth's surface is minimized and comparatively little cooling results. Conversely, on clear nights, especially if wind is negligible, cooling is relatively greater.

Dew fall is a result of condensation of moisture from the atmosphere due to falling temperatures overnight. The amount of dew fall depends on the amount of moisture in the atmosphere in the form of water vapor and on the rate or amount of temperature decline. Since the rate of temperature drop overnight is controlled by radiation which in turn is controlled by cloudiness and wind it is easy to understand the confusion which has arisen in the past concerning the effect of dew fall on morning roadside activity. It has already been indicated that cottontails are seen in greatest abundance on mornings followed clear, calm nights. Such morning should also have relatively heavy dew fall, and for similar reasons.

The writer is tempted to speculate on why rabbits are active along roads following nights when rapid cooling occurs. Since most dry exposed surfaces (exposed to direct sunlight) are warmed to a greater extent than are damp and protected surfaces, it follows that roads would be warmer following a day of sunshine than the surrounding terrestrial surfaces protected by vegetation. This condition would remain overnight. During the early morning peak of rabbit activity, cottontails would prefer the warmer road surfaces for their various activities than relatively cooler surrounding surfaces. This I believe is the crux of the whole problem. Wind probably serves as a brake on activity itself. Rabbit activity probably declines relative to wind velocity and their exposure to it. Wind would, also, tend to minimize the difference in temperature between road surface and surfaces protected by vegetation. Which influence has greatest importance would be difficult to assess.

With the foregoing facts and assumptions in mind, it is possible to lay down criteria which apply directly to July roadside counts: 1st, it is important that the sun shine most of the day preceding so as to create the temperature differential between roads and surrounding terrestrial surfaces; rain would not be permitted unless during early morning of the preceding day followed by clearing skies; 2nd, the night preceding must be clear and calm so as to permit maximum cooling; and 3rd, the counts should be conducted only during mornings when wind velocity is negligible, preferably less than 8 m. p. h..

I believe further study of weather influence of rabbit activity on roadsides is not needed, provided the present data is completely analyzed, evaluated, and published.

MUSKRAT POPULATION INCREASES IN NORTHWEST IOWA 1959-63

James G. Sieh
Game Biologist

The rapid return of muskrats within the food-rich marshes of northwestern Iowa is illustrated by a study within the Jemmerson Slough complex in Dickinson County, Iowa. The small "Northeast Marsh" of approximately 25 acres has been checked repeatedly during the past 5 years to evaluate ecological changes following complete dryness and re-inundation of the marsh. Prior to the drought of the middle fifties, this small area contained a few scattered stands of emergent plants out in the water and a dense peripheral band of emergents around the shoreline. The muskrat population was very low. During the drought the marsh dried up completely, and a dense stand of cat-tails developed throughout the entire area. The area was checked intensively for muskrats during the dry period and not a single animal was found.

Muskrat activity was again noted in the spring of 1960 when a very little water returned within the dense cat-tail marsh. In the fall of 1960 approximately five muskrat houses plus attending feeders were counted, indicating a population of about 25 muskrats. No visible trapping pressure was exerted on these animals during the fall of 1960, probably because existing rat houses were hidden in the cat-tails and populations of rats and water levels were both too low for good trapping. The following autumn this muskrat population had increased to approximately 125 animals or more as indicated by some 25 houses, additional feeders, and band runs. Some of these animals were removed from the area during the trapping season of 1961. It was estimated there were approximately 100 breeding muskrats in the spring of 1961, and possibly more. By the fall of 1961 the marsh contained 125 muskrat houses, many feeders, and numerous rat runs indicating a minimum population of 500-600 muskrats. Almost all of the cat-tail had been cut from the open water areas. Thus in 3 years we observed a rapid increase of muskrats within this Northeast Marsh (Table 1) and the removal of most of the cat-tail for house building and food purposes. We are witnessing a prolific species literally eating themselves out of house and home.

Approximately 50-60 per cent of the fall population of muskrats have been taken by trappers from this area so far this season (Jan. 10, 1963). Under-ice trapping is still removing approximately 3-5 animals per day, and it is possible but doubtful if another 20-30 per cent of the fall population can be removed by the close of the trapping season on February 28, 1963. Since many of the active houses in shallow water cannot be trapped effectively under ice, and since no bank runs have been trapped since ice cover developed, the remaining breeding stock in 1963 will probably be well in excess of the 1962 breeding population which effectively repopulated the area. It is possible that too many breeders will survive and their offspring seriously damage the remaining stands of emergent vegetation upon which the muskrat population depends. Since the cat-tail marsh already shows signs of "eat-out" coupled with some water already too deep for optimum cat-tail production, additional trapping pressure is desirable.

Protection of marsh habitat is the first responsibility in marsh management. In that this small area reflects similar muskrat problems in many state-owned marshes in 1963, some serious consideration should be given to the removal of additional muskrats from such problem areas if practicable. One approach might be a late season trapping by opening

muskrat houses as permitted under section 109.90 of the Iowa Code by special permission of the Conservation Officers.

TABLE 1. Number of muskrat houses and estimated population increase in a small marsh in Dickinson County, Iowa, 1959-63

Year	No. Houses	No. Feeders	Estimated Population
1959-60	None	None	None
1960-61	5	Several	20-25
1961-62	25	10-15	100-125
1962-63	125	Many	500-625

RESULTS OF A VOLUNTARY CREEL CENSUS ON SOME NORTHEAST IOWA RIVERS IN 1962

Roger Schoumacher
Fisheries Biologist

Creel census data are extremely valuable to the fishery manager for evaluating a given resource, but the collection of reliable data is difficult because of the many statistical problems encountered and the usual lack of finances to conduct such investigations. Since personnel are not available to adequately census the rivers of northeast Iowa on any type of statistical basis it is necessary to resort to some type of voluntary census on the part of the anglers if any appreciable amount of data is to be gathered. The decision was made to follow a system used by Cleary (unpublished) on northeast Iowa rivers from 1950-1956.

Conservations Officers in the various counties were asked to furnish a list of 6-10 "better-than-average" fishermen whom they had contacted and who had agreed to keep a record of their angling activities. These contacts were sent a letter (Figure 1) explaining the reporting technique, as well as five post-card "report forms" (Figure 2). A record was kept on 3 x 5 cards at the biology station of each contact, and as reports were returned a new supply was sent to him. The census covered the entire open-water fishing period - March through December - but did not include any fishing on the trout streams or the Mississippi River, as Cleary's work did.

A total of 203 names was given us - 186 by Officers and 17 from miscellaneous sources. Of these, 108, or 53 per cent, responded by returning at least one card. This return of 53 per cent is identical with the returned experienced by Cleary over a 6-year period (Table 1). The 108 respondents surpass his high figures of 102 in 1952 and 1953. Since this is the first year of the new voluntary census, I expect to build up a much bigger mailing list in subsequent years, with fuller coverage of the rivers.

The 108 fishermen reported a total of 1,109 trips and 3,688 hours of fishing, an average of 3.3 hours per trip and 10.3 trips per angler (Table 1). Compared to figures from Cleary's work the hours of fishing are lower than in all but 1-year, the average number of trips per angler is lower than in any year, and the average length of the 1962 fishing trip of 3.3 hours compares with the 7-year average of 3.0 hours. It should be noted that an exceptionally wet spring kept the rivers high during much of the early part of the fishing year, and probably cut down on the number of trips that the anglers took. Also, Cleary had 7 years to compile a list of contacts and he seems to have gotten more avid fishermen each year, as the average number of trips per angler increased each year from 15.7 in 1950 to 36.0 in 1956.

In 1962, 74 per cent of the fishing trips were successful - at least one fish was caught. This compares with an average of 80 per cent successful trips over the 7-year period that Cleary collected data.

The number of contacts on the three largest rivers in the area - the Iowa, Cedar, and Wapsipinicon - was about equal, and the Shellrock River received about half as much coverage. The Maquoketa, Turkey, Upper Iowa, Volga, Yellow, Winnebago, and Little Cedar Rivers were not reported on enough to justify an intensive interpretation of the data.

FIGURE 1. Letter sent to creel census contacts.

IOWA CONSERVATION COMMISSION
Biology Station
Box 406
Independence, Iowa

February 22, 1962

Dear _____:

The Conservation Officer in your area informed me that you are willing to cooperate with me on a voluntary creel census on some of the major rivers in northeastern Iowa (Upper Iowa, Yellow, Turkey, Wapsie, Cedar, Shellrock, Iowa, Volga, Maquoketa, NOT Mississippi or trout streams). As the biologist in charge of investigations on these rivers I am interested in the harvest of our river fish. This information will act as a guide to future river management, as well as a check against our river surveys, upon which we base our recommendations for regulations, stocking, etc.

