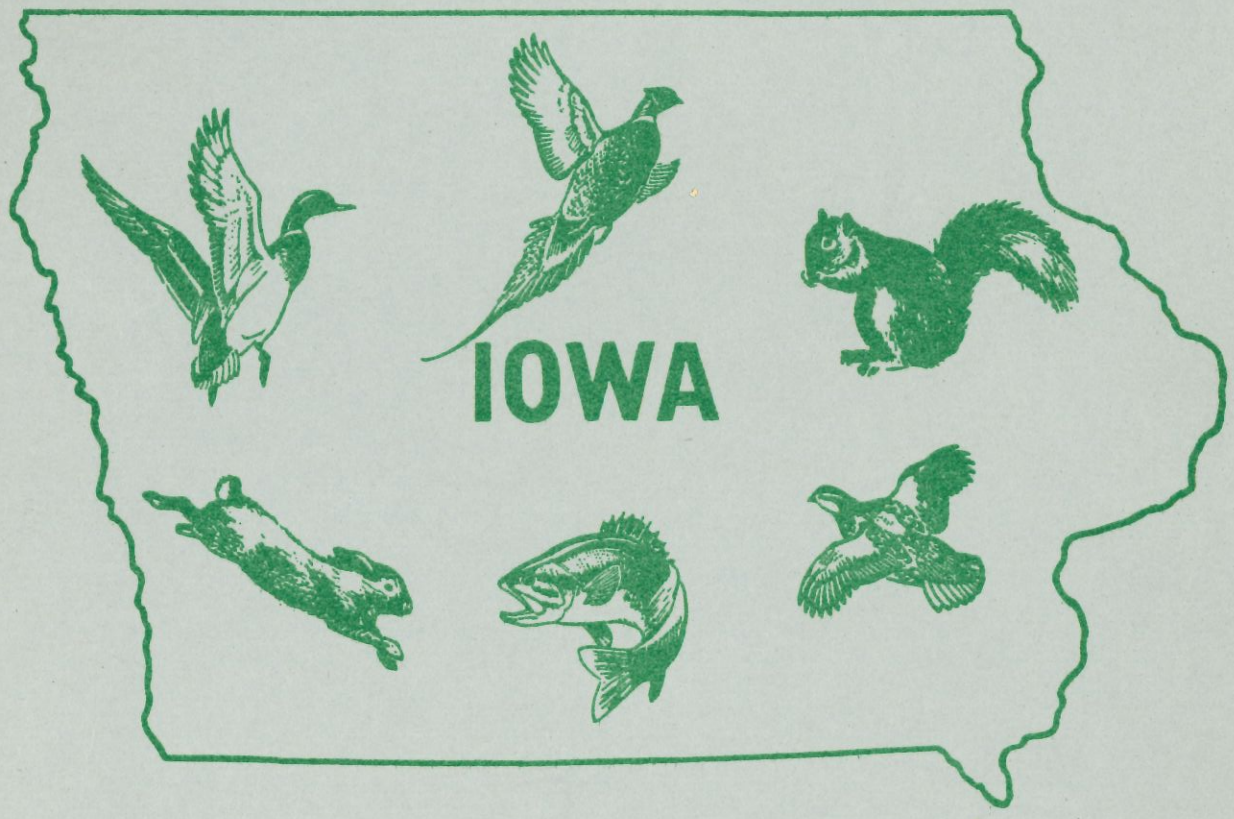
1959

QUARTERLY BIOLOGY REPORTS



FISH AND GAME DIVISION — BIOLOGY SECTION

STATE CONSERVATION COMMISSION

TABLE OF CONTENTS

ABSTRACTS

ABSTRACTS OF ALL PAPERS PRECEED THE PAPERS IN THE REPORT..... (Page I - V)

****

FISHERIES — PAGE NO.

1. QUANTITATIVE CREEL CENSUS OF FOUR IOWA LAKES, MAY - SEPTEMBER, 1959
   By Tom Moen..... 1 - 6

2. CREEL CENSUS OF CEDAR RIVER, SHELLROCK RIVER AND SWEET MARSH, 1959
   By Bill Tate..... 7 - 11

3. SUMMARY OF INVESTIGATIONAL SHOCKING ON THE MISSISSIPPI RIVER IN THE VICINITY OF LANSING, IOWA, 1958.
   By R. E. Cleary.....12 - 18

4. PRELIMINARY REPORT ON THE USE OF A REPELLENT TO DRIVE FISH IN STREAMS
   By Harry M. Harrison.....19 - 23

5. MISSOURI RIVER CREEL CENSUS - 1959
   By Delmar Robinson.....24 - 26

GAME

1. RESULTS OF THE 1959 BOW HUNTING FOR DEER
   By Eldie W. Mustard.....27 - 33

2. THE 1959 IOWA QUAIL SEASON
   By M. E. Stempel.....34 - 38

3. CURRENT WATERFOWL POPULATIONS INFORMATION
   By James G. Sieh.....39 - 40

4. THE 1959 IOWA PHEASANT SEASON
   By Richard C. Nomsen.....41 - 43

5. KNOWN MORTALITY OF IOWA DEER ATTRIBUTABLE TO DECIMATING FACTORS OTHER THAN LEGAL HUNTING IN 1959.
   By Eldie W. Mustard and Paul Leaverton.....44 - 50

ABSTRACTS OF QUARTERLY BIOLOGY REPORTS

Quantitative Creel Census for Four Iowa Lakes May - September, 1959

by
Tom Moen
Fisheries Biologist

Abstract

Quantitative creel census techniques were employed to obtain estimates of total fishing pressure, total harvest, and fishing success on four northern Iowa lakes during the five month period of May through September, 1959. During the five months these four lakes, totaling 6,429 surface acres, were fished by 160,621 fishermen who caught an estimated 1,647,300 fish at an average rate of 3.1 fish per hour. The average acre of water had a fishing pressure of 81 hours and produced 78 pounds of fish. In 1959 the fishing pressure on these four lakes increased fifteen per cent. Data concerning the catch by species for each lake are presented in table form.

Creel Census of Cedar River, Shellrock River and Sweet Marsh, 1959

by
Bill Tate
Fisheries Biologist

Abstract

A total of 120 anglers were contacted on the Upper Cedar River and the Shellrock River. Fishing pressure was concentrated in the stretches of water below the dams in both streams. Most of the fishermen (90%) were seeking Channel Catfish and the catfish comprised about half of the total catch (47%).

Most of the anglers were bank fisherman and males.

Angling success on both streams was high, with 0.94 fish per hour for the Cedar River fishermen and 0.96 fish per hour for the anglers contacted on the Shellrock River.

A similar census on Sweet Marsh indicated a catch of 4.03 fish per hour which was comprised of bullheads almost entirely.

It was calculated that the average angler contacted on the Upper Cedar River made 16 trips during the year and spent $23.63 on his sport. The fishermen on the Shellrock made 9 trips per year and spent $22.17. The Sweet Marsh fishermen averaged 5 trips during the year and spent $11.77 pursuing bullheads.

Summary of Investigational Shocking on the Mississippi River in Vicinity of Lansing, Iowa, 1958

by
R. E. Cleary
Fisheries Biologist

Abstract

During the summer of 1958 attempts were made to determine one or more physical or climatic factors affecting the effectiveness of the electric shocking device used in inventorying Iowa's stream fishes. Relationships between size of catch (numbers) and water and air temperatures, turbidity, electrical resistance, cloud cover, wind direction and velocity, and time of day were noted and for the most part proved negative. A direct relationship between catch and water temperature was the most apparent.

Various types of electrodes (grids) were teated under various conditions and habitats and a piece of copper coated rod or weighted copper tubing proved the most efficient. The length and size of the rod purely a matter of choice or convenience.

Preliminary Report on the Use of a Repellent to Drive Fish in Streams

by
Harry M. Harrison
Fisheries Biologist

Abstract

This paper reports the results obtained from seven field tests employing a Chemical, AQUALIN, as a repellent to drive fish in streams. This work revealed the chemical to be effective. The distances that the material drove fish varied, with circumstances, from two to eight miles. Large fish moved the greatest distances. Mortality occurred in five of the seven tests, but in no case did it exceed an estimated 10 per cent of the population.

III

Results of the 1959 Bow Hunting Season for Deer

by
Eldie W. Mustard
Game Biologist

Abstract

Iowa bow hunters (1,491) reported harvesting 255 deer during the 31-day open season, for a hunter success ratio of 16.2 per cent. The bow hunters further reported hunting 64,385 hours, or about 41 hours per hunter. An average of 252 hours of hunting was required to reduce a deer to possession during the 1959 season, which was much less than the 363 hours required in 1958.

The sex ratio of the deer in the harvest was 238 males; 100 females; with an age ratio of fawns per 100 adults of 35:100.

Bow hunters reportedly sighted 20,984 deer during the bow season for an average of 13.3 sighted per bow hunter, and a rate of about 0.33 deer seen per hour hunted.

The 1959 Iowa Quail Season

by
M. E. Stempel
Game Biologist

Abstract

The 1959 Quail season opened October 31 in 66 Iowa counties. Thirty-four per cent of hunters thought the season was poorer than in 1958. Twelve per cent thought the 1958 season was less productive than in 1957. The number of coveys flushed by the most successful single party was less than in 1958. South-central Iowa had the poorest shooting. Southeastern Iowa had good success. Outlying counties had lower success than in 1958. The best hunting, in birds per hour, was in early November. Hunters using dogs had the best success.

IV

Current Waterfowl Population Information

by

James G. Sieh
Game Biologist

Abstract

Indications of poor reproduction of ducks on the breeding grounds during the summers of 1958 and 1959 were corroborated by age and sex data gathered during the hunting seasons of 1958 and 1959 in the Mississippi Flyway. Age ratios of mallards obtained from hunting kills at Stuttgart, Arkansas since 1946 indicate very serious population declines in 1958 and in 1959. Geese populations apparently remain in satisfactory condition. The fate of our depressed duck population depends upon habitat conditions and breeding success in 1960.

The 1959 Pheasant Season

by

Richard C. Nomsen
Game Biologist

Abstract

Pheasant hunting success in 1959 was below normal due to low production of young plus very unfavorable hunting conditions. The 7,870 hunters contacted had bagged 6,422 cocks while hunting a total of 28,061 hours. Each bird bagged required 4.4 hours of effort compared to 3.1 hours in 1958. The number of birds checked per 100 hunters decreased from 118 in 1958 to 82 during the past season. Crippling loss was lower because of the snow cover.

V

Missouri River Creel Census - 1959

by

Delmar Robinson
Fisheries Biologist

Abstract

A "spot" check creel census program was carried on in the Iowa waters of the Missouri River during 1959.

Of the 724 fishermen contacted during this project: 44% were seeking catfish: 19% expressed no species preference: 17% preferred carp: and 15% were fishing for crappie.

The species composition of the angler catch in this study was as follows: 34% carp, 25% catfish and 24% crappie. Sheepshead and sauger made up the bulk of the remaining catch.

Anglers success was .69 fish per hour during the period studied.

Known Mortality of Iowa Deer Attributable to Decimating Factors Other Than Legal Hunting in 1959

by

Eldie W. Mustard and Paul Leaverton

ABSTRACT

A total of 508 deer were reported to have been killed during 1959 by decimating agents other than legal hunting. Traffic accidents claimed 403 of the deer, with damages to the autos involved amounting to over $34,000.00.

A spring peak and a fall peak in the number of deaths reported was noted; the peaks are believed to be associated with activities related to fawning and rutting respectively.

