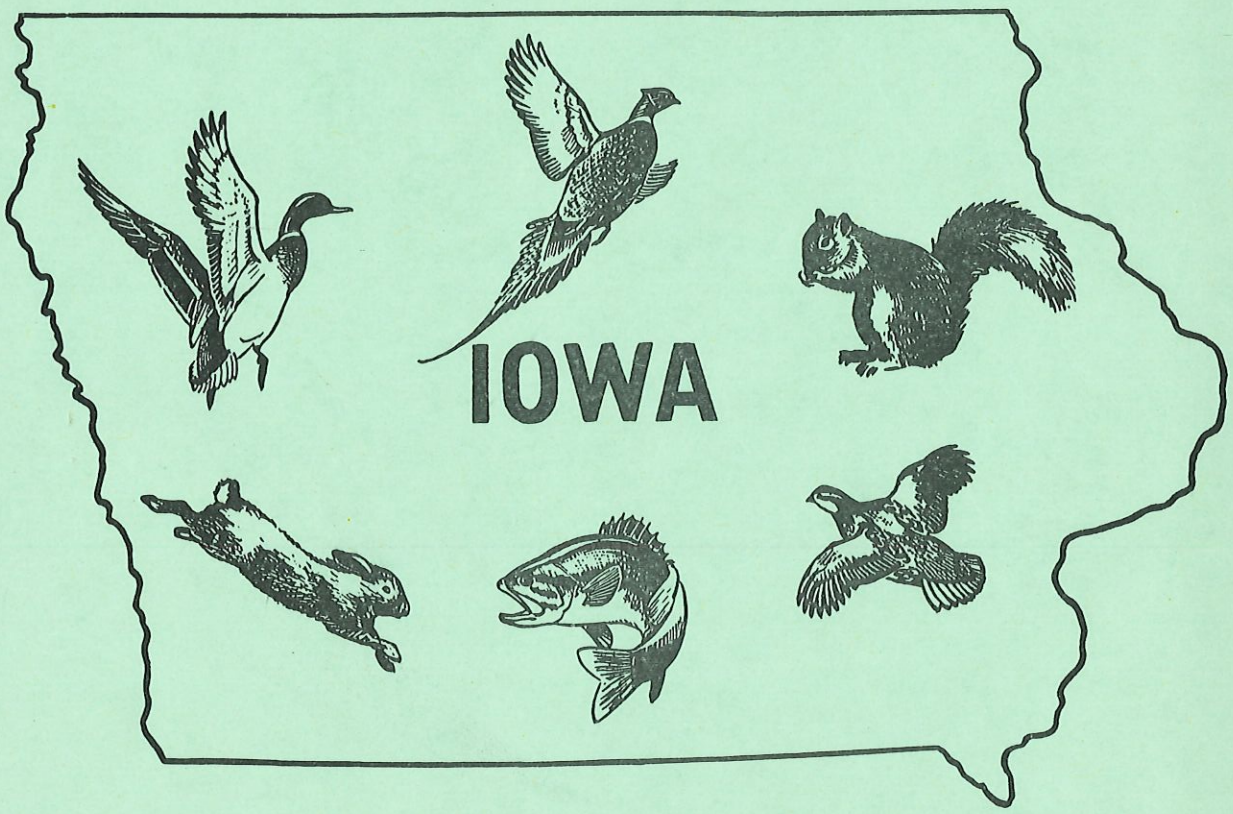
1961

QUARTERLY BIOLOGY REPORTS



FISH AND GAME DIVISION — BIOLOGY SECTION

STATE CONSERVATION COMMISSION

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CREEL CENSUS OF THE DES MOINES, BOONE, NORTH RACCOON, MIDDLE RACCOON, SOUTH RACCOON, NORTH AND SOUTH SKUNK RIVERS, 1961

BY

Harry M. Harrison
Fisheries Biologist

A creel census was conducted on the Des Moines, Boone, Raccoon and Skunk Rivers in 1961. The method involved Conservation Officer interviews with anglers. The information gathered included the number and kind of fish caught, and the number of hours the angler had fished. The information is tabulated to show the number of contacts made, the hours fished and the fish caught per hour. A total of 2,977 fishermen were interviewed. They had fished 5,982 hours and had caught 2,889 fish. The rate of catch was 0.48 fish per hour. The channel catfish was the most abundant fish caught. They were followed by carp, bullheads, walleye, sheepshead, crappie, a variety of suckers, smallmouth bass, flathead catfish, sunfish, northern pike, and buffalo, in that order of importance.