Enclosed are five (5) post-card "report forms" for your use. There is space on each card for five fishing trips. Each time you go fishing fill in a space and when the card is full, drop it in the nearest mail-box. I will keep track of the number of cards that you send me, and keep you supplied, should you need additional forms in the future.

Here are two examples of how to fill out a form:

Date	No. Hrs. Fished	River and Location Fished	Number, size, and kind of fish caught
May 1	4	Cedar River (Cedar Rapids)	6 catfish, 12-15" 4 crappie, 6-10" 1 catfish, 30"
May 5	4	Cedar River (Vinton)	No fish caught

Please note that unusually large fish are listed separately. One of the most important things to remember is to list all of your fishing trips, EVEN IF YOU DIDN'T CATCH ANY FISH (as in above example). Also, just report your fishing, and not that of any other fishermen in your party.

If, at any time, you have questions to ask me, please feel free to drop me a line. I appreciate your interest and cooperation in this investigation and will be looking forward to receiving your reports in the coming months. Good Fishing!

Sincerely yours,
Roger Schoumacher
Roger Schoumacher
Fisheries Biologist

RS/lf

Name _____ Address _____

Date	No. Hrs. Fished	River and Location Fished	Number, Size, and Kind of Fish Caught

FIGURE 2. Post-card "report form" used in the voluntary census.

TABLE 1. Number of contacts, respondents, and other information for the voluntary creel census conducted by Cleary from 1950 - 1956

Year	No. of Contacts	No. of Respondents	Per Cent Responding	No. Trips	Avg. No. Trips	Per Cent Successful Trips	No. Hours	Avg. Hrs. Per Trip
1950	163	89	55	1395	15.7	82	4745	3.4
1951	230	100	44	1955	19.5	77	5996	3.1
1952	235	102	43	2465	24.0	78	7968	3.2
1953	204	102	50	3089	30.3	82	9405	3.0
1954	111	77	69	2533	33.0	78	6849	2.7
1955	114	52	46	1785	34.0	81	5056	2.8
1956	--	35	--	1264	36.0	84	3313	2.6
Totals	1057	557	53	14486	24.5	80	43332	3.0

Table 2 gives the basic information as to the number of trips, hours fished, per cent successful trips, number of fish caught by species, and per cent composition of the catch for the four rivers under discussion. In order to compare this year's data with those collected by Cleary it was necessary to tabulate the catch in fish per hour for each species. This was done by inspecting the catch for each fishing trip. If the catch consisted exclusively, or primarily, of one species - catfish, for instance - it was assumed that the angler was fishing for that species. If it was not possible to tell what the angler was fishing for from his creel - for instance, if he caught one catfish, two crappie, and one bass - the data for the trip were recorded under the heading "mixed bag". When no fish were caught, the species sought by the angler were determined by the species he fished for on other trips on which he was successful. Therefore, all figures of catch per hour for a particular species of fish reported in this paper represent the catch per hour for the species by fishermen who were fishing for that particular species. This information, as well as the per cent of time spent fishing for each species, is reported in Table 3.

Wapsipinicon River

On 277 fishing trips and 1,132 hours of fishing, anglers reported a catch of 1,139 fish for a catch rate of just over one fish per hour (Table 2). Crappies and catfish together comprised nearly 80 per cent of the catch. Crappies were caught at the rate of 3.07 per hour by crappie fishermen, whereas catfish were caught at the rate of 0.68 per hour (Table 3). Compared to the 1950-1956 period, this is excellent crappie fishing and about average catfishing (Table 4). Bass were caught at the rate of 1.50 fish per hour and accounted for 4 per cent of the total catch. Bullheads were caught at the rate of 2.57 per hour and accounted for 9 per cent of the catch. Sixty-five per cent of the fishing trips were directed towards catfish, 9 per cent towards crappies, 5 per cent towards bullheads, and 4 per cent towards bass. Seventy-seven per cent of the fishing trips were successful (at least one fish caught).

Iowa River

Three hundred fifteen trips and 811 hours produced 826 fish for a catch rate of 1.02 fish per hour (Table 2). This was considerably higher than figures reported for the 1950-1956 period, in which the highest catch per hour was 0.85 and the average was closer to 0.55 (Table 5). Sixty-six per cent of the trips were successful. The catch included 32 per cent bullheads, 29 per cent catfish, and 26 per cent carp. Catfishing was about average, and bass fishing was relatively poor. Twenty-eight of the 31 bass taken in the Iowa River were taken in the Alden and Iowa Falls area which was rotenoned in September, 1960.

Forty-three per cent of the fishing trips were directed towards catfish, 13 per cent towards carp, 10 per cent towards bass, and 9 per cent towards bullheads (Table 3).

Cedar River

Two hundred ninety-four trips, of which 76 per cent were successful, and 894 hours of angling on the Cedar River resulted in a catch of 839 fish at the rate of 0.94 fish per hour (Table 2). This is about average, perhaps tending to be a little above average, as compared with data from 1950-1956 (Table 6). The catch consisted of 54 per cent channel cat, 20 per cent crappies, 9 per cent white bass, and 7 per cent each of bass and carp. Fishing effort was 79 per cent catfish, 6 per cent crappies, 4 per cent white bass, and 2 per cent each bass and

TABLE 2. Creel census information on the Iowa, Cedar, Wapsipinicon, and Shellrock Rivers from the 1962 voluntary census. (Figures in parentheses are the per cent of the total number of fish caught in each river that each species represents.)

River	No. trips	Per cent successful trips	Hrs. fished	Fish per hour	Total fish caught	Bluegill	Crappie	Bass	White Bass	Walleye	Northern	Ch. Cat	Flat. Cat	Bullhead	Carp	Drum	Suckers	Perch	Misc.
Wapsie	270	77	1,132	1.01	1,139	4 (tr)	282 (25)	52 (4)	0	2 (tr)	5 (tr)	617 (54)	1 (tr)	99 (9)	66 (6)	0	5 (tr)	4 (tr)	2-dogfish (tr)
Iowa	315	66	811	1.02	826	5 (tr)	2 (tr)	31 (4)	4 (tr)	21 (2)	3 (tr)	243 (29)	3 (tr)	266 (32)	214 (26)	0	7 (1)	0	27-chubs (3)
Cedar	294	76	894	0.94	839	0	171 (20)	57 (7)	79 (9)	3 (tr)	0	452 (54)	3 (tr)	9 (1)	59 (7)	1 (tr)	2 (tr)	1 (tr)	1-shad, 1-gar (tr)
Shellrock	83	84	482	0.58	278	0	0	9 (3)	0	2 (tr)	0	266 (96)	0	0	1 (tr)	0	0	0	0
Totals		74	3,319	0.93	3,082	9 (tr)	455 (15)	149 (5)	83 (3)	28 (1)	8 (tr)	1578 (51)	7 (tr)	374 (12)	340 (11)	1 (tr)	14 (tr)	5 (tr)	2-dogfish 1-shad (tr) 1-gar 27-chubs (1)

TABLE 3. Fish per hour catch for various species of fish for which anglers were fishing specifically. (Numbers in parentheses represent the per cent of fishermen who were fishing for each of the various species).