The sex ratio of the deer was 140 males: 100 females, which agreed quite closely with that found in the deer checked during the 1959 shotgun season for deer.

Quantitative Creel Census of Four Iowa Lakes
May - September, 1959

by
Tom Moen
Fisheries Biologist

Quantitative creel census techniques were employed to obtain estimates of total fishing pressure, total harvest, and fishing success on four northern Iowa lakes during the summer of 1959. The lakes censused were Clear, Black Hawk, North Twin and Lost Island. The 1959 season was the third year that quantitative methods have been used to obtain data concerning fishing on these waters during the same five month period of May through September.

The method of gathering and processing the data has been described in detail by E. T. Rose in previous Quarterly Biology Reports. For that reason only a brief summary of the method will be presented in this paper.

Method

One census clerk was assigned to North Twin and Black Hawk Lakes; one clerk was assigned to Clear Lake and one to Lost Island Lake. Each clerk followed a carefully planned schedule as to the time he would make fisherman counts and interviews. Special consideration was given to week ends and early and late fishing periods of each day in order to sample an adequate portion of the fishing each month. All boats and shore fishermen were counted every two hours during any one eight hour period. In the interval between these counts the clerk conducted interviews with fishermen who had completed their fishing trip. During the past two seasons the clerks were instructed to record data concerning the success of shore fishermen even though they had not completed their fishing but had fished at least two hours. These interviews supplied data necessary for calculation of the various statistics of measurement such as fish per hour, fish per man, weight of the fish, etc. Through the use of an IBM Data Processing Machine these foregoing items are calculated on a monthly basis.

General Results

These four lakes vary in size from 569 to 3,643 surface acres and have a combined surface area of 6,429 acres. During the five month period the four lakes were fished by 160,621 fishermen who caught 1,647,300 fish at an average rate of 3.1 fish per hour (Table 1). Individually the fishing pressure ranged from 31 hours per acre at Clear Lake to 237 hours on Lost Island Lake. The average rate of catch ranged from 1.4 fish per hour at Clear Lake to 3.4 fish per

hour at Lost Island Lake. The total of 532,722 hours of fishing estimated for these four lakes is fifteen per cent more than recorded for 1958.

Table 1. Basic catch data for four lakes censused May-Sept., 1959.

Name of Lake	Area (acres)	Total fish caught	Total pounds per acre	Total fishing trips	Average No. fish per hour
North Twin	569	87,817	73	13,940	2.4 *
Black Hawk	957	201,890	105	25,584	2.7 **
Lost Island	1,260	1,195,258	255	83,598	3.4 ***
Clear Lake	3,643	162,338	14	37,499	1.4 ***
Totals and/ or averages	6,429	1,647,303	78	160,621	3.1

* 74 per cent yellow bass
** 50 per cent bullheads
*** over 80 per cent bullheads

The salient features of the catch will be discussed under separate headings for each lake. Data concerning the catch by species for each lake appears in appendix tables one and two.

Lost Island Lake

Fishing pressure on Lost Island Lake has increased steadily over the past three seasons, from about 40,000 fishermen in 1957 to 83,000 in 1959. The harvest has tripled during the same period of time, reaching 255 pounds per acre in 1959. The average rate of catch for the three years has varied less than five per cent.

Bullheads made up 99 per cent of the catch and 95 per cent of the total weight. Eighty-seven per cent of the bullheads were taken during May and June. In spite of this heavy reduction there has been only a slight increase in the average length and no noticeable increase in weight during the past season.

Crappies and carp each contributed slightly more than five pounds per acre to the total harvest. In addition to the above named species, sheepshead, walleye, largemouth bass, channel catfish, yellow perch, and suckers were also taken by fishermen.

North Twin Lake

Contrary to customary fishing success during the summer months, the success at North Twin Lake improved each month during the census period. Fishermen caught fish at 1.5 fish per hour in May and the catch increased to over three fish per hour in September. This surprisingly good fishing through the summer months was brought about by a consistent fishery for yellow bass. Yellow bass comprised 74 per cent of the catch by numbers and 60 per cent of the weight. This is more than a two-fold increase over the 1958 estimates.

The bullhead fishing has declined over the past three years. They made up 18 per cent in 1959 and 52 per cent in 1958. This occurred in spite of the fact that the number of anglers remained quite constant.

Although the relative importance of the carp decreased from 10 per cent of the catch in 1958 to 7 per cent in 1959 the total number and weight of the carp increased over the 1958 figures.

Crappie, walleye, channel catfish, and northern pike each made up less than one per cent of the total catch. Without the yellow bass, fishing would have been considered poor for North Twin Lake in 1959.

Black Hawk Lake

The 1959 census data indicates that fishing on Black Hawk Lake was much improved (2.7 fish per hour) over that for 1958, and it was more than five times as good as 1957 fishing. Bullheads again lead the number of fish caught, increasing from 36 per cent of the catch in 1958 to 50 per cent of the catch in 1959. By weight the catch was about equally divided among bullheads, carp and channel catfish with each species contributing 29, 27, and 26 pounds per acre respectively. Each of these species made substantial increases in total poundage removed over 1958. Crappies also made good gains, making up 21 per cent of the catch in 1959 as compared to 9 per cent in 1958. The catch of walleyes increased from 1,600 fish in 1958 to 3,426 in 1959 and made up a little more than six per cent of the total weight of fish caught. Walleyes averaged about two pounds each.

Bluegill, yellow bass, largemouth bass, northern pike and suckers amounted to less than two per cent of the total catch.

Clear Lake

Bullheads supported the bulk of the fishing on Clear Lake, making up 82 per cent of the catch and 71 per cent of the weight of all fish taken.

Yellow bass, long a popular fish in Clear Lake, was relatively unimportant in the take in 1958 and dropped to even lower levels in 1959; they comprised only six per cent of the catch and four per cent of the weight. Walleye fishing was considered fair to good during the early part of the season but in the final tally they made up one per cent of the catch and nine per cent of the weight. The average walleye weighed between two and three pounds. Crappie fishing increased about five-fold, from about two per cent of the catch in 1958 to nine per cent in 1959. The bulk of the crappie fishing occurred during the month of June.

Bluegills, white bass, largemouth bass, yellow perch, northern pike, channel catfish, suckers, and carp made up slightly more than two per cent of the total catch.

Appendix Table 1

Number, weight and pounds per acre of each species caught by anglers fishing North Twin and Black Hawk Lakes during the period of May through September, 1959.

Species	North Twin Lake - 569 A. Number	Weight	Lbs/acre	Black Hawk Lake - 957 A. Number	Weight	Lbs/acre
Bluegill				1,874	426	T *
Crappie	128	55	T	53,107	14,553	15
Walleye	121	201	T	3,426	6,494	6
Channel Catfish	8	43	T	21,204	24,927	26
Black Bullhead	16,112	6,073	10	101,271	28,100	29
Yellow Bass	65,500	24,874	44	1,284	325	T
Northern Pike	28	90	T	68	391	T
L. M. Bass	00	00	0	30	73	T
Comm. Sucker				21	21	T
Carp	5,920	10,108	18	19,476	25,656	27
Totals	87,817	41,444	73	201,890	101,041	105
Number of Anglers		13,940			25,584	
Total hours of fishing		35,851			75,148	
Hours of fishing per acre		68			79	
Average number of fish per man		6.4			7.9	
Average number of fish caught per hour		2.4			2.7	

* less than one pound per acre

Appendix Table 2

Number, weight and pounds per acre of each species caught by anglers fishing Clear Lake and Lost Island Lakes during the period of May through September, 1959.

	Clear Lake - 3,643 acres			Lost Island - 1,260 acres		
Species	Number	Weight	Lbs/acre	Number	Weight	Lbs/acre
Bluegill	2,253	876	T *	38	10	T
Crappie	14,988	4,260	1	9,934	6,780	5
Walleye	1,928	4,432	1	326	1,013	1
Black Bullhead	132,108	36,829	10	1,181,349	303,884	241
Yellow Bass	9,583	2,133	T	00	00	0
White Bass	363	150	T	00	00	0
L. M. Bass	46	225	T	71	264	T
Yellow Perch	405	61	T	23	2	T
Northern Pike	71	254	T	00	00	0
Channel Catfish	184	248	T	30	111	T
Common sucker	268	805	T	00	00	0
Sheepshead	00	00	0	1,506	1,436	1
Carp	131	1,254	0	1,974	7,358	6
Totals	162,338	51,527	14	1,195,258	320,859	255
Number of Anglers		37,499			83,598	
Total hours of fishing		112,895			298,828	
Hours of fishing per acre		31			237	
Average number of fish per man		4.3			14.3	
Average number of fish caught per hour		1.4			3.4	

* less than one pound per acre

Creel Census of Cedar River, Shellrock River and Sweet Marsh, 1959

by
Bill Tate

Fisheries Biologist

During the spring and summer of 1959 spot censuses of anglers were made on the Cedar and Shellrock Rivers. Several contacts were also made at Sweet Marsh in conjunction with survey activities. The Cedar River was censused from St. Ansgar to the dam at Palisades Park near Mt. Vernon, and the Shellrock River from its junction with the Cedar to Nora Springs. The river anglers were contacted on week ends. Inclement weather and fluctuating water levels particularly in the Cedar River from Waterloo downstream probably reduced fishing pressure. In the winter kill area of the Cedar River, from the dam at Nashua to the village of St. Ansgar, very few contacts were made although this area was visited regulary. The catch in this area was negligible in 1959, according to both the fishermen who regularly fish this area and to the few contacts made in the field.

As reported by Cleary (1959) in a similar Creel Census on Southeast Iowa Streams, most of the fishing pressure on the Cedar and Shellrock Rivers in 1959 was concentrated immediately below the dams. Impoundment fishing for Crappie, Bluegill and other species is passe on week-ends, because of the boating activity. Contacts were made by driving to spots of known heavy fishing pressure; boat survey on impoundments; and by floating selected sections of stream which were reported to be heavily fished.

The Census clerk recorded the distance the fisherman had traveled; the number of trips made per year; whether bank, boat or wading fishermen; value of his gear; species of fish being sought; sex of angler; and, the number and species of fish caught as well as the duration of the fishing period.

All of the anglers contacted were fishing for a particular species of fish (or a combination of species). The Channel Catfish was being sought by 90% of the anglers contacted on the Upper Cedar and Shellrock Rivers. Bass were next in angler preference (Table 1).

Table 1: Type of Fish Sought by Anglers on Upper Reaches of Northeastern Iowa Rivers.

Species	Cedar	Shellrock	Total	Angler-Preference
Catfish	76	44	120	90 %
Carp	1	0	1	Tr.
Bullheads	3	0	3	2 %
Bass	5	3	8	6 %
Crappie	1	1	2	1 %
Walleye	1	1	2	1 %
	87	49	136	

Tr. -- Less than 1%

Boat fishermen were far outnumbered by the bank fisherman and men outnumbered women by about the same proportion (Table 2).

Table 2: Angler Type in Sample taken on Northeast Iowa Inland Rivers.

River	Boat-Fishermen	Bank-Fishermen	Male	Female	Total
Cedar	11	76	78	9	87
Shellrock	2	47	45	4	49

Although several species of fish were taken as indicated by this Creel Census, channel catfish comprised almost half of the total catch (47%) and with carp and bullheads, these made up 86% of the catch. Bass represented 5% of the total catch. Cleary (op cit), reported 1958 catch per hour figures ranging from 0.25 for the lower Iowa River to 0.63 for the lower Cedar and Des Moines Rivers. The catch per angler hour in 1959 was 0.94 for the upper Cedar River and 0.96 for the Shellrock River (Table 3).