THE VERTICAL DISTRIBUTION OF SEVERAL SPECIES OF FISH IN RED HAW LAKE DURING SPRING AND FALL OVERTURN

BY

Jim Mayhew
Fisheries Biologist

The vertical distribution of six species of fish was studied during spring and fall overturn by gill netting in Red Haw Lake. Spring netting produced a sample of 1,086 fish in 604 hours of netting, and fall netting produced a sample of 1,624 fish in 1,224 hours of netting. Golden shiner comprised the largest sample followed by bullhead, crappie, bluegill, yellow perch, and channel catfish.

Both spring and fall overturns were highly unstable periods of fish distribution. Vertical movements were more pronounced and vigorous than in any other limnological period of the year. There was a progressive movement of fish into the warmer strata in the spring, and movements in the opposite direction in the fall. Golden shiner were very abundant in the shallow strata during both periods. Channel catfish, bullhead, and yellow perch inhabited the deeper waters. Crappie and bluegill were fairly evenly distributed during both periods, with a marked increase in the numbers found in shallow depth intervals when the water was warmed in the spring.

SUMMARY OF AQUATIC WEED TREATMENTS, 1960-61

BY

Tom Moen
Fisheries Biologist

Several chemicals were used in experimental control of aquatic vegetation as well

as in routine control applications. A brief description of the chemicals used and a summary of the results obtained from some 35 trials and applications are presented. No one chemical has been developed to control all types of aquatic vegetation. Each chemical has advantages and disadvantages and applications must be tailored to fit the situation, both biological and physical.

PHEASANT COUNTS ON PROPOSED RELEASE AREAS IN SOUTHEASTERN IOWA

BY

Eugene D. Klonglan
Game Biologist

A mean of only 0.18 pheasants per mile was sighted on four roadside counts of 30 miles each in early August in Henry and Des Moines counties. These counts were made in areas being considered for experimental releases in the project to increase southeastern Iowa pheasant populations. Similar roadside counts taken by Conservation Officers over the entire county for the past 8 years show a mean of 0.08 birds per mile for Henry county and 0.12 for Des Moines county. Spring crowing cock counts taken by the Officers for the past 12 years indicate a mean of only 0.2 cock calls per 2-minute stop in both counties. During the same period the mean for Winnebago county was 34.5 calls and for Adair county was 15.5 calls. The mean Winnebago county August roadside count over the 8-year period was 5.47 birds per mile; for Adair county it was 4.62 birds per mile.

PHEASANT NESTING SUCCESS BY ROADSIDE COVER FRANKLIN COUNTY, IOWA

BY

Richard C. Nomsen
Game Biologist

The roadside nesting study was continued in 1961. Nest density was high and similar to the results obtained in 1960, however, only 10 percent of the nests hatched. Predators destroyed 58 percent of the nests and 31 percent were abandoned or deserted. Production along roadsides was noticeably lower in 1961.

Observations were made on five nests sprayed with 2,4-D. The incubating hens did not flush as the weed spray was applied. Three nests were exposed by the wilting cover and ultimately destroyed by predators. The remaining two nests appeared to hatch normally.

STATUS OF IOWA QUAIL, 1960-1961

BY

M. E. Stempel
Game Biologist

The 1960 quail loss occurred in late winter. By July the loss was established

at above 30 per cent and it was greatest in marginal areas. The season was cut to 30 days compared to the customary 45. Hunting success was poor to fair in the best areas. The 1960-61 winter was favorable to quail and by late summer there was an indicated increase of over 20 per cent. The season was increased to 42 days. Hunters found quail fairly plentiful but cover was dense and success was moderate. To this time, winter has been somewhat rigorous, but food is plentiful since corn and beans are mostly unharvested in the best range. With the aid of some moderate weather the quail will do fairly well. Prolonged harsh winter weather will be destructive.