River	Fish per hour										
	All Spp.	Blue-gill	Ch. cat	White bass	Wall-eye	Carp	Bass	Crappie	N. Pike	Bull-head	Mixed bag
Wapsie	1.01	--	0.68 (65)	--	1.00 (1)	1.54 (2)	1.50 (4)	3.07 (9)	0.29 (3)	2.57 (5)	1.11 (11)
Iowa	1.02	1.00 (1)	0.56 (43)	--	0.55 (4)	1.53 (13)	0.37 (10)	0.67 (1)	0.27 (2)	3.93 (9)	1.17 (17)
Cedar	0.94	--	0.60 (79)	2.47 (4)	1.00 (tr)	2.22 (2)	2.65 (2)	2.63 (6)	--	0.90 (tr)	0.84 (6)
Shellrock	0.58	--	0.56 (88)	--	0.29 (2)	0.25 (1)	0.60 (5)	--	--	--	2.17 (4)

TABLE 4. Comparison of fish per hour catch rates for various species of fish from 1950 - 1956 and 1962 in the Wapsipinicon River, Iowa

Year	Avg.	Catfish	Carp	Bass	Crappie	Walleye	Northern	Bullhead	Bluegill	Mixed bag
1950	0.89	0.61	--	0.18*	3.25	--	0.90	--	0.50	1.61
1951	0.47	0.36	--	0.32*	1.43	--	0.69	--	--	0.98
1952	0.72	0.66	--	0.25** 0.41*	1.38	0.35	0.48	--	--	1.14
1953	0.68	0.60	--	0.62*	1.20	0.47	0.31	--	--	1.29
1954	0.75	0.60	--	0.50*	2.20	0.30	0.21	--	--	1.03
1955	1.20	0.79	--	1.30*	2.08	0.22	0.09	--	--	1.62
1956	1.39	1.42	--	1.00*	--	--	--	--	1.20	1.50
1962	1.01	0.68	1.54	1.50***	3.07	1.00	0.29	2.57	--	1.11

* smallmouth bass only
** largemouth bass only
*** largemouth and smallmouth bass combined

TABLE 5. Comparison of fish per hour catch rates for various species of fish from 1950 - 1956 and 1962 in the Iowa River, Iowa

Year	Avg.	Catfish	Carp	Bass	Crappie	Walleye	Northern	Bullhead	Bluegill	Mixed bag
1950	0.39	0.45	--	0.69*	--	0.25	--	--	0.39	0.13
1951	0.54	0.36	--	0.08*	3.53	--	--	--	--	1.71
1952	0.48	0.47	--	0.49*	2.00	--	0.57	--	--	0.82
1953	0.55	0.56	--	0.77*	0.07	0.10	0.52	--	--	0.90
1954	0.63	0.68	--	1.46*	0.59	0.13	0.24	--	--	0.57
1955	0.63	0.71	--	0.60*	--	0.07	0.44	--	--	0.63
1956	0.85	0.69	--	1.97*	--	--	--	--	--	1.21
1962	1.02	0.56	1.53	0.37**	0.67	0.55	0.27	3.93	1.00	1.17

* smallmouth bass only
** largemouth and smallmouth bass combined

TABLE 6. Comparisons of fish per hour catch rates for various species of fish from 1950 - 1956 and 1962 in the Cedar River, Iowa

Year	Avg.	Catfish	Carp	Bass	Crappie	Walleye	Northern	Bullhead	White Bass	Bluegill	Mixed bag
1950	0.69	0.53	--	0.62* 0.57**	1.17	1.20	0.19	--	--	--	0.83
1951	0.65	0.64	--	0.53* 0.54**	1.22	0.58	0.58	--	--	--	0.73
1952	0.65	0.60	--	0.47* 0.33**	1.79	0.61	0.46	--	--	--	0.74
1953	0.99	0.69	--	0.72* 0.63**	3.64	0.56	0.48	--	--	2.09	1.54
1954	1.09	0.64	--	0.71* 0.34**	2.92	0.44	0.36	--	--	--	1.21
1955	1.07	0.73	--	0.66* 0.67**	2.62	0.61	--	--	--	0.66	1.46
1956	1.18	0.97	--	0.57* 0.73**	2.05	0.93	--	--	--	2.00	1.59
1962	0.94	0.60	2.22	2.65***	2.63	1.00	--	0.90	2.47	--	0.84

* smallmouth bass only
** largemouth bass only
*** smallmouth and largemouth bass combined

carp (Table 3). Catfishing was about average, or perhaps a bit below; crappie and white bass fishing was very good; bass fishing was excellent, especially in the Osage, Waterloo, and Vinton areas, although there isn't a great deal of data on the bass fishing.

Shellrock River

Eighty-three trips, 84 per cent of which were successful, and 482 hours of fishing produced 278 fish for an average catch of 0.58 fish per hour (Table 2). Catfish received 88 per cent of the pressure, made up 96 per cent of the catch, and were caught at the rate of 0.56 per hour (Table 3). The fishing was somewhat below average in the Shellrock River (Table 7).

Comparison of Voluntary Data with Officer Contact Data

Officer contact data are not available as yet for the 1962 fishing season; however, a comparison of the voluntary data reported in this paper with the officer contact data for 1960 and 1961 shows, at least for the Wapsie, Iowa, and Cedar Rivers, that the fishermen in the voluntary census did catch fish at a higher rate than did the "run-of-the-mill" angler contacted by the Officers (Table 8). The officer contact data on the Shellrock River, which show a higher catch rate than does the voluntary data, were based on a small amount of fishing effort, and may not express the true catch per hour for the river. It is interesting to note that, even in the first year of the new census, as many data were collected - as reflected by hours fished - as were gathered by the officer contacts. The two types of creel census should complement each other, and provide interesting and valuable comparisons of fishing success by both average and better-than-average fishermen.

SUMMARY

1. A voluntary census of better-than-average anglers contacted by Conservation Officers was conducted on northeast Iowa streams. Anglers reported their fishing efforts on post-card "report forms".

2. One hundred eight (53%) of 203 anglers reported 1,109 trips and 3,688 hours of fishing, an average of 10.3 trips and 3.3 hours per trip. Seventy-four per cent of the trips were successful - at least one fish was caught.

3. The fishing effort on four rivers - the Iowa, Cedar, Wapsipinicon, and Shellrock - justified rather intensive tabulation and interpretation of the fishing success.

4. Catfish (51%), crappies (15%), bullheads (12%), and carp (11%), were the primary species caught, with most of the fishing effort directed towards catfish.

5. The past fishing season was better than average on the Wapsipinicon and Iowa Rivers, average or a little better on the Cedar, and below average on the Shellrock, as compared with the 1950-1956 period.

TABLE 7. Comparisons of fish per hour catch rates for various species of fish from 1950 - 1956 and 1962 in the Shellrock River, Iowa

Year	Average	Catfish	Carp	Bass	Crappie	Walleye	Northern Pike	Mixed bag
1950	0.66	0.71	--	0.50*	0.67	0.43	--	0.65
1951	0.82	0.66	--	0.12*	2.80	--	--	0.77
1952	0.90	0.96	--	0.52*	--	0.50	0.26	1.14
1953	0.66	1.01	--	0.43*	1.00	0.39	0.20	0.81
1954	0.82	0.57	--	0.66*	2.17	0.42	0.11	0.96
1955	1.20	1.42	--	0.67*	2.53	0.55	--	0.96
1956	0.80	0.96	--	0.72*	1.00	0.28	--	0.81
1962	0.58	0.56	0.25	0.60**	--	0.29	--	2.17

* smallmouth bass only
** smallmouth and largemouth bass combined

TABLE 8. Comparison of fish per hour catch and hours fished between officer contact creel census for 1960 and 1961 and voluntary creel census for 1962

River	Type of Census					
	Officer Contact				Voluntary	
	1960		1961		1962	
	Fish/hr.	Hrs. fished	Fish/hr.	Hrs. fished	Fish/hr.	Hrs. fished
Iowa	0.83	503	0.81	1247	1.02	811
Wapsipinicon	0.57	798	0.56	950	1.01	1132
Cedar	0.61	1984	1.68	846	1.94	894
Shellrock	insufficient data	9	0.68	159	1.58	482
Total Hours	3294		3202		3319	

FALL FISH POPULATIONS BY SHOCKING

CENTRAL IOWA STREAMS 1959 THROUGH 1962

Harry M. Harrison
Fisheries Biologist

INTRODUCTION

During the late summer and fall of 1962, the fish inhabitating several Iowa streams were surveyed by electrical shocking techniques. This has been an annual activity since 1954.

The streams surveyed include the Des Moines River from the city of Des Moines to its forks in Humboldt County, the East and West Forks of the Des Moines, the Boone and North Raccoon Rivers.

Equipment used to make the surveys consists of a 230 v. alternating current generator mounted in a boat equipped with an outboard motor. Two forward-projecting booms with drop-electrodes introduce an electrical field into the water ahead of the boat. In operating the unit, one man runs the outboard and directs the path of the boat, while the second stands in the bow and records the fish by numbers and kinds as they come into view.

Areas ranging from 1/4 to 1 mile in length, separated from each other by segments of stream varying from 10 to 20 miles, are surveyed each year. The survey areas are extensive enough to contain in nearly proportionate amounts the important habitat types occurring in the streams. Thus, the information recorded at a station or series of stations on a particular river will be indicative of the fish population for that stream.

The surveys are conducted in the late summer and fall for a number of reasons: (1) During that time, water stages are more comparable from one year to the next. (2) Water stages are low. Because of this, fish are congregated in pools and are not likely to escape the electrical field. (3) By this time of year, the forces that establish or limit fish populations have run much of their course. Therefore, fall populations are believed to be representative of the capacity of a stream to produce fish.