Table 3: Angling Success and Effort on Upper Reaches of Rivers in Northeast Iowa.

Species	Cedar	Shellrock	Totals	% of Catch
Catfish	81	32	113	47
Carp	47	1	48	20
Bullheads	27	18	45	19
Bass	6	8	14	5
Crappie	1	2	3	1
Walleye	0	1	1	Tr.
Bluegill	2	0	2	Tr.
Sunfish	2	0	2	Tr.
Sucker	3	6	9	3
Sheepshead	2	0	2	Tr.
Redhorse	2	1	3	1

Table 3: Continued.

Species	Cedar	Shellrock	Totals
No. Anglers Interviewed -	87	49	136
No. Unsuccessful Anglers -	31	22	53
No. Unsuccessful Hours -	44.55	28.45	73
No Fish Caught -	173	69	242
No. Success Hr. -	139.15	43	182.15
Fish/Success Hour -	1.25	1.60	
Fish/Angler Hour -	0.94	0.96	

Anglers using the Upper Cedar River in 1959 spent an average $23.63 in pursuit of their sport. Fishermen on the Shellrock made fewer trips but spent about the same on fishing, $22.17 (Table 4).

Table 4: Inland River Creel Census Evaluation - Upper Reaches

River	No. Ang. Contact	Av. Trips to River	Total Dist. Trav.	Av.Trav. Expense Year(1)	Av.Cost of Gear Year(2)	Av.Misc. Cost Year(3)	Av. Tot. cost/Ang. per/Yr.
Cedar	87	17	22,268	$ 8.94	$ 4.42	$10.27	$23.63
Shellrock	49	9	15,918	$11.37	$ 4.11	$ 6.69	$22.17

1. Based on 3½¢ mile (AAA Operation only costs).
2. Based on five-year depreciation schedule on estimated replacement value.
3. Based on average trips per year X 50¢ for bait, plus fishing license at $2.00.

Intermittently throughout the spring and summer anglers were contacted at Sweet Marsh and the same information was gathered as for the River Creel Census. Following a drastic thinning by winter kill the bullheads in Segment B and C of Sweet Marsh grew rapidly and by mid-June, 7 to 13 inch bullheads were being harvested by the hundreds each day. One fisherman reported that he had caught 1200 bullheads from the Marsh when interviewed in mid July.

Most people fishing at Sweet Marsh (92%) were fishing for bullheads (Table 5).

Table 5: Type of Fish Sought by Anglers on Sweet Marsh.

Species	Total	Anglers Preference
Bullhead	54	92 %
Bass	3	7 %
Northern Pike	1	Tr. %
Carp	1	Tr. %

Tr. Less than 1%

All that were contacted were bank fishermen and every third angler was a woman (Table 6).

Table 6: Angler Type in Sample taken on Sweet Marsh.

Area	Boat-Fishermen	Bank-Fishermen	Total	Male	Female
Sweet Marsh	0	56	56	42	14

Although our contacts were not made during the periods of best success and extended throughout the season, the catch was excellent. Practically all the fish caught were bullheads (98%) with a few carp, sunfish and chubs (from Plum Creek, a tributary stream to the Marsh) taken. Of 56 anglers interviewed, only 6 (11%) that had spent 7 hours fishing were unsuccessful. The catch per angler hour was 4.03 (Table 7). By the first of August, young of the year bullheads had entered the catch and fishing pressure decreased.

Table 7: Angling Success & Effort on Sweet Marsh

Species	Sweet Marsh	Total	% of Catch
Bullhead	574	574	98 %
Carp	3	3	Tr.
Sunfish	2	2	Tr.
Chubs	2	2	Tr.

No.Anglers Interviewed -	56
No. Unsuccessful Anglers -	6
No. Unsuccessful Hours -	7
No. Fish Caught -	581
No. Successful Hours -	137
Fish/Success. Hour -	4.24
Fish/Angler Hour -	4.03

The average fisherman traveled 17.5 miles to fish at Sweet Marsh and spent $11.77 in pursuit of bullheads (Table 8).

Table 8: Inland Creel Census Evaluation on Sweet Marsh.

No.Ang. Contact	Av.Trips to area/ Angler	Tot.Dist. Traveled	Av.Trav. Expense Year(1)	Av.Cost of Gear Year(2)	Av. Misc. Cost per Year(3)	Av. Tot. Per Ang. Per Year
56	5	4,994	$ 3.11	$ 4.11	$ 4.55	$ 11.77

1. Based on 3½¢ mile (AAA Operation only costs).
2. Based on five-year depreciation schedule on estimated replacement value.
3. Based on average trips per year X 50¢ for bait, plus fishing license at $2.00.

The Upper Cedar River and the Shellrock River contributed about one fish per hour to the angler's catch. This catch compares favorable with good fishing waters throughout the nation.

Bibliography

Cleary, R. E.
1959. Inland River Creel Census and Angling Evaluation Southeast Iowa 1958. Quarterly Biology Reports: 11, No. 1, pp. 17-20.

Summary of Investigational Shocking on the Mississippi River in Vicinity of Lansing, Iowa, 1958

by
R. E. Cleary
Fisheries Biologist

Two field stations were established in the vicinity of Lansing, Iowa, to test the effects of certain ecological variables on shocker efficiency. One station was a heavily vegetated, running slough (Barge Slough); the other directly on the navigation channel.

During four separate weeks, portions of each station were shocked in the a.m. and different but adjacent portions after dark. The "shocked" fish were identified as to species and allowed to remain where they were stunned. Only the "bow observer" made the counts and determinations; and only identifiable fish were counted -- no "splashes" or "boils". A ratio of unidentifiable to identifiable fish was established during the course of the survey at 1:1.

It was readily recognized that there were two very important variables which could not be completely evaluated. One, that the disturbance caused by day-after-day crew activities could have caused some fish to leave the study area; and two, that the normal seasonal migration of fish in and out of the study area could have caused fluctuation in counts.

The shocker equipment used was that which has been more or less standardized in inventorying Iowa river fish. The generator was a 3-phase, 2500-watt, 180 cycle, A.C.-D.C. machine. It produced 230 volts of A.C. current at 6.3 amps. The grids (3 in number) were boom-rigged, 1/2-inch copper rods, 5 feet long and fanned in a 90 degree arc from the front of a 20-foot flat boat.

The following determinations (of variables) were made prior to each shocking traverse:

a) Water and air temperature.

b) Turbidity (Sechii disk reading).

c) Cloud cover.

d) Wind direction and velocity.

e) Time of day (night or day).

f) Amperage at each electrode.

In order to eliminate personnel bias, only the man in the bow of the boat made the species identification and his position was alternated on a daily basis with that of outboard operator.

The ideal location for this experiment would have been in a drainable pond where exact numbers and species of fish were known. However, pond fish seemingly do not react as do river species and the fluctuations within the variables themselves would not have been even as pronounced as they were in the river (even here ranges proved rather limited during the course of the investigation).

Despite the fact that visually similar areas were halved for night and day shocking in hope of attaining paired comparisons, we had in reality four distinct test areas. We did not subject the same areas to both day and night shocking because we assumed that the disturbance and the short (12 hour) re-adjustment period between periods of electro-stimuli would tend to drive fish from the investigational area.

To check the effect of the 24-hour recovery period on the stability of the fish in the test area, the first day's catch of each of the four periods was used as an index (number underlined in Table 1). If the average of the succeeding day's catches was definitely lower than the index number, then it was assumed that fish were driven out of the area; if the mean approximated or was definitely higher than the index number, then shocking activities did not disturb the resident population.

In eight of the possible sixteen instances, the weekly mean was higher than the initial day's catch (Table 1), indicating a chance situation in the catch. In five out of eight cases it was higher at night, indicating the fish are less inclined to move from familiar surroundings at night.

Table 1. Daily Counts of Fish Made at Four Shocking Stations on the Mississippi River.

Date	Upper Barge Slough-P.M.	Lower Barge Slough-A.M.	Upper Lansing Channel -P.M.	Lower Lansing Channel -A.M.
July 8	-	128	-	68
July 9	22	26	17	13
July 10	36	27	32	17
July 11	16	16	17	19
August 4	65	32	58	-
August 5	73	49	46	27
August 6	25	54	121	45
August 7	36	41	81	47

Table 1. (Continued)

Date	Upper Barge Slough-P.M.	Lower Barge Slough-A.M.	Upper Lansing Channel -P.M.	Lower Lansing Channel -A.M.
August 8	31	23	56	34
August 18	33	36	22	22
August 19	24	34	15	9
August 20	25	25	17	17
August 21	21	12	11	14
August 22	-	15	-	5
September 22	32	92	9	6
September 23	-	42	-	13
September 24	35	50	14	12
September 25	62	67	31	8
September 26	40	44	22	11

The effectiveness of any electrical field in shocking fish depends primarily on certain environmental and mechanical resistances, which in turn depend on the conductivity of the water and of the bottom; the depth of the water; the fish themselves; and the mechanics of transferring the electrical charge from the generator to the water.

In this project we arbitrarily assumed that the size and format of the fish population, the individual fish, the quality of the bottom, and the mechanical transfer of electricity were reasonably constant. The weakest link in this hypothesis being that the fish population remained unaltered or nearly so. In fact, we are quite sure this was not the case, but we have no factor to adjust the catch figures to compensate for this variation in numbers.

The conductivity of the water being a function of the amount of dissolved salts is a variable and as such is expressed by amperage determinations. Both temperature and turbidity determine ionization of dissolved salts which in turn governs conductivity. These factors were determined directly by standard measurements. The other variables investigated in the project, cloud cover, wind direction, and water velocity, could affect the visual acuteness of the observer rather than the fish-taking ability of the shocking device, but these had to be considered in a study of this type.*

Table 2. Ecological Data for Barge Slough at Lansing, Iowa.

Date	A. M. Water Temp.	Turbid.	Neb.	Wind	Amp.	P. M. Water Temp.	Turbid.	Neb.	Wind	Amp.
June 23	67	10"	Brt.	N-S	-	67	10"	Rain	NW-M	-
July 8	72	(F) 7"	P.C.	Calm	2.3	-	-	-	-	-
July 9	72	(R) 7"	P.C.	S-H	5.0	72	(R) 12"	Cl.	W-S	2.3
July 10	75	(R) 8"	Cl.	N-S	4.3	75	(R) 8"	Cl.	N-S	-
July 11	75	(R) 9"	C-Fog	Calm	-	75	(R) 9"	P.C.	N-M	-
Aug. 4	83	(S) 9"	Brt.	Calm	5.0	83	(S) 9"	Cl.	None	5.0
Aug. 5	78	(S) 9"	Cl.	SW-S	4.0	85	(S) 9"	P.C.	Calm	5.0
Aug. 6	78	(S) 9"	Cl.	Calm	5.0	80	(S) 9"	P.C.	SW-S	5.0
Aug. 7	79	(R) 9"	Brt.	N-H	4.0	79	(R) 9"	Brt.	NE-S	5.0
Aug. 8	79	(R) 9"	Brt.	Calm	4.0	79	(R) 9"	Brt.	Calm	5.0
Aug. 18	79	(S) 10"	Brt.	S-S	4.6	79	(S) 10"	P.C.	Calm	4.0
Aug. 19	79	(S) 8"	P.C.	Calm	3.3	77	(S) 8"	P.C.	Calm	3.3
Aug. 20	77	(R) 8"	Cl.	NW-S	3.6	77	(R) 6"	P.C.	Calm	3.6
Aug. 21	76	(F) 8"	Brt.	NW-M	3.7	74	(F) 9"	Brt.	Calm	3.8
Aug. 22	70	(F) 10"	-	Calm	3.1	-	-	-	-	-
Sept.22	65	9"	Cl.	S-H	4.0	65	9"	Brt.	S-M	4.0
Sept.23	65	10"	Cl.	S-H	5.0	-	-	-	-	-
Sept.24	68	10"	Cl.	S-M	4.0	69	16"	Cl.	S-M	4.0
Sept.25	66	10"	Brt.	N-H	3.7	66	15"	Brt.	NW-H	3.6
Sept.26	66	12"	Brt.	S-M	4.3	66	10"	Brt.	S-S	4.0
Averages	73	9"			4.0	74	10"			4.1

(R) - Rising river
(S) - Stable river
(F) - Falling river

Nebulosity:
Brt. - Bright
P.C. - Partly cloudy
Cl. - Cloudy

Wind (letter after direction):
S- Slight
M- Moderate
H- High

* Tables 2 and 3 present the day-by-day variables and are included to show the ranges experienced; which, despite the fact that the survey progressed over a three-month period, were rather limited in scope.