AGE AND SEX INFORMATION FROM BLUE-WINGED TEAL CAPTURED AND BANDED IN IOWA IN 1961

BY

James G. Sieh
Game Biologist

Drive trapping resulted in the capture and banding of 888 blue-winged teal in 1961. Of this total, "locals" were represented by 293 males and 288 females. Excellent production was exemplified by the capture of 118 young teal in the small Trappers Bay area of Silver Lake near Lake Park, Iowa.. A preponderance of moulting males were captured at Goose Lake in Greene County and at Prairie Lake in Dickinson County indicating additional blue-wing production in outlying areas.

Iowa is in an enviable geographic location in regard to the fall migratory pathway of blue-winged teal. In that the Mississippi Flyway Waterfowl Council is encouraging species management of waterfowl whenever practicable, it behooves us to continue our banding efforts and, if possible, to increase the sample of banded teal from Iowa. Without adequate information which is well documented, we have little chance of obtaining special regulations on "blue-wings".

INFLUENCE OF PRODUCTION ON IOWA COTTONTAIL RABBIT POPULATIONS

BY

Paul D. Kline
Game Biologist

(No Abstract)

RESULTS OF IOWA'S 1961 BOW SEASON FOR DEER

BY

Eldie W. Mustard
Game Biologist

Iowa bow hunters harvested 367 deer for a hunter success ratio of 17.1 percent during the 1961 bow season for deer. The season was statewide in scope and was 48 days in length, extending from October 14 through November 30.

The hunters spent a total of 103,889 hours hunting for an average of 48.4 hours per hunter.. An average of 283 hours of hunting was required for each deer reduced to

possession. Deer were sighted at the rate of 0.30 per hour and the average hunter saw 14.8 deer during the course of the season.

A sex ratio of 174 males:100 females and an age ratio of 17 fawns:100 adults was reported by the bow hunters. As in past years, this would tend to indicate the bow hunters were selective toward male adults.

CONSERVATION OFFICERS' DEER KILL REPORT - 1961

Eldie W. Mustard
Game Biologist

During 1961 a total of 839 deer was reported killed by decimating factors other than legal hunting. The total includes 683 killed by traffic, 75 by miscellaneous causes, 74 by illegal hunters, and 7 by dogs.

Almost 85 percent of the deer killed by traffic were killed on hard-surface roads, with the remainder killed primarily on graveled roads. Over 83 percent of the deer involved with traffic were killed 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.

A plan to conduct an experimental program designed to reduce the number of deer-traffic accidents is discussed briefly.

CONSERVATION COMMISSION STATE-WIDE MEETING
Biology Section Highlights

BY

E. B. Speaker
Supt. of Biology

With Contributions From the Entire Biology Staff

(No Abstract)

CREEL CENSUS OF THE DES MOINES, BOONE, NORTH RACCOON, MIDDLE RACCOON, SOUTH RACCOON, NORTH SKUNK AND SOUTH SKUNK RIVERS, 1961

BY

Harry M. Harrison
Fisheries Biologist

A creel census in central Iowa streams has continued annually since 1953. Before 1960, this work was carried on wholly within the Biology Section of the Conservation Commission. In 1960, assignments to Conservation Officers, requiring that certain records be kept as they contacted sportsmen in the field, made it possible to get creel information comparable to and much more extensive than that collected previously. As a result, we have dropped much of the field work part of the census by Biology personnel, and now obtain our creel data from the Conservation Officer's contact records.

The census involves interviews with fishermen in the field at frequent and irregular intervals throughout the main fishing season (April to November). The information secured from the angler includes: the date, time and place of the interview; the length of time spent fishing up to the time of contact; and the kind and number of fish caught. This information is tabulated by stream for each Officer for the territory which he covers. From that tabulation, the catch per hour and the species composition of the catch are determined.