Populations are evaluated by a frequency-of-occurrence method. The population is based upon the number of times a species appears per thousand fish stunned by the shocker. Species that occur less than once per thousand are regarded as insignificant to the economy of the stream and are not reported. Only adult and advanced sub-adults are counted. Forage and young fish are excluded from the census because it is impossible to count, record and identify the vast numbers of these little fishes as they appear in the electrical field. Additionally, closely related and hard to separate species, such as the carpsuckers, Carpiodes, and certain redhorses, Moxostoma, are recorded by groups rather than by species.

Because only fish of substantial size (sub-adult and adult) are recorded, the bias of small fish having equal importance to large fish in our frequency-of-occurrence method is minimized.

DATA

The structure of the fall fish population for each stream as revealed by electrical shocking for 1962, is compared to the three previous years in Tables 1 through 5. These Tables show by years the number of occurrences for each species or closely related species per thousand fish shocked.

TABLE 1. Structure of fish population by fall shocking Boone River; based on per thousand fish shocked 1959 through 1962

Species	1959	1960	1961	1962
Carp	479	243	268	110
Carpsuckers, Carpiodes sp.	379	631	667	791
Redhorse, Moxostoma sp.	122	79	49	21
Common sucker	-	-	-	55
Buffalo	-	1	-	-
Hog sucker	-	-	-	12
Channel catfish	15	25	8	3
Walleye	-	10	4	-
Smallmouth bass	4	9	4	3
Stone cat	-	-	-	6

TABLE 2. Structure of fish populations by fall shocking West Fork of the Des Moines River; based on per thousand fish shocked 1959 through 1962

Species	1959	1960	1961	1962
Carp	511	No surveys in 1960	599	378
Carpsuckers, Carpiodes sp.	368		149	450
Redhorse, Moxostoma sp.	38		67	1
Common sucker	-		3	53
Buffalo	15		9	-
Channel catfish	17		3	24
Walleye	46		151	86
Crappie	5		6	2
Bullhead	-		6	2
Northern pike	-		3	1
Bluegill	-		3	1

TABLE 3. Structure of fish populations by fall shocking East Fork of Des Moines River; based on per thousand fish shocked 1959 through 1962

Species	1959	1960	1961	1962
Carp	386	No surveys in 1960	597	721
Carpsuckers, Carpiodes sp.	441		330	211
Redhorse, Moxostoma sp.	108		39	-
Common sucker	-		15	-
Buffalo	11		-	-
Channel catfish	24		-	10
Walleye	29		18	48
Crappie	2		-	-
Smallmouth bass	-		-	10

TABLE 4. Structure of fish populations by fall shocking North Raccoon River based on per thousand fish shocked 1959 through 1962

Species	1959	1960	1961	1962
Carp	568	214	197	197
Carpsuckers, Carpiodes sp.	170	683	699	671
Redhorse, Moxostoma sp.	204	72	51	48
Common sucker	-	-	6	8
Buffalo	3	3	2	4
Hog sucker	-	-	6	4
Channel catfish	43	15	30	46
Walleye	1	-	-	3
Flathead catfish	1	2	1	19
Crappie	8	8	1	1
Smallmouth bass	2	-	5	2

TABLE 5. Structure of fish population by fall shocking, main stem of Des Moines River, Scott Street Dam, City of Des Moines to Forks in Humboldt County; based on per thousand fish shocked 1959 through 1962

Species	1959	1960	1961	1962
Carp	262	149	350	154
Carpsuckers, Carpiodes sp.	471	659	562	729
Redhorse, Moxostoma sp.	194	132	56	60
Common sucker	-	-	-	3
Buffalo	8	6	6	9
Hog sucker	-	6	-	2
Channel catfish	37	30	10	28
Walleye	12	8	7	8
Crappie	8	4	4	3
Flathead	7	4	2	3
Smallmouth bass	2	2	2	2
Northern pike	-	-	-	1

DISCUSSION

It is recognized that many factors operating in complex combinations and to varying degrees have an influence upon the results obtained by electrical shocking techniques. For this reason, subtle changes in a fish population are not always reflected in the type of survey reported upon here. However, fish populations studied by shocking methods and subsequently killed by chemicals show that electrical techniques reveal the status of various populations in a general way and adequately reveal significant trends in a specific population. Within these premises, generalizations regarding the important species and populations inhabitating the streams in central and north central Iowa follow.

Central Iowa streams continue to be dominated by rough fish composed of carpsuckers, Carpiodes sp., carp and a variety of suckers. Carp and carpsuckers make up the preponderance of the total population. Except for the East Fork of the Des Moines River, carp populations have declined during the past 4 years while carpsuckers have increased to the extent of outnumbering all other fish. The redhorses (three varieties of Moxostoma) have declined sharply since 1959. Over the same period, the common sucker, Catostomus c. commersoni, has become a significant species, and in the West Fork of the Des Moines and Boone Rivers, it appears to have replaced the redhorses. Hog suckers, Hypentelium nigricans, existing as scattered individuals prior to 1960, have made notable increases in the Boone, Raccoon, and main stem of the Des Moines in the past two years. Bigmouth buffalo seem to have maintained stable numbers. This has remained so since the surveys were initiated in 1954. In total, rough fish comprise more than 90% of central Iowa's stream fishes.

Game fish in central Iowa streams include channel catfish, walleye, flathead catfish, crappie, smallmouth bass, bullheads, northern pike and bluegill, in that order of abundance.

In combination, they comprise less than 10% of the total population, but in light of the large number of fish involved, they may and often do number into the hundreds per mile of stream.

Channel catfish are the most important game fish and are distributed throughout all of the streams involved in the survey. They reach their greatest abundance in the larger streams. Their populations have remained quite stable since the survey started in 1954; it is postulated that they are adapted to and occupy certain niches to such an extent that suppression by other species cannot reduce them much below present levels.

Walleye occur throughout the entire survey area, but are most abundant in the West and East Forks of the Des Moines and the upper reaches of the North Raccoon Rivers. They are also distributed along the entire length of the main stem of the Des Moines River above the city of Des Moines. In this reach, however, their numbers vary from few to abundant, from one place to another. In the North Raccoon below Jefferson and in the Boone River, walleye populations have continued low for the past 9 years.

In central and north-central Iowa streams, walleye populations are given to pronounced fluctuations. The numbers of walleyes are presently very high in the West Fork of the Des Moines and much above average in the East Fork. A similar condition occurred in the North Raccoon in the early 1950's. At that time and place, their numbers reached record proportions for Iowa waters.

These fluctuations are believed to be primarily related to spawning success. The factor or factors that limit walleye spawning in Iowa's flowing waters are not known, but whatever they are, they apparently fail to function from time to time. Cleary and Mayhew (1961) suggest that spawning success is related to stream discharges for March, April and May, and that there was "a reasonable direct relationship between year-class abundance and high water and high temperature." This writer questions the validity of that hypothsis and would point out if their contentions were correct, year-class abundance should occur simultaneously in adjoining watersheds. This has not occurred in central Iowa streams. Furthermore, walleye should have spawned successfully in 1962 as spring runoff for that year was the highest on record. During 1962, we found no evidence whatsoever of walleye reproduction in central Iowa streams.

From the standpoint of weight, flathead catfish rank third in importance among the game fishes in central Iowa streams. Their distribution, however, is limited in the survey area; they are only found in the Des Moines River below Ft. Dodge and in the Raccoon from the vicinity of Auburn and Lake City downstream. In these streams, they are most abundant in association with lowhead dams; they live abundantly immediately below the dam as well as in the impounded areas and for a considerable distance (5-10 miles) above the impounded areas.

Because of their habitat preferences for deep water and seclusive habits, flatheads are difficult to census by electrical techniques. They are believed to be much more abundant than indicated by our surveys. This belief is substantiated by the fact that winter or pollution kills always turn up larger number of flatheads than are suspected to have lived in those areas. Additionally, flathead fishermen catch many more flatheads from specific areas than our surveys reveal.

The remaining game species (crappie, smallmouth bass, bullheads, northern pike and bluegill) persist as vestige populations. Of these species, crappie, smallmouth and bullheads may become abundant in spots, but they rarely flourish over long reaches for any appreciable length of time in central Iowa. Northern pike and bluegill occur only as scattered individuals.