Table 3. Biological Data for the Navigation Channel at Lansing, Iowa.

	A. M.					P. M.				
Date	Water Temp.	Turbid.	Neb.	Wind	Amp.	Water Temp.	Turbid.	Neb.	Wind	Amp.
June 24:	68	12"	Cl.	Calm	-	-	-	-	-	-
July 8:	75	(F) 12"	P.C.	Calm	2.3	-	-	-	-	-
July 9:	75	(R) 12"	P.C.	S-H	2.3	72	(R) 7"	P.C.	S-M	2.3
July 10:	75	(R) 11"	Cl.	W-M	2.3	75	(R) 11"	Cl.	N-S	-
July 11:	75	(R) 12"	P.C.	S-M	2.3	75	(R) 12"	Brt.	N-S	-
Aug. 4:	-	-	-	-	-	79	(S) 31"	P.C.	Calm	2.5
Aug. 5:	79	(S) 31"	P.C.	SW-H	3.0	79	(S) 20"	P.C.	Calm	3.0
Aug. 6:	79	(S) 28"	Cl.	S-S	3.0	79	(S) 28"	Brt.	S-S	3.0
Aug. 7:	79	(R) 31"	Brt.	SW-S	3.5	79	(R) 29"	Brt.	Calm	3.0
Aug. 8:	79	(F) 35"	Brt.	Calm	3.0	79	(F) 24"	Brt.	Calm	3.0
Aug. 18:	79	(S) 18"	Brt.	Calm	4.7	79	(S) 18"	Brt.	Calm	4.0
Aug. 19:	77	(S) 18"	Brt.	S-S	3.3	78	(S) 18"	P.C.	Calm	3.3
Aug. 20:	77	(R) 16"	Brt.	Calm	3.3	77	(R) 18"	Cl.	Calm	3.7
Aug. 21:	74	(S) 10"	P.C.	N-M	3.8	74	(F) 20"	Brt.	Calm	4.3
Aug. 22:	76	(F) 21"	-	Calm	3.7	-	-	-	-	-
Sept. 22:	65	21"	Cl.	S-H	3.0	65	21"	Brt.	S-S	2.5
Sept. 23:	65	21"	Cl.	S-H	2.5	-	-	-	-	-
Sept. 24:	65	21"	Cl.	S-M	2.5	78	19"	Cl.	S-M	2.5
Sept. 25:	66	30"	Brt.	N-S	3.0	66	27"	Brt.	N-S	3.5
Sept. 26:	67	22"	Brt.	S-S	2.8	66	22"	Brt.	S-M	3.0
Averages	73	20"			3.0	75	20"			3.1

(R) - Rising river
(S) - Stable river
(F) - Falling river

Nebulosity:
Brt. - Bright
P.C. - Partly cloudy
Cl. - Cloudy

Wind (letter after direction):
S - Slight
M - Moderate
H - High

If no annotation - no observation made

Discussion

The variations in the ecological factors were plotted against the mean catch and scatter diagrams were made of each factor at each station. The limited range of a single variable plus the uncorrelated appearances of the scatter diagrams, led to the decision not to attempt to statistically correlate the data (See Figs. 1 and 2).

While little significance could be ascribed to the data, certain trends toward direct relationship were found in night water temperatures in Barge Slough and both day and night water temperatures at the channel station. There also was a trend toward inverse catch rate between turbidity at night and catch at both stations.

The data on conductivity, as expressed by amperage readings, were very confused when catches of fish were used as one determinant. In fact, the data did not even show a trace of correlation between turbidity or water temperatures and amperage readings. Both of these physical variables should have been very important in determining conductivity as expressed by increased or decreased current. Evidently an undetected change in the mineral components of the water was more important than either water temperature or turbidity.

There was no apparent cause and effect relationship between degrees of cloud cover and fish catch at any of the four stations; nor between catch and wind direction or velocity; nor between the various conditions of river stage.

For several reasons identification of "shocked" fish usually gives a minimal indication of the total number which are shocked or stunned. Bottom dwellers such as catfish and bullheads are normally not seen; and crappies which do not react violently to electrical stimuli usually remain exactly where the electrical field catches up with them. Even of the fish which came to the surface or were stunned near the surface, only 50 percent remained on the surface long enough to permit visual identification.

Electrode Effectiveness

In addition to the above attempts at determining cause and effect factors in electro-fishing, several electrode patterns were tested in various habitat types. Observations were made on their manueverability and their potential for overcoming resistance.

Figure 3 pictures the various designs and sizes of the experimental grids. Grid "A" is a 5-foot piece of 1/2-inch copper tube with a steel rod insert to give it weight and stability and is the

standard survey grid used in eastern Iowa and the Mississippi River. This is a simple, stable, easily fished electrode and is practically foul-proof in any type of habitat. In the tests this battery of three grids conveyed an average of 4.5 amps into the water.

Grid "B" is a 6-foot piece of 1/2-inch galvanized pipe. It is fitted with a nipple at the distal end to allow for experimental grid designs (see "C" and "D" patterns) to be interchanged on the base pipe. The average amperage reading made while using these grids was 5.0 amps. This electrode had the same features as the type "A" except it was lighter and consequently ran rather high in the water.

Grid "C" is an adaption of the conventional, fixed, shoe-type grid used as a hand electrode in shocking small streams. The T-joints had a 9/16-inch inside diameter which allowed the shoe to revolve on the 1/2-inch galvanized base pipe. The forward action of the boat provided enough back pressure contact to complete the electrical circuit and still the shoe could swivel freely with the changes in course made by the boat. Despite the fact that this grid conducted 9.7 amps, the highest of any tested, it vibrated and hung up on weeds and brush to a point that it was discarded as a potential survey electrode.

Grid "D", despite its apparent bulkiness, handled well in all environments except heavily vegetated areas. The current built up by these electrodes averaged 8.5 in intensity (amps). Weeds "hanging" up between the rod and copper plate often forced the grid to plane the surface by interfering with the pivotal movement around the rod.

From these experiments it was decided that the standard survey electrodes offered the best design for most uses. If increased amperage was desired or necessary in certain waters, the plate type grid or smaller modifications thereof would suffice.

Preliminary Report on the Use of a Repellant to Drive Fish in Streams

by

Harry M. Harrison
Fisheries Biologist

This is a preliminary report concerning the use of "Aqualin", a repellant, for driving fish in streams.

Aqualin, the trade name of a chemical supplied by the Shell Oil Company, is a member of the acrolein family of chemicals. It is a highly volatile, colorless liquid, and is intensely irritating to the nose and eyes.

This chemical was developed and is marketed as an aquatic herbicide. It was first recognized as a repellant when fish were noticed running ahead of Aqualin-treated water in irrigation ditches being treated for aquatic vegetation. The fact that fish had a strong aversion to Aqualin in very dilute concentrations (2 ppm) was observed again at a field demonstration where the material was being demonstrated as a herbicide.

In view of this, it was decided to investigate the value of the chemical for driving fish in streams. It was resolved that the initial test would be on a broad scope rather than in detail; and on the basis of those results, the material would either be tested further or discarded.

During the summer and fall of 1959, Aqualin was introduced seven times at various places in central Iowa streams. The significant results and implications coming from that work follow in topical form:

Repellant Features: All seven tests revealed Aqualin to be an effective fish repellant. Water temperature and the concentration required had a decided influence upon the effectiveness of the chemical, but when both were favorable, all species made a concerted effort to avoid the material by swimming downstream.

The distance that the material will move fish was not determined precisely. On two occasions some fish, principally large carp, evidenced a downstream movement exceeding eight miles. In the other tests, the distance that fish moved varied between little or no movement up to approximately five miles.

A variety of factors enter into the effectiveness of the chemical in repelling fish for greater or lesser distances. These are, or may include, such things as the amount of organic matter in the water treated; technique of application; size of the individual fish; species, to some extent; and also the amount of material used and the water temperature, as mentioned previously. The degree to which these factors, either singly or in combination, influence the effectiveness of Aqualin to drive fish will require more study before positive results can be had.

The capability of the chemical to rid an area of fish was studied three times in the seven field tests. These studies involved running a 230 V shocker downstream behind the "slug" of treated water. Of the three tests, two showed good results; the third did not. The test that failed resulted from cold water (41°F.) coupled with an insufficient concentration (2 ppm) for that temperature.

The results of shocking behind the Aqualin treated water revealed it to be very effective for driving large fish. The distribution of fishes proceeding downstream in the treated area was by size -- it is thought that the effectiveness of Aqualin for driving large individuals is related to their ability as strong swimmers.

In general, the distribution of fish in the area over which Aqualin had been administered was as follows: In the first 200-500 yards below the point where the chemical had been introduced, there was no fish, save perhaps minnow fry in the very shallow water adjacent to the bar side of the stream. Beyond that segment, small minnows and the young (small fingerlings) of larger species began to appear in increasing numbers. This condition continued for approximately the next mile. At this distance adult minnows and large fingerlings (4-6 inches) of bigger species returned to near normal populations, and an occasional adult sucker (several species) or fiddler catfish was observed. They increased to near normal population levels in the ensuing mile or so of stream.

Carp demonstrated either a greater sensitivity or were more adept in avoiding the chemical than other forms. In the two areas surveyed by shocker after treatment, no carp, either large or small, were found less than two miles below the point of application. Since the tests were made in the fall, young of the year carp exceeded six inches in length and were relatively powerful swimmers. This, together with the distribution by size of the other species in the treated area, leads to the assumption that ability to swim, rather than specific tolerance, may be the important factor causing fish to move greater distances.

Specificity: Although ability to swim is regarded to be the important factor related to the extent of movement of fish, the various species also demonstrated different tolerance and response to Aqualin. This aspect was not pursued to much extent, but it was observed in cases of mortality that suckers in the genus Moxostoma and minnow, genus Notropis, were the first to show distress and die. Channel catfish and carp, on the other hand, appeared to be more resistant than other species.

Mortality: Some mortality occurred in five of the seven field tests. In only two cases, however, was there any mortality of significance and involving fish other than minnows or smaller fingerling of the larger fishes.