The results of the 1961 creel census for the Des Moines and Skunk River drainages are given in Tables 1 and 2. Table 1 shows the number of contacts made by stream for each Officer by their county territories, the total hours fished, the number of fish caught, and the fish caught per hour. Table 2 gives the species composition of the catch.

Because the census covers such a wide area and involves so many variations in habitat, a comparison of anglers' catch from one area to another is significant only in very broad terms. In a general way, it can be stated that fishing success in the North Raccoon was poorer than in the other streams. The South Skunk River furnished the best success. The lower reaches of the Des Moines (Polk County, downstream) provided a higher rate of catch than the upstream reaches (Table 1).

Regarding the species composition of the catch (Table 2), channel catfish are the most important fish taken; carp rank second, and bullheads follow. Walleye pike are fourth in importance, the bast majority of these being taken from the upper reaches of the Des Moines River. Other fish caught, in their order of abundance, are sheepshead, suckers, crappie, sunfish, flathead catfish, smallmouth bass, northern pike, and buffalo.

The most meaningful results to come from the creel census reported upon here are those which follow the catch on an individual area basis. Factors relating to habitat, species composition, distribution, etc., which make up the fishery in a particular area are, for the most part, of a continuing nature. By censusing on an area basis with the same personnel and in the same general way, the results become comparable. For convenience, the catch is and will be compared annually. Table 3 shows this comparison for the years 1960 and 1961. Only those areas where a sufficient number of contacts was made are included.

Perusal of Table 3 reveals the rate of catch on the Des Moines River areas for the two years of record remained quite constant. An exception occurred in Humboldt County; a large catch of bullheads in 1960 accounts for this change. Fishing success was generally down in the Raccoon except for Polk County, where a slight (and probably insignificant) increase occurred. Fishing was noticably better in the South Skunk in 1961.

Table 1. Number fishermen contacted, total hours fished, total fish caught and fish caught per hour by streams and Conservation Officers' territories, 1961

Stream	County	Number Contacts	No. hrs. Fished	Total fish Caught	Fish per Hour
West Fork D M	Emmet & Palo Alto	5	10	15	1.5
	Humboldt	257	437	253	.58
	Webster	109	170	65	.38
Main	Boone	466	1040	405	.39
Stem,	Polk	404	821	422	.51
Des Moines	Dallas	5	5	8	1.6
	Warren & Marion	183	301	174	.58
	Mahaska	60	94	51	.54
	Wapello	167	229	324	1.41
	Van Buren	75	204	117	.57
	Lee	13	5	6	1.20
East Fork	Kossuth	10	17	92	5.41
Des Moines	Humboldt	12	13	24	1.9
Boone	Hamilton	7	9	11	1.2
	Sac	2	4	1	.25
North	Calhoun	5	6	2	.33
Raccoon	Carroll & Greene	325	622	153	.25
	Dallas	319	816	168	.21
	Polk	75	161	60	.36
	Mahaska & Keokuk	30	49	25	.50
South	Jefferson & Washington	156	415	186	.45
Skunk	Henry & Des Moines	215	344	216	.63
	Lee	13	11	33	3.0
North Skunk	Mahaska	4	6	20	3.33
South Raccoon	Dallas	48	100	33	.33
Middle Raccoon	Dallas	12	93	25	.27
	TOTAL	2977	5982	2889	0.48

Table 2. Species composition of fish caught by streams and Conservation Officers' territories, 1961