SUMMARY

Data resulting from these surveys show; (1) in combination, the ratio of all species of rough fish to all game species remains quite constant from year to year; (2) rough fish dominate to an extent in excess of 90 per cent of the total population; (3) game fish populations are usually quite stable and remain at low levels; (4) major variations occurring in stream fish compositions involve the abundant species such as the carp, carpsuckers and other suckers; (5) carpsuckers have replaced the carp in abundance; (6) channel catfish continue to be the dominant game species and are followed by walleye and flathead catfish. Crappie, smallmouth bass, bullhead, northern pike and bluegill persist as remnant species.

LITERATURE CITED

Cleary, R. E., and J. K. Mayhew

1961. An analysis of an alternate-year walleye fry stocking program in the Cedar River in Iowa. Proc. Iowa Acad. Sci., 61: 254-259.

CREEL CENSUS OF FIVE NATURAL LAKES IN 1961-62

Tom Moen
Fisheries Biologist

Comprehensive creel census techniques were employed to obtain estimates of total fishing pressure and total harvest on three Dickinson County Lakes during the summer of 1961 and for ice fishing during the winter of 1961-62. Simple fisherman contact methods were used for securing data on the fishing success at Black Hawk Lake in Sac County during the summer of 1961 and for the month of June at Clear Lake in Cerro Gordo County. The comprehensive method was used during the months of July and August at Clear Lake.[1]

The method of gathering and processing data has been described in detail in previous seminar reports. The results for each lake will be discussed under individual headings by lake.

East Okoboji Lake

This 1400-acre lake produced excellent bullhead fishing during the summer months but failed to provide any interest to the late fall or ice fisherman. Thus the census period covered only the 5 months of May through September (Table 1).

Of the eleven species recorded in the creel, bullheads were the most abundant, accounting for 92 per cent of the total fish caught and 88 per cent of the total weight. This is the second successive season in which fishermen have removed approximately 100 pounds of bullheads per acre, and a 5-year average of 74 pounds per acre. Yellow perch were next in importance with better than 90 per cent of the perch catch taken during the month of September. Walleyes were the third most abundant fish on the stringer and they were second in total weight for the season.

As to be expected, fishing reached a peak in June. Approximately half of the total fish and half of the total weight were recorded during this month. Fisherman success also reached a peak in June of 2.3 fish per hour, but it was not much higher than in May or September. The news of the good bullhead fishing during May brought about longer trips in June, with 2.1 hours per trip recorded in May and 3.1 hours per trip in June. This also shows up in the number of fish per man which increased from about five in May to slightly over seven in June while the success remained about the same.

During the 5 months of open water fishing, the average acre of East Okoboji Lake provided 80 hours of fishing and approximately 100 pounds of fish at an average rate of 2.1 fish per hour.

[1] The comprehensive portion of the Clear Lake census for July and August at Clear Lake was secured by personnel of the Fisheries Research Unit of Iowa State University.

TABLE 1. Harvest of fish as estimated from the comprehensive creel census of East Okoboji Lake during the 5-month period of May through September, 1961

Species	May		June		July		August		September	
	Number	Weight*	Number	Weight	Number	Weight	Number	Weight	Number	Weight
Bluegill	197	49	362	131	86	34	558	--	558	238
Crappie	549	236	457	320	144	79	56	31	534	219
Walleye	388	783	270	390	295	514	1,145	1,632	944	1,752
White Bass	--	--	--	--	--	--	--	--	397	541
Northern Pike	--	--	31	119	--	--	35	132	--	--
Bullhead	64,156	37,898	119,682	69,665	17,585	10,234	15,040	8,812	2,000	1,153
L.M. Bass	--	--	--	--	88	78	41	51	65	192
S.M. Bass	--	--	--	--	--	--	--	--	10	34
Yellow Perch	13	8	51	27	66	22	207	95	8,387	3,949
Sheepshead	388	341	1,052	1,161	393	631	433	636	115	197
Carp	--	--	23	83	53	17	15	77	--	--
Totals	65,691	39,315	121,928	71,896	18,710	11,609	16,972	11,466	13,010	8,275
Men (trips)	13,013		16,757		4,818		4,542		3,102	
Hours	28,931		51,633		14,381		11,014		6,291	
Fish per hour	2.27		2.34		1.30		1.53		2.07	
Fish per man	5.04		7.27		3.91		3.68		4.19	

* in pounds

West Okoboji Lake

Although West Okoboji Lake is a rather deep lake (maximum depth - 135 feet) for this region, it is highly eutrophic and provides excellent fishing for several species. Creel census data were gathered on this 3,939-acre lake over a period of 10 months, May through February, 1961-62. Some fishing occurred in April and March but was insufficient to warrant a full scale census. For comparisons, the results are presented as open water fishing and winter fishing (Table 2).

Open water fishing: Yellow perch ranked number one among the ten species of fish taken by hook and line, making up 50 per cent of the total catch of fish during the open water fishing season. Bullheads were second in importance, comprising 25 per cent of the total catch. Bluegills and walleyes were also important in the creel, making up 12 and 6 per cent respectively. Perch made up about 38 per cent of the total weight of fish while walleyes and bullheads each accounted for about 20 per cent.

The 31.5 pounds per acre harvested from West Okoboji during the open water season fell far short of the harvest from East Okoboji during the same period. All other categories, except fish per hour, were also low when compared to East Okoboji. West Okoboji provided comparatively good fishing success for several species rather than one dominant species. Approximately 10,000 more fishing trips were recorded from East Okoboji than from West Okoboji, a lake nearly three times as large.

Winter or ice fishing: The yellow perch continued to be the most important species during the ice fishing season, making up over 90 per cent of the fish taken, a three-fold improvement over the winter fishing of 1960-61. The interest in and the success of the perch fishing seemed to pull the fishermen away from fishing bluegills. The number of bluegills taken during the winter fishery dropped from nearly 40,000 in 1960-61 to 8,000 in 1961-62. Netting surveys and other data gathered during the summer months indicated continued high populations of bluegills. Walleye fishing improved 100 per cent over the previous winter period. There were insufficient numbers of other species taken to make valid comparisons.

Combining both open water fishing and ice fishing results, we find that West Okoboji provided 13 trips and 32 hours of fishing per acre of water, two-thirds of which occurred during the open water period when pleasure boats were numerous. Pleasure boating may have influenced the total fishing pressure during the summer months in that the fishing success was relatively high during the period but the number of trips and number of hours of fishing declined sharply from former years.

Spirit Lake

The quantitative or comprehensive creel census data presented for this lake covers a period from May, 1961 through February, 1962 (Table 3) and marks the 17th consecutive year in which some type of creel census data has been collected. A limited amount of fishing occurred in March and April but was insufficient to warrant a full scale census. This was also true for the month of November, normally an active month for fishermen, particularly those interested in walleyes or perch.

Open water fishing: This period of fishing on Spirit Lake included the months of May

TABLE 2. Harvest of fish from West Okoboji Lake as estimated from the comprehensive creel census during May through February, presented as open water fishing and winter fishing, 1961-1962

Species	Open Water		Winter		Total	
	Number	Weight*	Number	Weight	Number	Weight
Bluegill	23,464	11,340	8,171	3,629	31,635	14,969
Crappie	6,430	3,136	225	89	6,655	3,225
Walleye	13,518	23,771	3,832	9,830	17,350	33,601
White Bass	461	688	68	156	529	844
Northern Pike	1,134	4,369	255	1,169	1,389	5,538
Bullhead	51,552	27,386	--	--	51,552	27,386
L.M. Bass	772	1,493	37	48	809	1,541
S.M. Bass	1,762	3,198	--	--	1,762	3,198
Yellow Perch	99,856	47,967	144,042	62,579	243,898	110,546
Sheepshead	1,555	3,042	155	315	1,710	3,198
Totals	200,504	126,390	156,785	77,815	357,289	204,205
Men (trips)	38,460		15,444		53,904	
Hours	86,765		44,002		130,767	
Fish per hour	2.3		3.5		2.7	
Fish per man	5.2		10.1		6.6	

* in pounds

TABLE 3. Harvest of fish from Spirit Lake as estimated from the comprehensive census during May through February, 1961-1962, presented as open water fishing and winter fishing

Species	Open Water		Winter		Total	
	Number	Weight*	Number	Weight	Number	Weight
Bluegill	--	--	--	--	--	--
Crappie	448	338	33	27	481	365
Walleye	21,661	23,641	3,159	6,583	24,820	30,224
White Bass	11,065	8,472	103	143	11,168	8,615
Northern Pike	127	477	59	249	186	726
Bullhead	69,057	51,473	--	--	69,057	51,473
L.M. Bass	313	391	23	53	336	444
S.M. Bass	32	69	17	51	49	120
Yellow Perch	3,189	2,364	2,757	2,201	5,946	4,565
Sheepshead	2,536	3,429	--	--	2,536	3,429
Totals	108,428	90,654	6,151	9,262	114,579	99,961
Men (trips)	47,799		3,402		51,201	
Hours	144,299		10,184		154,483	
Fish per hour	0.75		0.60		0.74	
Fish per man	2.27		1.81		2.24	

* in pounds

through October, 1961. Bullheads outnumbered all other fish combined, comprising 63 per cent of the total catch and 50 per cent of the total weight. Walleyes were second in importance, both in number and weight. White bass were the third most common fish on the stringers. The numbers of white bass have increased from an average of about 3,000 per year during the 4-year period of 1956-59 to 34,000 in 1960 and 11,000 in 1961. The remaining six species accounted for only 5 per cent of the total catch.