The two major cases of mortality involved not more than ten per cent of the population, and both occurred with extenuating circumstances. These concerned an attempt to drive fish into weirs for subsequent landing and examination. To accomplish this, the application of Aqualin was extended and fish that had gathered at the upstream side of the weir were subjected to heavy and repeated shocking in an effort to drive them into the nets. Due to lack of proper equipment, many individuals escaped the landing efforts. It is believed that most of the death loss was associated with this unusual treatment and abuse at the weir rather than from toxic effect of the chemical.

In light of the fact that a few fish succumb for no other reason than application of the chemical, Aqualin must be regarded as potentially lethal to fish. As a consequence, use of the material should be regarded with caution.

Application Rate: In the seven tests, the rate of application was maintained at or near 2 ppm. That concentration was adequate to move fish; additionally, it is a sublethal dosage, and at that dilution the cost of material (approximately $5.00 per gallon) is not prohibitive. The only variable associated with the rate of application was the length of time the material was added to the flow of the river. This controlled the length of the Aqualin-bearing "slug" moving down the stream, and also had a corresponding effect upon the time that fish would be subjected to treated waters. Again, the limited number of tests did not permit us to establish effective latitudes, but an application of 2 ppm. for fifteen minutes was found adequate to drive large numbers of fish.

Mortality occurred quite proportionately with application time exceeding fifteen minutes.

Water Temperature: The full effects of water temperature on the effectiveness could not be adduced in the limited number of tests run in 1959. The results at present could be summarized as follows:

(1) At temperatures in excess of 75°F., fish respond quickly to Aqualin in dilutions of 2 ppm; (2) Below 65°F., response drops rapidly at 2 ppm; and (3) Below 40°F., fish showed very little response.

Discussion

Rough fish, including carp, quillback, and a variety of suckers are recognized as the most important factor limiting game and/or pan fish in this state's warm water streams. Survey data and information resulting from pollution or controlled chemical kills leave no doubt that rough fish dominate the vast majority of Iowa's flowing waters. In many cases, species of little or no value to the sport fishery constitute 90 per cent of the total population by number and as much as 95 per cent by weight. As a consequence, improved angling in our streams is contingent with adequate control over coarse species.

The earliest endeavor to control rough fish in Iowa streams was by means of conventional drag seines. Seining soon was abandoned when it was found that it was impossible by this method to take fish in poundage large enough to have a detectable influence upon the remaining population.

The next attempt at controlling species composition in streams involved the use of entrapment devices affixed to fish ladders stalled at a series of dams along the Des Moines and Cedar Rivers. Like seining, this method failed to take fish in sufficient numbers or poundages to merit continuation.

More recently, fish toxicants have been utilized by the Conservation Commission to control fish population in Iowa streams. This technique has furnished means of destroying fish in quantities adequate to have a real effect upon the habitat, but it carries with it the destruction of game fish as well as trash species.

Comes now another approach to the problem of controlling rough fish in streams, that of employing repellants. On the basis of our preliminary tests, the material used appears to have considerable merit, but the technique of using it needs further exploration.

These exploratory studies should be directed toward: (1) determining the minimum lethal dosages of the chemical as related to water

temperature; (2) finding the proper method of application; (3) evaluating its repellant qualities by size of fish as well as by species; and (4) developing entrapment devices adequate to take and hold for handling large numbers of fish in flowing water.

When these things are known, we will be a step nearer to the control of stream fish populations.

Missouri River Creel Census - 1959

by
Delmar Robinson
Fisheries Biologist

This report concerns angler success in the Iowa waters of the Missouri River during the open water months from April through November of 1959. This project was initiated in September of 1958 and will be continued in the future.

The method employed was the "spot census" in which the personnel (biologist or biologist aide) made contacts in the field with fishermen actively engaged in fishing or just completing a fishing trip. Information obtained from each angler was recorded on individual census cards and includes the following: date, time and place of the interview, amount of time spent fishing up to the time of the contact, the kind and number of fish caught, principal species being fished for, bait used, and the distance the fisherman had traveled to fish. To insure coverage of both the boat and bank angler, a boat was used extensively to contact anglers fishing from boats as well as those fishing in areas not readily accessible by car.

All interviews included in this report were made in the section of the Missouri River from Sioux City to Council Bluffs.

The original plan was to make all creel census contacts in conjunction with routine work on the river. However, it soon became apparent that the number of contacts that could be accomplished in that manner would be far too few to be of any value. Consequently, extra effort and time were devoted to checking "hot" spots near the large cities and at the mouths of the major tributaries. One of the most important angling spots on the entire river was the mouth of the Big Sioux River and many contacts were made at this point.

The 724 fishermen contacted during this study had caught 1,194 fish in 1,726 hours of fishing and at a rate of .69 fish per hour. (Table 1.)

Table 1. Rate of Catch of Fish from the Missouri River - 1959

Fishermen Contacted	Total hours Fished	Total Fish Caught	Rate of Catch Per Hour
724	1,726	1,194	.69

Fourty-four per cent of the anglers contacted came to the river to catch catfish: while 19 per cent had no preference as to species.

Fishing for carp and crappie were equally important in the anglers' desires with one in five anglers expressing fishing interest in either species. Little interest was expressed in the balance of the game fish species with only four per cent of fishermen trying for sauger and one per cent trying to catch largemouth bass. (Table 2.)

Table 2. Species Preference of Anglers Missouri River - 1959.

Species	Number of Anglers Preferring	Per Cent of Total
Catfish	315	44%
Anything	136	19%
Carp	122	17%
Crappie	108	15%
Sauger	32	4%
Largemouth Bass	8	1%
Bullhead	2	Trace*
Sheepshead	1	Trace*

*Less than 1%

Carp and catfish made up almost 60 per cent of the anglers catch in the Missouri River. Pan fishing was fair with crappie and bluegill accounting for 26 per cent of the total catch from the river. (Table 3.)

Table 3. Species Composition of Angler Catch from Missouri River 1959

Species Caught	Number Caught	Per Cent of Total
Carp	410	34%
Catfish	294	25%
Crappie	286	24%
Sheepshead	72	6%
Sauger	44	4%
Bullhead	26	2%
Bluegill	22	2%
Goldeye	12	1%
Perch	10	Trace*
Largemouth Bass	6	Trace*
Flathead catfish	6	Trace*
Shad	2	Trace*
Sturgeon	2	Trace*
Sucker sp.	1	Trace*
Spoonbill Catfish	1	Trace*

*Less than 1%

This initial creel census data indicates that sport fishing in the Missouri River in the portion of the river studied is primarily confined to fishing for carp and catfish with a few anglers seeking pan fish or the larger game species. However, lack of access areas and public roads near the river make it extremely difficult for any but the dedicated fisherman to successfully fish the Missouri River.

Results of the 1959 Bow Hunting Season for Deer

by
Eldie W. Mustard
Game Biologist

INTRODUCTION

Iowa bow hunters were allowed to participate in the 1959 deer harvest for the seventh consecutive year. Regulations covering the October 31 - November 30 (31-day) season were as follows: weapon limited to bows of 40-pound pull or greater, using broadhead arrows; hunting was allowed daily from 6:30 A.M. to 5:30 P.M.; deer of any age or sex were legal game; a season, daily, and possession limit of one deer; with hunting allowed on a state-wide basis.

METHODS

All persons securing a bow permit to hunt deer are required to submit a hunter report card within three days after the close of the bow portion of the open deer season. The data presented here were obtained from these report cards.

RESULTS

Card Returns

A total of 1,627 bow permits were issued for the 1959 bow season for deer. Report cards were received from 1,541 bow hunters, for a 94.1 percent return. Fifty permit holders reported they did not hunt, which left a total of 1,491 hunters who participated in the 1959 deer season, and who returned their report cards.

Total Kill and Hunter Success Ratio

Iowa bow hunters reported harvesting a total of 255 deer during the 1959 deer season, for a hunter success ratio of 16.2 percent. Table 1 indicates the kill greatly exceeds that recorded in any other previous deer season, with the hunter success ratio also being higher than for any previous season.

Figure 1 indicates the 1959 deer kill by county and the number of bow hunters reporting hunted in each county.

Total Hours Hunted, Hours Hunted per Deer Harvested, and Average Hours Hunted per Bow Hunter

Total hours hunted: Iowa bow hunters reported hunting a total of 64,385 hours during their 31-day season. This amounts to an

equivalent of 8,048 eight-hour working days, or, more strikingly put, over 22 years of eight-hour days!

The importance of the Iowa deer herd in providing recreation for our Iowa bow hunters cannot be underestimated, as the above figures tend to indicate.

Hours hunted per deer harvested: An average of 252 hours of hunting effort was required for every deer reduced to possession by the bow hunters during the 1959 season. This figure, while it may appear high, is actually 111 hours less than the corresponding figure for the 1958 deer season when an average of 363 hours was required for each deer harvested by the bow hunters. As indicated in Table 1, the hours of hunting required to bag a deer have been reduced each year since 1956. The primary reason for this reduction is probably the fact that the Iowa bow hunters are becoming more experienced, but this alone could not, it seems, account for the vast difference between the 1958 and 1959 figures.

Average number of hours hunted per hunter: The average bow hunter reportedly hunted 40.8 hours during the 1959 open deer season. This is a reduction of 4.3 hours from the 45.1 hours averaged during the 1958 season.

Deer Observed

Bow hunters reported sighting 20,984 deer while hunting in 1959, for an average of 0.33 deer seen per hour of hunting. This figure is practically the same as for 1958 (Table 1).

Sex And Age of Deer Harvested

Sex:

The breakdown of deer killed by bow hunters indicates that 178 males and 75 females were reportedly harvested, with three of unreported sex. This indicates that 69.5 percent of the kill were males, and 29.3 percent females, with a sex ratio of 238 males: 100 females in the harvest. This compares almost identically with the sex ratio of the 1958 harvest which was 237 males: 100 females.

Sex ratio data from deer shot during the shotgun portion of past deer seasons indicates that males only slightly outnumber females in the Iowa deer herd. The preponderance of males harvested by bow hunters shows, therefore, inconclusively, that this group of hunters is quite selective, with bucks being the favored quarry.

Age:

Bow hunters reported harvesting 65 fawns and 185 adults, for an

indicated age ratio of 35 fawns: 100 adults. This figure is considerably above the 1958 fawns per 100 adult ratio of 21:100.

Time of Day and Part of Season Deer Were Killed

Time of day (AM vs. PM):

Bow hunters harvested 104 (40.9 percent) of their deer in the morning, and 149 (58.3 percent) in the afternoon during the 1959 season. In 1958 time of day seemed to matter very little, with about 50 percent of the deer killed in each period. The significance of the apparent differences between the two years is not known, however, the weather during the 1959 season was quite cold and disagreeable which may account for more hunters hunting in the afternoon hours.

Part of season:

The data indicate that 119 (46.8 percent) of the deer harvested by bow hunters were taken during the first-half, and that 131 (51.2 percent) were taken during the last-half of the 31-day bow season.

Top Counties

The nine top counties, as determined from the number of deer reportedly killed in each, are given in Table 2. It should be noted that 40 percent of the deer which were harvested by bow hunters in 1959 came from these nine counties, with the remaining 60 percent being divided among 60 other counties which reported at least one deer taken.

Thirty counties reported no deer kills, with 78 reporting three or less (Figure 1).

Thirty-four percent of the bow hunters reported they hunted in at least one of the top nine counties during the course of the 1959 bow season for deer.

Hunter Mobility

The average bow hunter reported hunting in 1.40 counties during the 1959 deer season, while in 1958 they reported hunting in an average of 1.48.

Occupational Groups and Group Success

Table 3 shows the number of bow hunters in each occupational group. As indicated, persons classified as laborers comprised 50 percent of the total hunters, followed by students who made up 11.8 percent of the total.