Stream	County	Species											
		Channel Catfish	Carp	Bullhead	Walleye	Sucker	Sheepshead	Buffalo	Flathead	Crappie	Sunfish	Northern Pike	Smallmouth Bass
West Fork Des Moines	Emmet & Palo Alto	2	2	4	7								
	Humboldt	52	23	114	37	1				19		6	1
	Webster	5	27	8	11	2							12
	Boone	265	74	13	24	28				1			
Main stem, Des Moines	Polk	332	73	12		1			3	1			
	Dallas	8											
	Warren, Marion	126	28	15		1	4						
	Mahaska	41	5	4			1						
	Wapello	235	79				9		1				
	Van Buren	71	18	2			26						
	Lee	3	3										
East Fork Des Moines	Kossuth		3	89									
	Humboldt		3	21									
Boone	Hamilton			6							5		
	Sac								1				
North Raccoon	Calhoun	1		1									
	Carroll, Greene	101	31	13	1	2							4
	Dallas	137	18	2		7			2		2		
	Polk	54	5			1							
	Mahaska, Keokuk	20	3	2									
South Skunk	Jefferson, Washington	164	12	9		1							
	Henry, Des Moines	100	83	5			24	1	2		1		
	Lee	33											
North Skunk	Mahaska		7	13									
South Raccoon	Dallas	22	4	1			1		4				
Middle Raccoon	Dallas	12	4	9									
	TOTALS	1784	505	343	80	44	65	1	13	21	8	6	17

Table 3. Comparison of angling success by streams and Conservation Officers', also territories, 1960 and 1961

Stream	County	Number Contacts	Fish per hour	Number Contacts	Fish per Hour
	Humboldt	178	1.43	257	.58
	Webster	47	.43	109	.38
	Boone	208	.39	466	.39
	Polk	285	.48	404	.51
Des Moines	Warren, Marion	135	.55	183	.58
	Mahaska	22	.90	60	.54
	Wapello	245	1.80	167	1.41
	Van Buren	52	.49	75	.57
North	Carroll, Greene	189	.39	325	.25
Raccoon	Dallas	195	.32	319	.21
	Polk	129	.29	75	.36
South	Mahaska	16	.25	30	.50
Skunk	Jefferson, Washington	65	.21	156	.45
	Henry, Des Moines	198	.56	215	.63

THE VERTICAL DISTRIBUTION OF SEVERAL SPECIES OF FISH AT RED HAW LAKE DURING SPRING AND FALL OVERTURNS

BY

Jim Mayhew
Fisheries Biologist

The effects of various physical and chemical phenomena on the habits of fish have been studied at Red Haw Lake for the past 3 years. This study originated in an attempt to gain basic knowledge about the effects of thermal stratification on the vertical distribution of fish. For comparison with summer stagnation, the study was continued into the winter stagnation, fall overturn, and spring overturn periods. The former two studies have been reported on previously in Quarterly Biology Reports. This study is concerned with the vertical distribution of six species of fish during the spring and fall overturns.

Description of Study Area

Red Haw Lake is a typical 80-acre, state-owned, artificial lake located 3 miles east of Chariton in Lucas County, Iowa. Construction of the earthen dam was started in 1935 and completed in 1936 by the Civilian Conservation Corps. Originally the lake was stocked with largemough bass, bluegill, crappie, and black bullheads. However, since that time golden shiner, warmouth, green sunfish, yellow perch, and walleye have either been stocked or accidentally introduced into the lake. Public angling was first permitted on May 30, 1939.

The lake is located in a long, narrow, steep-sided valley that divides into two arms mid-way along the median axis. This forms an irregular "Y" shaped lake, with the dam at the base of the figure. Bottom contours are extremely steep in the lower segment of the lake. Approximately 85 per cent of the lake is deeper than 8 feet, with a maximum depth of 40 feet. The shoreline is very irregular and completely covered with climax woodland. The remaining watershed is privately owned and is under general agricultural use.

Methods and Materials

Vertical distribution of six species of fish was studied during both the spring and fall overturn by using a depth-marked experimental nylon gill net. Mesh size increased from 1 to 2½ inches, bar measure, in four 50-foot segments. Depth was marked at 2 foot intervals with colored yarn to a depth of 18 feet. One netting station in the middle of one arm of the lake, with a maximum depth of 21 feet, was used throughout the study. The direction of the net was varied at 14-day intervals from parallel to perpendicular with the shoreline. Netting started in the fall as soon as the thermocline had dissipated and continued until the lake froze over. In the spring, netting continued from shortly after the ice cover thawed until the surface temperatures warmed in excess of 60°F. Nets were inspected at intervals ranging from 24 to 72 hours. The depth at which each individual fish was netted was recorded with color-coded pins placed in a styrofoam sheet with marked depth intervals. All data from the spring and fall overturns of 1958, 1959, and 1960 were combined for analysis.