Fishing success showed the typical pattern of good fishing during May and June followed by poor fishing during the following 4 months. Forty-one per cent of all the walleyes and 37 per cent of the bullheads were taken in the month of June.

The walleye catch was composed of relatively small fish, averaging 1.2 pounds per fish for the open water season. While collecting data concerning a population estimated and rate of growth, it was determined that during May and June the hook and line catch of walleyes was composed primarily of fish of the 1958 year class. Sixteen per cent of the walleyes on the stringers in May and June were less than 12 inches long; these belonged to the 1959 year class. Twenty-four per cent of the July harvest of 6,200 walleyes were less than 12 inches long. Approximately 50 per cent of the total catch in July fell in a group ranging from 12 to 16 inches in length. By late fall the fishermen were keeping fewer small fish with less than 10 per cent of the catch less than 12 inches in length.

Winter fishing: Ice fishermen caught about half as many fish during the 1961-62 season as they did the previous winter and about equal the number taken during the 1959-60 winter season. The decrease was shown in walleyes and perch, the two most catchable species in the normal winter fishery in this lake. The perch were of excellent quality, averaging over 0.8 pound per fish. The walleyes followed the usual winter pattern with an average of slightly better than 2 pounds per fish as compared to the summer average of only 1.2 pounds. Length-frequency measurements taken during the winter fishing season indicated that 9.4 per cent of the walleyes taken home were less than 12 inches long and that 73 per cent of the catch fell in the 12 to 16 inch range. Most of these fish were less than 12 inches long at the start of the fishing season in May and had grown into this length range during the summer.

Only 5 per cent of the total fish taken during the entire 10 months of censusing were taken during the winter period. About 12 per cent of the total walleyes and 50 per cent of the perch were caught during the ice covered season. The catch of perch was quite low for both periods, approximately one perch per acre, both seasons combined. During the 10-month census period, Spirit Lake provided an estimated 10 fishing trips and 27 hours of fishing per acre, with a harvest of 20 fish weighing 17 pounds.

Clear Lake

As mentioned above, Clear Lake was censused during June of 1961 by the use of a simple contact method and during the months of July and August by a quantitative type census (Table 4).

Fishermen enjoyed good fishing at Clear Lake during the month of June and very poor fishing during July and August. With an average success of 1.6 fish per hour during June, the fishing was five times better than during July or August.

TABLE 4. Harvest of fish as estimated from a simple contact census of fishermen on Clear Lake during June and through a comprehensive type census during the months of July and August, 1961

Species	June Number	July Number	July Weight	August Number	August Weight
Bluegill	3	42	8	405	116
Crappie	1,092	653	248	144	56
Walleye	199	263	749	10	10
White Bass	32	15	17	--	--
Northern Pike	19	32	125	--	--
Yellow Bass	98	333	77	414	81
Bullheads	1,090	891	365	619	239
L.M. Bass	1	4	10	--	--
Yellow Perch	22	220	51	36	11
Channel Catfish	20	22	59	102	124
Carp	3	--	--	--	--
Totals	2,576	2,475	1,709	1,730	937
Men (trips)	642	3,970		8,220	
Hours	1,566	7,938		13,865	
Fish per hour	1.64	0.31		0.12	
Fish per man	4.0	.62		0.21	

Bullheads and crappies were of equal importance in the catch and the two species accounted for over 85 per cent of all the fish taken in June. Walleyes were third in importance. Bullheads continued as the dominant species taken through the remaining 2 months. Bluegill and yellow bass were second and third most important on the stringers in August. Crappie fishing was fairly good through the early part of July.

Black Hawk Lake

Black Hawk Lake was censused on a contract basis during the months of June through October of 1961 (Table 5), marking the 15th consecutive year that a creel census has been conducted on this lake.

Fishing at Black Hawk Lake was excellent throughout the census period with better than one fish per hour caught each month and approaching two fish per hour during August and September. The 5-month average of 1.4 fish per hour is down somewhat from the previous 3-year average of 2.3 fish per hour.

Bullheads and crappie were the two most important fish in the harvest, composing 37 and 28 per cent of the total catch respectively. Channel catfish and carp were of about equal importance, each making up approximately 10 per cent of the catch. The ranking of the top four species of fish taken from Black Hawk Lake each year has been the same over the past 5 years. Although walleye fishermen were successful in the early part of the season, their mid-summer and fall fishing was poor, of the 50 walleyes recorded, 43 were taken in June. Undoubtedly this is related to the gizzard shad hatch.

TABLE 5. Harvest of fish as determined through a simple contact type census of fishermen on Black Hawk Lake during the 5-month period of June through October, 1961

Species	June Number of fish	July Number of fish	August Number of fish	September Number of fish	October Number of fish
Bluegill	210	66	63	30	--
Crappie	372	72	133	812	132
Walleye	43	3	--	3	1
Yellow Bass	1	4	20	14	--
Channel Catfish	102	221	135	139	12
Bullhead	675	691	350	236	62
Northern Pike	2	0	--	--	--
Largemouth Bass	77	1	--	2	--
Carp	87	116	245	165	260
Totals	1,569	1,174	946	1,401	266
Men (trips)	539	366	198	307	69
Hours	1,502	1,010	486	708	156
Fish per hour	1.04	1.16	1.96	1.98	1.64
Fish per man	2.91	3.21	4.78	4.56	3.71

PROGRESS REPORT ON COMPARISONS OF CHANNEL CATFISH POPULATIONS IN STRAIGHTENED AND UNSTRAIGHTENED SEGMENTS OF THE LITTLE SIOUX RIVER

Bill Welker
Fisheries Biologist

During the summer of 1956, work was begun on the relocation and channelization of the Little Sioux River in Monona and Harrison Counties. This flood control project extends approximately 34 river miles from Rodney, Iowa, in north-central Monona County to the confluence of the Little Sioux River and the Missouri River at River Sioux, Iowa. The project was completed in the fall of 1961.

The new river channel is approximately 90 feet wide with a uniform depth in the center of about 11 feet. Extending parallel and at approximately 150 feet from each side of the channel is a large earth dike. A mixed cover of crested wheatgrass, smooth brome and winter rye extends over the enbankment of the area. There are no trees or brush along the banks. The overall effect of this flood channelization project on the Little Sioux River is to provide a uniform channel with a minimum number of bends during its 34-mile course to the Missouri River.

The old, unaltered river channel upstream from the new channel has steep banks, frequent bends and piles of brush that have fallen into the river. This area is considered good catfish habitat.

The average annual rainfall in the lower Little Sioux River watershed is 28 inches. Water conditions during 1962 were good with three recording stations in Monona County reporting over 29 inches of rainfall through the first 9 months. During mid-September, 1962, the water depth in the middle of the new channel, not including the areas under the bridges, was a fairly uniform 7 feet. Water depths in the center of the channel under bridges varied between 8 and 10 feet due to the water currents moving around the bridge abutments. The old river channel upstream contains holes during the summer months around brush piles which vary in depth from 6 to 12 feet.

Shad, carp, sheephead and carpsuckers compose the bulk of the fish population in both the straightened and unstraightened sections of the river. Although the catfish is considered the most important game fish by the anglers, walleye, sauger, black and white crappie, northern pike, bluegill and largemouth bass are other species of game fish found in both sections of the river.

During late summer and fall of 1962, hoop nets were fished in the straightened and unstraightened sections of the Little Sioux River. These nets had 1-inch bar measure mesh and a mouth diameter of 21 inches. Cheese clippings were used as bait and the nets were set between 3 and 6 feet from the bank. All nets were set each day and checked the following morning. When possible, all nets were left in the river three nights. Sometimes rain forced removal of the nets before the end of the 3-day period.