Persons classified as professionals had the highest hunter success ratio of 20.8 percent, followed by the labor occupational group with 19.2 percent (Table 3).

SUMMARY

1. Iowa's bow hunters recently participated in the seventh open deer season in as many years. The 31-day season was state-wide in scope, with any deer, either sex legal.

2. Bow permits were issued to 1,627 applicants; hunter report cards were received from 1,541 bow hunters for a 94.1 percent return.

3. A total kill of 255 deer was reported, for a hunter success ratio of 16.2 percent.

4. Bow hunters reported hunting 64,385 hours (8,048 eight-hour days), and required an average of 252 hours of hunting to reduce a deer to possession.

5. The average bow hunter hunted 40.8 hours, and saw 0.33 deer per hour while hunting. A total of 20,984 deer were reportedly sighted for an average of 13.3 deer seen per hunter during the course of the season.

6. The kill was comprised of 178 males and 75 females for a ratio of 238 males: 100 females in the kill.

7. Bow hunters reported harvesting 65 fawns and 185 adults for a ratio of 35 fawns: 100 adults.

8. Bow hunters reported that 40.9 and 58.9 percent of their kills were made in the morning and afternoon hours respectively. The hunters further indicated that 46.8 percent of their deer were taken during the first-half, and 51.2 percent during the last-half of their 31-day open season.

9. A total of 102 deer, or 40 percent of the total bow kill, was harvested in the top nine counties, with 30 counties reporting no deer kills during the bow season.

10. The average bow hunter reported hunting in 1.40 counties.

11. Laborers comprised the largest occupational group, with 50 percent of all bow hunters falling into this classification. Students, the next largest occupational group, made up 11.8 percent of the aggregate.

Table 1: Summary of Data from Bow Seasons for Deer, Iowa 1953 - 1959.

Item	YEAR						
	1953	1954 1/	1955	1956 2/	1957	1958	1959
Number permits issued	10	92	414	1280	1228	1380	1627
Deer Kill	1	10	58	117	138	162	255
Success Ratio (%)	10.0	10.9	14.0	9.1	11.4	12.4	16.2
Hours hunted/deer bagged	----	----	----	432	370	363	252
Deer observed/hour hunted	----	----	----	0.12	0.29	0.34	0.33
Length of season (days)	5	12	23	31	31	30	31

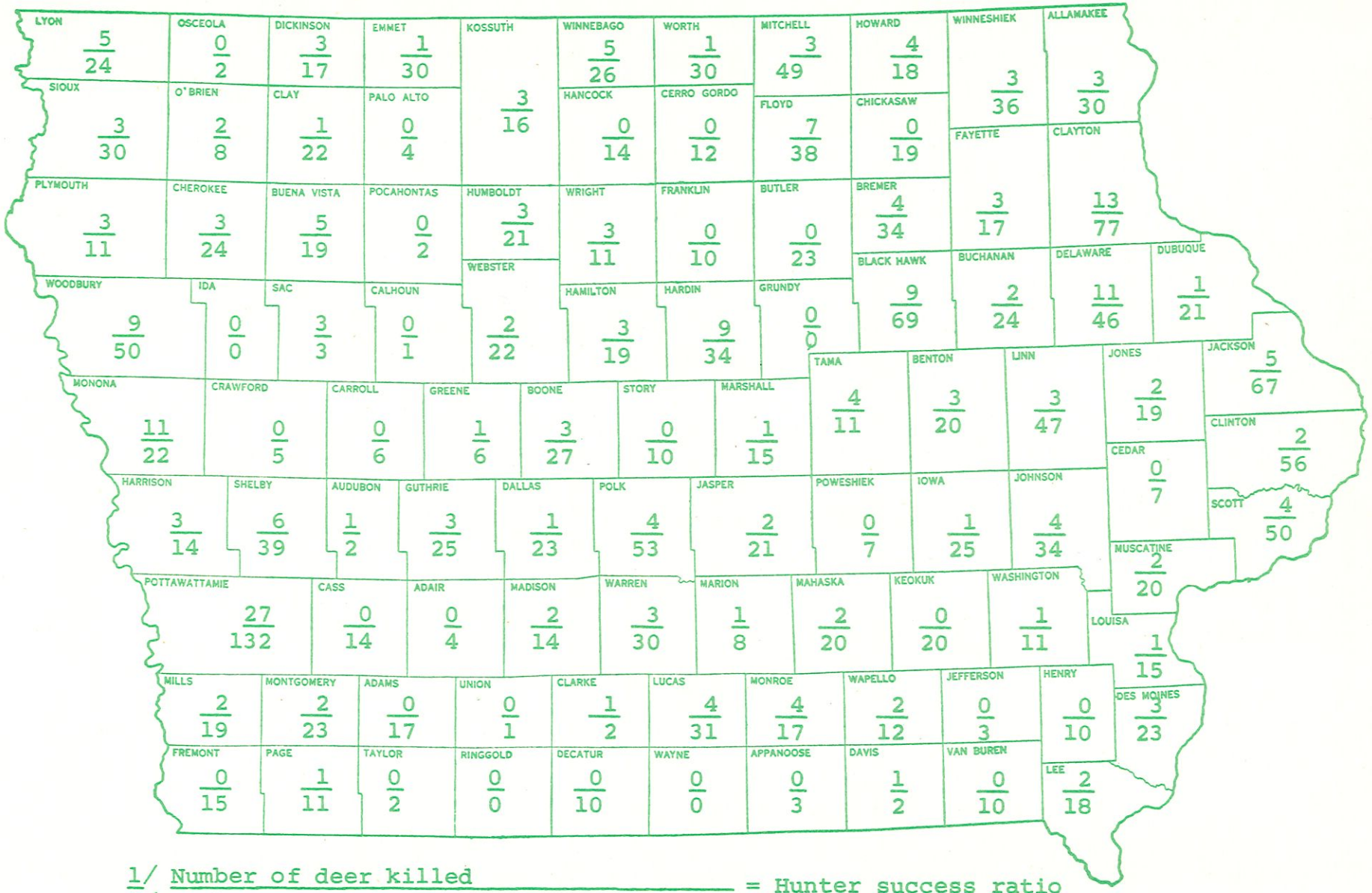
1/ First extended season.
2/ First year a special permit was required for hunting deer with bow and arrow.

Table 2: Counties Reporting Six or More Deer Killed by Bow Hunters, Number of Hunters Hunting in Each, and Hunter Success Ratios -- Iowa, 1959.

County	Number of Deer Killed	Number of Hunters	Hunter Success Ratio
Pottawattamie	27	132	20.4
Clayton	13	77	16.9
Delaware	11	46	23.9
Monona	11	22	50.0
Black Hawk	9	69	13.0
Hardin	9	34	26.5
Woodbury	9	50	18.0
Floyd	7	38	18.4
Shelby	6	39	15.4

Table 3: Occupations and Hunter Success Ratios of the Various Occupational Groups as Reported by 1,491 Bow Hunters Iowa -- 1959.

Occupation	Number of Hunters	Percent of Total	Number of Deer Killed	Hunter Success Ratio
Laborer	747	50.0	143	19.2
Student	176	11.8	20	11.3
Merchant	162	10.9	30	18.6
Farmer	145	9.7	24	16.5
Miscellaneous	108	7.3	15	13.8
Professional	77	5.2	16	20.8
Technician	49	3.3	3	6.0
Female	18	1.2	1	5.6
Unknown	9	0.6	3	33.3
Totals	1,491	100.0	255	



1/ Number of deer killed / Number of bow hunters who hunted county = Hunter success ratio

Figure 1. Number of deer killed, and number of hunters reporting hunting in each county as reported from bow hunter report cards, Iowa, 1959.

The 1959 Iowa Quail Season

by

M. E. Stempel
Game Biologist

In Iowa, the 1959 quail hunting season opened on October 31 in 66 counties. In 52 counties shooting was permitted through December 14, while in 14 others, shooting was legal through November 23. Shooting hours were from 9:00 a.m. to 4:30 p.m. Bag limit was six, possession limit, 12.

The opening date was on Saturday to conform to the policy of starting hunting on a week-end. Length of the season was similar to 1958. Boone, Carroll and Greene counties were added to the list of those where shooting was permitted for 24 days.

This report is based on information gathered during the 1959 and preceeding seasons. It includes information compiled from hunter success cards which were supplied to conservation officers by the Biology Section. There are comments on weather and crops, a summary of unofficial observations on the Missouri quail hunting as given by newspapers, television, radio and by some Missouri quail shooters.

Method

Letters of instruction and forms for collecting information were mailed to the field men before the hunting season. The following information was entered in spaces provided on Quail Contact Cards: date, county, number of hunters in party, hunters are local or non-local (over 25 miles), number of hours hunted today, number of coveys, quail bagged, is success the same, better or poorer than last year? Other information was gathered by the Biologist.

State-wide Success

Of the 590 report cards sent out, 231 were returned by the date this report was begun. The compiled data indicate that the average party size was 2.5 men, the majority traveled less than 25 miles to hunt, they spent 809 party hours afield and most used dogs to assist in hunting quail. These parties flushed 432 coveys, shot 1,201 birds. Officers indicated that 40 per cent of hunters thought the 1959 season success was the same as that of 1958, 25 per cent thought it better, while 34 per cent thought it was a poorer season.

In 1958, 1,150 cards were mailed out, 403 were returned. The average party size was 2.5 men, the majority traveled less than

25 miles to shoot, they spent 1,346 party hours. Dogs were used by most. They flushed 809 coveys, shot 2,617 birds; 43 per cent thought the season success was the same as in 1957, 45 per cent thought it better, while only 12 per cent thought it was poorer.

Comparable figures that concern quail hunting efforts from 1955 to and including 1959 are given in Table 1 below.

Table 1: Party Hunting Success, 1955 through 1959

Year	Hr. per Covey	No. Coveys Flushed	Birds Shot per Covey	Hr. per Quail	No. Quail per Trip
1955	1.8	1.9	2.6	0.7	5.0
1956	1.5	2.3	2.3	0.6	5.3
1957	1.8	2.0	2.8	0.6	5.6
1958	1.7	2.1	3.2	0.5	6.7
1959	1.9	2.0	2.8	0.7	5.7

In 1959, there was a 10 per cent increase from 1958 in the average amount of time required to flush each covey. The coveys flushed per party declined only slightly while there was a noticeable 13 per cent decline in birds shot per covey. Probably, most noticeable to hunters was the increase in party hours per bird. There was a 15 per cent decrease in number of quail killed per trip. The decreases throughout the season made for poorer hunting than in 1958.

Results by Districts

In the south-central district of Iowa during 802 man hours of hunting, a total of 454 quail were bagged for an average of 1.8 hours per quail. In the southeast, during 583 man hours of hunting, 471 quail were shot for an average of 1.2 man hours per quail. In the counties having the fewest quail, 660 man hours of quail hunting netted 236 birds at an average rate of 2.8 man hours per quail. Below, in the table, are results of hunting within the agricultural districts of Iowa.

Table 2. Hunting Success in Hunter Hours per Quail by Agricultural Districts, 1955 through 1959

District	1955	1956	1957	1958	1959
So-Central	1.6	1.2	1.4	1.1	1.8
E-Central	2.9	1.2	3.0	1.6	
So-East	1.4	1.4	1.3	1.2	1.2
Border Cos.*	1.9	2.2	2.2	1.5	2.8

* Border counties lie on the outskirts of the main quail range.