Catch data has been recorded, but since this project was just getting under way this year, the sample size (number of hoop-net days fished) was too small to warrant any presentation of the limited data at this time. The report is presented to indicate the study is in progress. It is intended next year to expand the study to a sufficient extent to be able to make valid comparisons of the catfish populations between the two segments of the river. It is hoped that information will also be obtained on several factors that may affect catfish population levels in the two areas - such as migration, drifting, water levels, and time of year. Information on the amount of reproduction in each segment should also be obtained.

AN EVALUATION OF INTRODUCING THE WALLEYE INTO A SOUTHERN IOWA ARTIFICIAL LAKE

PART I: HISTORY, STOCKING AND POPULATION

Jim Mayhew
Fisheries Biologist

The walleye has received much attention through research and fisheries management in Iowa by both the State Conservation Commission and the Cooperative Fisheries Research Unit at Iowa State University (Carlander, 1948; Cleary and Mayhew, 1961; Mayhew, 1956; Rose, 1948; 1949, 1955). Anglers generally regard this species as one of the most prized catches, and spend thousands of hours annually in quest of the walleye. In areas where the walleye is abundant the economic values offered to the community by anglers fishing for this species cannot be ignored as a substantial segment of the local economy. Most of Iowa's walleye waters are located in the natural lakes and inland streams in the northern part of the state and in the upper reaches of the Mississippi River.

Three hatcheries are operated by the Fisheries Section of the State Conservation Commission primarily for the artificial propagation of this species. Although the walleye is a native fish to Iowa waters, there has been no attempt to establish them in the vast network of artificial lakes in southern Iowa since 1932 (Records supplied by E. B. Speaker). Prior to this date routine plantings were made in many municipal water supply impoundments. After the walleye failed to perpetuate itself in most of these reservoirs, it was considered unsuitable for this region and dropped from the stocking list. During 1954 a pilot project was started in Green Valley Lake, in Union County, to attempt to develop and maintain a walleye population. This is a report on the development and status of this species during the first 9 years of the project.

Green Valley Lake is one of the largest state-owned recreational impoundments in Iowa. At spillway crest elevation the dam impounds 390 surface acres of water. Construction was started in 1952 and completed the following year. Unlike most other state-owned artificial lakes, Green Valley is relatively shallow with gentle sloping bottom contours and numerous mud shoal areas. Maximum depth is about 19 feet, with 71 per cent of the lake less than 9 feet deep. The lake does not thermally stratify during the summer, and has sufficient dissolved oxygen in the deeper water strata to support fish life throughout the entire year. There are only sparse wooded plots of land in the entire watershed, with a major portion of the shoreline completely open. Rock fill for wave action protection along the face of the dam offers the most suitable habitat to walleyes, with the remainder of the lake mostly a series of mud bottom bays and shoals.

Stocking and Natural Reproduction

The first walleyes were introduced during the second year of impoundment. This planting consisted of 1,500 fingerlings and 1,000 yearlings (Table 1). The yearlings were from 10 to 12 inches in total length that had escaped nursery pond seining the previous year. Two plantings of fingerling largemouth bass, one planting of fingerling channel catfish, and one planting of adult crappie and bluegill were made prior to the introduction of the walleye. Bullheads were present in the watershed prior to impoundment and also inhabited the lake.

Walleye fry have been introduced each year except in 1956 and 1960 when they were not available. Since 1959 the lake has received plantings of 1 to 3 million fry annually. To date a total of 6,550,000 walleye fry have been released in the lake. Fingerlings or yearlings have also been released each year with the exception of 1956 and 1962. The largest planting of fingerling was made in 1956 (due to no fry available that year) and 1958. The largest yearling stocking was made in 1957 when 2,000 were released.

TABLE 1. Walleye stocking in Green Valley Lake from 1954 to 1962

Year	Date of Release	Number and Age of Walleye Stocked		
		Fry	Fingerling	Yearling
1954	October 29		1,500	1,000
1955	May 9	300,000		
	September 30		800	200
1956	September 20		5,000	
1957	May 1	500,000		
	June 30		3,000	
	August 30			2,000
1958	April 29	750,000		
	May 15			820
	October 23		5,000	
1959	May 5	1,000,000		
	September 28		3,500	
1960	November 21			533
1961	May 12	2,000,000		
	May 15	1,000,000		
1962	May 9	1,000,000		

In the spring of 1959 preliminary field investigations were initiated to evaluate the success of introducing walleyes into Green Valley Lake. Four years prior to this study, during the annual fisheries inventory, six walleyes had been captured. However, during the three subsequent surveys no walleyes were observed. Creel census data indicated they were still present in the lake, but in an undetermined number. Thus, a long range study was begun to determine magnitude and success of natural reproduction, survival of young fish, growth, population size, and angler exploitation.

Spawning activity and natural reproductive success was studied during the first year. Two, 200' X 6' nylon gill nets with 2-inch bar measure mesh were fished immediately after the spring thaw for a total of 192 hours. The net sets were equally divided into 48 hours each at intervals of 11, 6, and 7 days, respectively. Total length, weight, condition of gonads, and water temperature were recorded for each sampling period and individual specimen of fish. From this information it was evident that the adult walleye population in the lake was capable of spawning.

Immediately after the ice cover thawed, all males captured in the first sampling period had ripe testes. Activity of both males and females increased rapidly as the water

temperature increased from 44° F. to 54° F. On the third series of net sets, with water temperature 54° F., 20 per cent of the females were capable of spawning, and emitted eggs from the urogenital pore when slight pressure was placed on the abdomen. Seven days later the water temperature had decreased to 52° F. due to cold atmospheric temperatures, but 60 per cent of the females caught were spent and 40 per cent were ripe. There was a definite acceleration of activity and an increase in net catches nearer the higher water temperatures.

Twenty days after the conclusion of netting, attempts were made to recover naturally reproduced walleye fry. A total of 24 hauls were made with a 25-foot bobinette drag seine. Seining sites were selected at random along the shoreline. No natural reproduction was found. Consequently, it was apparent that the failure of natural walleye reproduction of natural walleye reproduction in Green Valley Lake was due to either failure of the eggs to hatch or the very young fry to survive. One week after the bobinette seine hauls were made, 1 million fry from the Spirit Lake Fish Hatchery were planted in the lake, making further seine hauls inconclusive.

Population Studies and Angler Exploitation

An appraisal of the magnitude of the adult walleye population was conducted in 1960 and 1961 by tagging a total of 296 fish. The tags (No. 3 metal monel) were attached to the corner of the upper jaw completely enclosing the maxillary and pre-maxillary bones. All of the fish were captured at night by electro-fishing during spring spawning activity. Each fish was measured, weighed, sexed, tagged, and released from the identical location on the lake. Several days after the conclusion of tagging an inspection was made of the entire shoreline for dead walleyes. No visible loss of tagged walleyes was observed.

1960 Tagging Studies

A total of 198 fish was tagged during the first year of the study. Volunteer public angler tag returns and periodic resampling by electro-fishing was used to determine angler exploitation and population size. Much publicity was given to the project by local radio stations and the press in an endeavor to obtain as many tag returns as possible.

Resampling of the walleye population by "shocker gear" was started in June 1960 after the tagged fish had seemingly randomly distributed themselves throughout the lake and the untagged segment of the walleye population. Early calculations by the Petersen method indicated a resident walleye population of approximately 5,200 fish. Subsequent samples in July, August, and September indicated this figure to be slightly high with a much truer value of about 3,650 fish, with individual sample ranges of 2,852 to 4,730 fish.

Anglers returned a total of 16 tags during the first summer of the project. This was a catch of 8.1 per cent of the adult walleye population. This figure is also considered the minimal exploitation by anglers since it is not known how many tags were thrown away unnoticed or forgotten about and not returned. During the following 2 years the catch of walleyes tagged in 1960 was considerably smaller, making up only 1.2 per cent of the catch in 1961 and 2.2 per cent in 1962 (Table 2).

1961 Tagging Studies

In the spring of 1962 an additional 98 adult walleyes were tagged during the spawning run. This was done primarily to re-evaluate angler exploitation during a second consecutive summer. A total of 12 tags were recovered from anglers of which 10 were from the 1961 tagging program and the remainder from the original project.(Table 2). At the end of the summer of 1961 there was a theoretical total of 261 tagged walleyes in Green Valley Lake. Since these returns were relatively constant during both years of the study, the minimum angler harvest is estimated at between 8 and 10 per cent of the adult walleye population.