Hunting suffered a considerable decrease over much of the quail country in Iowa, but the 1959 figures indicate that in southeastern Iowa there was very good quail shooting.

Hunting Within some Key Counties

Contact cards have been received from 31 counties open for quail hunting in 1959. In some counties quail shooting is incidental to rabbit or pheasant hunting, and no quail gunners are contacted. Hunters from some towns do not go out for quail in their own county, when there is good shooting in a nearby county. As a result, there are no records from some areas during some years.

According to cards returned to the Biology Section from counties within the main quail range, the following counties reported the highest hunting success: Davis, Des Moines, Mahaska, Ringgold, Van Buren, Wapello, Wayne; while in 1958, Adams, Decatur, Lucas, Taylor, Van Buren, Warren and Wayne.

The greatest number of coveys flushed per trip was six in Van Buren, and during another hunt, six in Wayne County.

Reports of two or three coveys flushed on single trips were not unusual for 1959. There were some quail hunters who flushed no birds; while in 1958 the biologist had no records of hunters who sought quail only, who failed to flush quail. In table 3 are comparisons with results in 1951 which was a poor year for quail shooting, with 1958 a good year, and with 1959.

Table 3: Success in Locating Coveys, 1951, 1958, 1959

County	1951 No. Coveys	1951 Party Hours	1958 No. Coveys	1958 Party Hours	1959 No. Coveys	1959 Party Hours
Clarke	3	3	9	7	4	4
Davis	5	5	9	7	4	5
Decatur	4	2	9	6	5	6
Van Buren	4	4	10 or 12	7	6	4
Wapello					3	4
Wayne	5	6	7	6	6	4

Long and Short Seasons and Results of Hunting Periods

Reports were received from 27 counties in the long season zone. Five hundred twenty-four men spent 2,023 man hours hunting, during

which time they flushed 432 coveys and shot 1,201 quail.

In 1958, there was an open season in the same number of counties; from these, reports concerning 936 individuals indicated they spent 3,365 man hours to flush 809 coveys and bag 2,617 quail.

From the 14 counties in the short season zone, it was specified that 52 hunters spent 160 man hours to flush 28 coveys and shoot 49 quail. In the short season zone in 1958, 61 gunners required 270 man hours to flush 54 coveys and take 92 quail. In 1959 the average success was 3.2 man hours per bird; in 1958 it was 3.0.

Boone County had legal quail shooting for the first time in recent years and 14 hunters reported that they took 7 quail in 19 party hours.

Hunting periods discussed in the following text are each two weeks long. Comparison of success during and between each of the three units of time gives an indication of changes due to altered field conditions as fall advances. It was suggested to conservation officers that one-third of the cards be filled out during each of the two weeks periods. This pattern was not always practical because hunters were reported as being scarce during the latter part of the season.

For the first period, 131 cards were filled out; 52 for the second, and 28 for the final period. The final count of success indicated that for the first two weeks, the average hunter spent 1.5 man hours for each quail bagged. In the second, 2.2 and in the final weeks 2.0 per bird.

Use of Dogs and Miscellaneous

In 1958 a sample from Clarke, Davis, Decatur, Lucas and Adams counties indicated 74 per cent were using dogs, while in 1959 some 85 per cent used dogs.

Parties with dogs hunted 138 party hours to flush 73 coveys, take 209 quail at an average of 1.9 party hours per covey and 0.7 hours per bird. Parties not using dogs hunted 41 party hours, flushed 16 coveys, and took 44 quail at the rate of 2.6 party hours per covey and 0.9 party hours per quail.

Weather was not as cold as in 1958, but there were many wet days during the 1959 season. Corn and bean harvest was very late, and some corn was still in the fields after the end of the quail hunting season. Added to the unusually heavy growth of brush, weeds and grass the field crops were a handicap for gunners.

Unusual numbers of immature young quail were reported by hunters during the early part of the season on quail.

Full reports have not been obtained on the outcome of the quail hunting in other states. However, a summary of information from Kansas City and St. Joseph, Missouri radio, television and newspapers indicates that the season was spotty with best hunting in the southern part of the state.

Conclusions

The best hunting in Iowa was in the southeast with spotty hunting the rule over much of the quail range. Some men who normally hunt several times during the fall said that they went only a few times or did not go out although they have quail shooting equipment. This indicated that though the season was generally favorable as far as weather was concerned, cover was abnormally heavy and conditions were not attractive to many.

Summary

1. Information on the 1959 quail season was gathered on Quail Contact Cards.

2. In 1959, 34 per cent thought the season was poorer than the 1958 season. In 1958 only 12 per cent thought the season poorer than in 1957.

3. Highest success for individual parties was below that for 1958.

4. The southeast with an average of 1.2 man hours per bird had best success.

5. Corn and bean crops were harvested later than usual: the unusual amount of cover was a handicap to hunters.

Current Waterfowl Population Information

by

James G. Sieh
Game Biologist

Indications of poor reproduction of ducks on the breeding grounds during the summers of 1958 and 1959 were corroborated by age and sex data gathered furing the hunting seasons of 1958 and 1959. Age ratios of Mallards obtained from hunting kills at Stuttgart, Arkansas since 1946 indicate very serious population declines in 1958 and in 1959 (Table 1). Age ratios of Mallards in the harvest falling below 2 young per adult are usually indicative of a declining population.

In Minnesota, locker plant checks of 507 Mallards and 587 lesser scaup from various parts of the state indicated 0.65 and 0.66 young per adult, respectively. These compared closely with the 0.71 and 0.89:1 ratios recorded at Delta, Manitoba. In Illinois, a sample of 857 mallards showed 0.43 young per adult. In Missouri, an examination of 1,283 mallards by November 28, 1959 tallied 0.6 young per adult with the proportion of young dropping toward the end of the period. At Stuttgart, Arkansas, 1,053 mallards were checked at locker plants on the opening two days of the season (11/30 and 12/1) providing only 0.3 young per adult. This was the lowest proportion of young recorded at Stuttgart during ten years of similar checks. In Louisiana, prior to December 8th, a small sample approximated a 1:1 ratio. Spot check of ducks harvested in Iowa likewise indicated a high proportion of adults in the bag. The Lake Erie Marshes in Ohio provided a slightly better ratio of 1.5 young per adult, still well below a desirable proportion. To date, no satisfactory age ratios have been reported within the Mississippi Flyway.

Geese populations apparently remain in satisfactory condition. Their breeding areas farther north have not been damaged by the severe drough in the prairie regions. A wet freeze-up and early heavy snows over the prairie breeding grounds are encouraging and may improve habitat conditions during the 1960 breeding season. The fate of our current depressed duck population depends upon habitat conditions and breeding success in 1960.

Table 1. Age ratios of wild mallards from hunting kills at Stuttgart, Arkansas (as reported at the Technical Section Meeting of the M.F.W.C. at St. Louis, Missouri on June 15, 1959 by Arthur Hawkins, Flyway Representative).

Year	Young / Adult Female
1946	2.64 : 1
1947	6.28 : 1
1948	5.83 : 1
1949	2.03 : 1
1950	1.95 : 1
1951	3.98 : 1
1952	4.96 : 1
1953-57	No Data
1958	1.17 : 1
1959*	0.72 : 1

* Data from 1,053 mallards at Stuttgart locker plants on the opening two days of the Arkansas season (11/30 and 12/1).

The 1959 Pheasant Season

by
Richard C. Nomsen
Game Biologist

Iowa's 1959 pheasant season opened November 14th continuing for 24 days in 70 northern counties and for 16 days in 22 southern counties. The daily bag limit was three cock birds with a possession limit of six. Shooting hours were from 9:00 A.M. to 4:30 P.M.

The information presented in this report was collected by conservation officers and unit managers during the open season. Procedures and type of data collected were similar to the 1958 survey. Through the excellent cooperation of field men, adequate samples were received from all parts of the state.

Hunting conditions were extremely unfavorable throughout the 1959 season. The harvest of farm crops was delayed by cold, wet weather during September and October. More than half of Iowa's 12 million acres of corn was still standing in the fields by the 14th, which furnished abundant cover for the ringnecks. Heavy snowfall and record breaking cold temperatures added to the discomfort of opening weekend hunters. Temperatures averaged 17-19 degrees below normal for the first week of the season. Agricultural field work progressed slowly during November as the frigid weather continued.

Pheasant hunting success was below normal, as could be expected from the low production of young as reported previously, plus unfavorable hunting conditions. The 7,870 hunters contacted by field men had bagged 6,422 cocks while hunting a total of 28,061 hours. Each bird bagged required 4.4 hours of effort which compared with 3.1 hours per bird in 1958. The number of birds checked per 100 hunters decreased from 118 in 1958 to 82 during the past season. Although records were not kept separate for roadside hunters, it was generally agreed by most officers that roadside hunting was extremely poor during the season; while those hardy individuals that took to the fields had good success. Road ditches were filled with snow and offered no protection for the birds. Pheasants remained in the standing corn until moved by corn pickers or flushed by hunters. Crippling loss was lower due to the additional snow cover which made it easier to find the downed birds.

The time required to bag a bird increased in all districts except east central Iowa where less effort was needed. This trend has continued in District Six for the past three years. Hunters

in northwest and west central Iowa experienced good shooting last fall; averaging a bird every 3.5 hours, which was slightly above the 1958 results but much better than either the 1956 or 1957 seasons. The most noticeable difference occurred in north central and northeast Iowa where hunters needed two extra hours to bag a bird in 1959. These three districts contain much of Iowa's prime pheasant range and shooting is usually much better than the state average. The time required to bag a bird also increased in central and southern Iowa.

Table 1. Average Hunting Success by Districts 1956-1959.

District	Hours per Bird Bagged			
	1956	1957	1958	1959
1. Northwest	3.9	3.6	2.8	3.2
2. North central	2.7	2.9	2.6	4.7
3. Northeast	2.9	3.1	2.8	4.7
4. West central	4.2	3.9	3.2	3.5
5. Central	4.7	4.6	4.8	6.2
6. East central	5.5	3.9	3.7	3.3
7. Southwest	4.0	5.7	2.6	5.5
8. South central	3.5	4.3	3.0	4.2
State Average	3.6	3.7	3.1	4.4

Hunters had relatively good success during the opening weekend; however, as the season progressed,much more time was needed to bag each bird (Table 2). On opening weekend, only four-tenths of an hour of additional effort was required for each cock but two extra hours hunting was needed during the last two weeks, when compared with the 1958 season. The ringnecks took advantage of the heavy cover in the standing corn where they were protected from the elements as well as the hunters.

Table 2. Hours Required to Bag a Bird Each Period of 1958 and 1959 Seasons

Year	First Period Opening Week end	Second Period Next 7 Days	Third Period Next 7 Days	Fourth Period Last 8 Days
1958	2.6	3.4	3.9	4.4
1959	3.2	4.8	5.9	6.4

The pheasant feet were collected during the 1959 season for the purpose of obtaining additional information concerning reproduction success. Extremely low age ratios were being obtained in neighboring states so it was decided to include this survey in order to compare results.

A total of 4,563 feet were received from all sections of the state and classified as young or adult according to the appearance of the spurs. The age ratio of all feet aged was 1.2 young per hen which was much lower than the results obtained during the seasons 1952-1955 (Table 3).

Table 3. Comparison of Pheasant Age Ratios 1952-1955 and 1959

Year	Young	Adult	Young per Adult Cock	Adjusted Young per Hen
1952	4,695	631	7.4	2.8
1953	3,258	573	5.7	2.6
1954	3.141	500	6.3	2.2
1955	2,772	263	10.5	2.9
1959	3,605	958	3.8	1.2

There was a wide range among district age ratios (Table 4.) The young per adult hen ratio was highest in southern Iowa and lowest in the northeast district.