TABLE 2. Catch of tagged walleye in Green Valley Lake from 1960 to 1962. (Number returned is in parenthesis)

Year Tagged	Number Tagged	Per Cent Tags Returned		
		1960	1961	1962
1960	198	8.1 (16)	1.2 (2)	2.2 (4)
1961	98		10.2 (10)	3.1 (3)
Total tags returned		16	12	7

Resampling of the walleye population for a Petersen method estimate was made at 30-day intervals in July, August, and September. During the spring tagging program information for a population estimate was obtained from the 1960 project. As individual fish were tagged, they were examined for old tags or marks indicating they had been previously tagged. This sample, along with the tagged fish captured, was used to establish the marked to unmarked ratio and to calculate the total population density.

The estimate indicated a population of approximately 3,000 walleyes with a range of 1,640 to 4,416. Later in the summer, however, further sampling indicated a larger population of about 4,150 fish with a range of 3,400 to 6,990.

In November 1961 several seine hauls were made to remove rough fish from Summit Lake. This lake is located immediately below Green Valley Lake and receives all the overflow discharge from the upper impoundment. A total of 11 tagged walleyes were captured during this operation. Ten of these were from the 1960 tagging program and one was from 1961. In addition to these, one tagged walleye was caught by an angler immediately below the Green Valley Lake spillway in 1962. Therefore, it is known that a minimum of 12 tagged fish escaped from the lake by swimming over the spillway.

Populations of fish are usually difficult to appraise with a high degree of accuracy even in small isolated ponds. Attempts to estimate population densities in a larger impoundment involve many systematic problems to eliminate most sources of error and bias. The fact that walleyes had free and apparently easy egress from the lake was not taken into consideration before they were discovered in Summit Lake. If they had not been taken during the seining, population estimates would have been undoubtedly considered valid.

The author realizes that such information is not wholly acceptable and does not intend to consider the population estimates as totally valid. Consequently, the population estimates are offered only for interest based on fragmentary information that would not have been possible by any other means.

Angler Success

Creel censuses have been conducted at Green Valley Lake since 1956 with the exception of 1959 when no information was obtained. Two basic methods were employed for the study. The first method, described by Mayhew (1956) and involving a sub-sampling quantitative census, was made during the first 3 years of the project. Since 1960 information relative to walleye angling success has been obtained from conservation officer field contact cards. In 1961 both methods were used.

During the first year of the creel census, only 2 years after the original planting of walleye, this species comprised 1.8 per cent of the total angler harvest. The following year this region of the state was in the midst of a severe drought which resulted in a reduction of water level of about 8 feet. Fishing success for all species declined rapidly, but the walleye fishery seemed to be reduced by a greater extent. That year only four walleyes were counted in 32, 2-hour sampling periods amounting to 0.4 per cent of the total catch. In 1958, water levels returned to normal and the walleye fishery expanded rapidly to 2.8 per cent of the harvest. During this year it also surpassed the catch of largemouth bass and channel catfish.

Since 1960 the angler catch of walleye has been as follows: 1960 - based on officer contacts--2.0 per cent; 1961 - officer contacts--1.6 per cent, creel census - 4.1 per cent; 1962 - officer contacts--2.7 per cent. From 1958 the walleye has been the most frequently caught predatory species by anglers. In catch status it is surpassed only by bullhead, crappie, and bluegill.

In 1961, miscellaneous data was also obtained from the anglers as to what species they were fishing for. The 64 walleyes reported in the creel that year were caught by 30 different parties. Twenty of these were fishing strictly for walleye. The remainder of the fish were caught incidentally by crappie, bullhead, or largemouth bass fishermen. Only five parties of anglers expressing the desire to catch walleye were completely unsuccessful. Certainly this would indicate that the angler possessing the equipment, ability, and general knowledge of walleye fishing were successful in their attempts to catch this species.

DISCUSSION

Through extensive planting of fry, fingerling, and yearling, the walleye has become well established in Green Valley Lake. This is the first artificial impoundment in Iowa in which this species has established itself to the extent that it annually contributes significantly to angler harvest. Five years after the original planting the walleye has become the most abundant predatory species of fish in the lake. Only bullhead, crappie, and bluegill are caught in greater number by the fishermen.

The success of this project does not necessarily mean that expansion of the walleye

stocking program to other Iowa artificial lakes will meet with unqualified success. Green Valley Lake is both ecologically and morphologically atypical of man-made lakes in this region of the state. It is characterized by shallow, non-stratified waters, numerous shoals, and numerous small bays. By many physical criteria it is more typical of the natural lakes in northern Iowa than the artificial lakes in southern Iowa. For this principal reason this project met with excellent success.

From the information that was obtained during the study, it is apparent the walleye population is wholly dependent upon annual fry and/or fingerling stocking for survival and perpetuation of the population. Although the adult fish successfully completed all preparations for natural reproduction, this ultimately failed. Further investigations indicated this was due to the failure of eggs to hatch or the very young fry to survive. Annual plantings of fry or fingerling are, therefore, expedient to the fishery. The only alternative would be the creation of "artificial" walleye habitat, such as rock reefs and shoals, for spawning.

Tagging studies during the project resulted in an estimate of the adult walleye population of approximately 3,500 fish, or about nine fish per surface acre. This population estimate varied with individual samples from 1,640 to 6,990 fish. Of this population, minimum angler harvest ranged from 8.1 to 10.2 per cent annually.

Creel censuses revealed this species comprised between 1.5 and 4.1 per cent of the fishery each year. This could undoubtedly be increased greatly if more fishermen would concentrate on the walleye. Like most of the other lakes in Iowa the fishery is concentrated toward the bullhead.

Each year there is a substantial egress of walleyes from Green Valley Lake into Summit Lake. During the study a total of 12 tagged fish were found in the latter impoundment. This is a 4.4 per cent loss of the total number of fish tagged, and might well represent the annual loss of fish from Green Valley Lake. It is doubtful if this spillway migration is a characteristic of the fish, but rather it occurs by accident. Furthermore, it is regarded as representative of the total walleye population and not characteristic of only the tagged fish. Each spring during accelerated spawning activity there is a definite concentration of walleyes in the vicinity of the dam. This is due primarily to the rock fill on the facing of the dam, which represents the most ideal walleye spawning habitat in the entire lake. At this time of the year there is also substantial water discharge from the lake due to spring run-off. As the concentration of fish occurs, many fish are caught in the fast current at the crest of the spillway, and as a result are swept out of the lake into Summit Lake immediately below.

ACKNOWLEDGEMENTS

The author wishes to express gratitude to many of the people who assisted with the project in many ways. Messrs. K. M. Madden, E. B. Speaker, and Dale Stufflebeam were extremely helpful in planning and executing the various phases of the project. Bill Smith, Fish Culturist, Mt. Ayr Fisheries Station, assisted the author in tagging, resampling, and obtaining growth data for this project, and without his help this study would have been impossible. This study has been an example of teamwork and could not have been accomplished by any other means.

LITERATURE CITED

Carlander, Kenneth D.

1948. Growth of the yellow pike perch, Stizostedion vitreum vitreum (Mitchell), in some Iowa lakes, with a summary of growth rates reported in some other areas. Iowa State Coll. Jour. Sci. 22: No. 3. 227-237.

Cleary, Robert E.

1949. Life history and management of the yellow pike perch, Stizostedion vitreum vitreum (Mitchell), of Clear Lake, Iowa. Iowa State Coll. Jour. Sci. 23: No. 2. 195-208.

Cleary, Robert E. and J. K. Mayhew

1961. An analysis of an alternate-year walleye fry stocking program in the Cedar River, Iowa. Proc. Iowa Acad. Sci. 65: 254-259.

Mayhew, Jim

1956. A preliminary report on the age and growth of the yellow pike perch in the Cedar River, Iowa. Quart. Biol. Report., Iowa Cons. Comm., Vol. VIII, No. 2, 35-40 (mimeographed)

1956. Sampling design for Iowa artificial lakes creel census. Iowa State Cooperative Research Unit, Iowa State College. 43-46.

Rose, Earl T.

1949. The population of yellow pike perch (Stizostedion v. vitreum) in Spirit Lake, Iowa. Trans. Am. Fish. Soc. 77: (1947) 32-41.

1949. Notes on the age and growth of Spirit Lake yellow pike perch. Proc. Iowa Acad. Sci. 55: 517-525.

1955. The fluctuation in abundance of walleyes in Spirit Lake, Iowa. Proc. Iowa Acad. Sci. 62: 567-575.