Table 4. Pheasant Age Ratios by Districts - 1959.

District	Young	Adult	Young per Adult Cock	Adjusted Young per Hen
1. NW	938	328	2.86	1.14
2. NC	528	141	3.74	1.25
3. NE	456	107	4.26	0.87
4. WC	324	82	3.95	1.32
5. C	498	127	3.92	1.31
6. EC	272	76	3.58	1.09
7 & 8	589	97	6.07	1.69
State Average			3.76	1.21

Previous age ratio studies in Iowa seemed to be quite variable and indicated that the proportion of cocks shot during the season influenced the age ratio results. Therefore, it is difficult to compare district results until winter sex ratio counts are complete. Results of this study substantiate the decrease in production during the summer of 1959.

KNOWN MORTALITY OF IOWA DEER ATTRIBUTABLE TO DECIMATING FACTORS OTHER THAN LEGAL HUNTING IN 1959

by

Eldie W. Mustard and Paul Leaverton

Iowa's deer herd is under intensive management, and it is both desirable and necessary that we have knowledge pertaining to the number of deer which are annually removed from the population by the various decimating factors. The portion of the herd which is legally harvested is known, and the figures are believed to be quite accurate. In 1951 Mr. Leaverton initiated a report system in which the Conservation Officers were asked to submit a brief report on each deer which was killed outside of the legal hunting seasons. Since that time a total of 3,167 deer have been reported, for an average of 352 animals a year.

To states having an almost infinite deer population these figures seem, perhaps, to be trivial; but to Iowa, with its relatively small population, it is not -- each deer is important both for its recreational and esthetic values.

Methods

Each Conservation Officer is asked to complete and submit a postal card form on every deer, other than legal kills, which he has reason to believe has met death in his territory. These cards are received by the Game Section and are passed on to the Biology Section's deer biologist for tabulation and analysis.

The following is a brief analysis of data obtained from these reports.

Results

Total mortality for 1959 - all causes except legal hunting.

A total of 508 deer were reported killed in 1959 by accidents and means other than legal hunting. This is an increase of 70 animals over the 1958 total, and is 176 animals above the average for the preceeding eight years of record (Table 1).

Deaths attributable to traffic, primarily autos and trucks, led all other causes, with 403 reported; this number is also the highest on record for the nine-year period .

As indicated in Table 2, where reported deer kills are listed by county, the number of kills ranged from a high of 47 in Pottawat-

tamie county to a low of zero reported for several counties. The average reported kill per county was slightly over five deer in 1959.

Mortality by months.

As in recent years, two rather pronounced peaks are noted when the reported deer kills are plotted by months. The first peak occurs in May and June, and is thought to be connected with activities related to fawning. The second peak, seen during October, November, and December, is undoubtedly a product of the rutting activities (Table 3).

It is interesting to note that over 20 percent of the reported deer fatalities were reported for the month of November. Over 44 percent of the reported fatalities were in the months of October, November, and December.

Sex and age ratio of reported deer.

The sex ratio of the deer reported by the Conservation Officers did not vary greatly from that found in deer checked during the course of the 1959 shotgun season for deer. A sex ratio of 140 males: 100 females was observed for the 464 deer on which sex data were reported by the officers. The sex ratio, based on 509 deer checked during the hunting season, was found to be 132 males: 100 females.

Age ratios were not calculated at this time although the age is usually included for each deer reported by the officers. It is presently planned to make a detailed study of our backlog of these past deer kill reports, and at such time an attempt will be made to secure accurate age ratio data from this source.

The age ratios, if accurately given on the report cards, could give us much needed information concerning reproduction success of the Iowa herd before the deer season and not after as we now obtain it. This possibility shall be explored in the near future as an aid in making management recommendations based on the most current biological facts available.

Further training in standard deer aging techniques should be given to all Conservation Officers to insure correct classification of reported animals as to whether they are immature or adults. A more detailed age classification, i.e., as year-classes, while perhaps desirable, is not thought by the senior author to be necessary, and it would probably be almost impossible to obtain under our field conditions.

Damage to autos involved in accidents with deer.

Estimates were received pertaining to the amount of damage sustained by autos in auto-deer accidents for 242 separate cases. Damages totaling $34,104.00 were reported, with estimates ranging from no damage to well over $1,000.00 to the individual vehicles involved. The average amount of damage to 242 autos where the extent of damage was reported was $140.92.

Personal injuries suffered by occupants of autos are not asked for, nor were any noted on the report cards.

Summary

1. A total of 508 deer were reported to have been killed during 1959 by decimating agents other than legal hunting.

2. Traffic accidents claimed 403 of the deer, with damages to the autos involved amounting to over $34,000.00.

3. A spring peak and a fall peak in the number of deaths reported was noted; the peaks are believed to be associated with activities related to fawning and rutting respectively.

4. The sex ratio of the deer was 140 males: 100 females, which agreed quite closely with that found in the deer checked during the 1959 shotgun season for deer.

Table 1. Total Annual Deer Kill by Agents Other Than Legal Hunting, Iowa, 1951-1959.

Year	Total Number Reported
1951	192
1952	256
1953	393
1954	310
1955	306
1956	419
1957	345
1958	438
1959	508
Total	3,167

Table 2. Deer Killed by Decimating Agents other than Legal Hunting, and Auto Damage Resulting from Deer-Auto Accidents, by County -- Iowa, 1959.

County	Decimating Agent					Auto Damage	
	1/ Traffic	Illegal	2/ Misc.	Dog	Total	Estimated Amount	Autos Involved
1. Adair		1			1	-------	---
2. Adams	1	1			2	$200.00	1
3. Allamakee	5	2			7	510.00	2
4. Appanoose	2		1		3	100.00	2
5. Audubon					0	-------	---
6. Benton	1		1		2	200.00	1
7. Black Hawk	2				2	85.00	2
8. Boone		1	3		4	-------	---
9. Bremer	5	2			7	700.00	3
10. Buchanan	4		1		5	300.00	2
11. Buena Vista	2				2	50.00	2
12. Butler	4				4	305.00	4
13. Calhoun					0	-------	---
14. Carroll	2		1		3	100.00	1
15. Cass	2				2	-------	---
16. Cedar	1				1	-------	---
17. Cerro Gordo	4				4	195.00	2
18. Cherokee	6		2		8	425.00	4
19. Chickasaw	4				4	650.00	3
20. Clarke	3		1		4	200.00	1
21. Clay	1				1	-------	1
22. Clayton	2		1	1	4	140.00	2
23. Clinton	8				8	250.00	2
24. Crawford	2		1		3	100.00	2
25. Dallas	5				5	700.00	2
26. Davis				1	1	-------	---
27. Decatur	4		2		6	315.00	3
28. Delaware			1		1	-------	---
29. Des Moines	2				2	620.00	2
30. Dickinson	5		1		6	725.00	4
31. Dubuque	4				4	50.00	2
32. Emmet	9		3		12	1,956.00	9
33. Fayette	6			1	7	550.00	3
34. Floyd	5				5	325.00	4
35. Franklin					0	-------	---
36. Fremont	12	1		1	14	2,190.00	10
37. Greene	5	3	1		9	900.00	3
38. Grundy					0	-------	---
39. Guthrie	5	1	2	1	9	30.00	2

Table 2 (Con'd)

County	Decimating Agent					Auto Damage	
	1/ Traffic	Illegal	2/ Misc.	Dog	Total	Estimated Amount	Autos Involved
40. Hamilton	3				3	$ 50.00	1
41. Hancock					0	-------	---
42. Hardin	3				3	5.00	2
43. Harrison					0	-------	---
44. Henry					0	-------	---
45. Howard	3		1	1	5	1,200.00	2
46. Humboldt	2				2	150.00	1
47. Ida	1				1	10.00	1
48. Iowa	7	1	2		10	455.00	5
49. Jackson	20	2	1		23	1,070.00	12
50. Jasper	9				9	600.00	3
51. Jefferson	6	2	1		9	605.00	4
52. Johnson	2	1			3	100.00	2
53. Jones	4	3	2	1	10	600.00	3
54. Keokuk	1				1	50.00	1
55. Kossuth	6				6	150.00	2
56. Lee	1				1	-------	1
57. Linn	7				7	540.00	6
58. Louisa	2				2	300.00	1
59. Lucas	6	1			7	78.00	2
60. Lyon	5	1			6	850.00	4
61. Madison	8		2		10	700.00	3
62. Mahaska	1	1			2	-------	1
63. Marion	1	1			2	400.00	1
64. Marshall	1				1	-------	---
65. Mills	11		1		12	435.00	4
66. Mitchell	2	2	1		5	300.00	2
67. Monona	9				9	700.00	8
68. Monroe	5				5	60.00	3
69. Montgomery	2		1		3	250.00	2
70. Muscatine	2		1		3	300.00	2
71. O'Brien					0	-------	---
72. Osceola	2		1		3	450.00	2
73. Page	1				1	25.00	1
74. Palo Alto	5	1			6	800.00	4
75. Plymouth	12	1	2		15	1,250.00	7
76. Pocahontas					0	-------	---

Table 2 (Con'd)

County	Decimating Agent					Auto Damage	
	1/ Traffic	Illegal	2/ Misc.	Dog	Total	Estimated Amount	Autos Involved
77. Polk	14		1		15	$ 165.00	5
78. Pottawattamie	40	6	1		47	760.00	4
79. Poweshiek		1			1	-------	---
80. Ringgold	1				1	125.00	1
81. Sac	1	1	1		3	25.00	1
82. Scott	4				4	125.00	1
83. Shelby					0	--------	---
84. Sioux	6		3	1	10	500.00	5
85. Story	2	3	2		7	150.00	2
86. Tama	2				2	900.00	2
87. Taylor					0	-------	---
88. Union	3				3	198.00	3
89. Van Buren	1				1	42.00	1
90. Wapello	5		1		6	300.00	3
91. Warren	7				7	675.00	4
92. Washington	1		1		2	50.00	1
93. Wayne					0	-------	---
94. Webster	2	1			3	395.00	2
95. Winnebago	5				5	715.00	5
96. Winneshiek	10			2	12	1,250.00	10
97. Woodbury	22	2		2	26	1,575.00	14
98. Worth	4	1	1		6	800.00	4
99. Wright					0	-------	---
TOTALS	403	44	49	12	508	$34,104.00	242

1/ Includes Auto, truck and train-caused fatalities.
2/ Includes fatalities caused by farm operation accidents, wounding presumed to have occurred during legal hunting, deer caught in fences, unknown, etc.

Table 3. Reported Deer Deaths by Month and Cause -- Iowa, 1959

Month	Cause 1/ Traffic	Illegal	Misc. 2/	Dog	Totals
January	14	10	0	1	25
February	16	4	0	0	20
March	15	2	2	4	23
April	25	1	0	0	26
May	46	2	5	2	55
June	35	0	9	1	45
July	16	0	2	0	18
August	15	1	2	2	20
September	24	2	3	0	29
October	57	3	6	1	67
November	81	11	15	0	107
December	41	5	5	1	52
Unknown	18	3	--	-	21
TOTALS	403	44	49	12	508

1/ Includes auto, truck and train-caused fatalities.
2/ Includes fatalities caused by farm operation accidents, wounding presumed to have occurred during legal hunting, deer caught in fences, unknown, etc.