Definition of Spring and Fall Overturn

If a series of vertical temperatures are taken just before the ice cover thaws in the spring, the water temperature is very near freezing just under the ice. As depth is increased the water at each successive depth is slightly warmer. The water temperature near the bottom remains close to that point at which maximum water density occurs (39.4°F.) throughout the period of winter ice cover. With the coming of spring water temperatures on the surface rise slowly until they reach the level of maximum density. At this point the heavier water, being on the surface, tends to sink through the cooler stratum causing a series of convection currents. This continues until the whole lake becomes homothermous and therefore of the same density. With the water at the same density and of low thermal resistance, spring winds mix the entire lake from surface to bottom.

Essentially, the fall overturn is a repetition of the spring overturn except it is terminated by declining water temperatures instead of increasing temperatures. With the passing of summer and early autumn, declining air temperatures cause a cooling of the surface. The cooled surface waters, rendered heavier by declining temperatures, sink into lower, warmer stratum, again causing a series of convection currents. This lowering of temperatures continues until the temperatures in the epilimnion equals the temperature in the hypolimnion. The cooling continues until the lake again becomes homothermous. Since the hypolimnion in Red Haw Lake remains above 39.4°F. during summer stagnation, the fall overturn begins when the temperature in the epilimnion and thermocline reach that of the hyplimnion. The overturn continues until the entire lake has cooled to 39.4°F. The duration of both the fall and spring overturn are dependent upon the rapidity of decline or rise in surface temperatures.

Results

Spring Overturn

Spring and fall overturns, characterized by rapidly increasing and decreasing water temperatures, are undoubtedly unstable periods of vertical fish distribution. The data indicate radical movements of distribution as the water is warmed or cooled. In the spring, when surface temperatures are warmed more rapidly than those in deeper strata, there is a generalized progressive movement of fish into this area. This is particularly true of crappie, yellow perch, and bluegill. These species were concentrated into the deeper waters in winter. As surface temperatures increased the frequency of occurrence of these species in shallow waters became progressively greater.

During the spring netting a total of 1,086 fish was caught in 25 net days (604 hours). This was the nighest netting success of any limnological period. Golden shiner, with a total catch of 519, were the most frequently caught fish, followed by black bullhead, 279; crappie, 175; bluegill, 72; yellow perch, 24; and channel catfish, 17. Occasionally largemough bass and warmouth were also captured, but were not taken in great enough numbers to be considered significant.

Golden shiner was the only species found at all depths (Table 1). There was no concentration of any species into isolated or narrow strata, as was indicated in the winter and summer netting studies. Crappie and bullheads were found in all but one depth interfal. Channel catfish and yellow perch were found more frequently in deeper waters, but always in less than 50 per cent frequency. In general, golden shiner, bullhead, crappie, and bluegill were fairly evenly distributed from surface to bottom. However, a progressive movement of these species into warmer levels as surface temperatures increase is thought to bias these data to some extent.

Table 1. The vertical distribution of six species of fish in Red Haw Lake during spring overturn

	Species					
Depth	G. Shiner	Crappie	Bullhead	Bluegill	Y. Perch	Channel Catfish
0-2	19.6	8.0	7.1	8.3	4.1	-
2-4	29.0	12.0	8.2	8.3	4.1	11.7
4-6	18.8	24.0	8.6	11.1	-	-
6-8	14.2	-	6.4	-	-	-
8-10	2.3	5.1	4.3	-	-	-
10-12	3.4	6.8	-	12.5	-	-
12-14	10.0	9.1	1.7	16.6		5.8
14-16	0.9	17.7	27.2	22.2	8.3	35.2
16-18	1.3	17.1	36.5	20.8	83.3	47.0

(Individual depth distribution sample is expressed in per cent of occurrence).

Fall Overturn

Fall overturn is also a period of unstable and vigorous vertical movements of fish. After dissopation of the thermocline and reoxygenation of the hypolimnion, vertical movements of fish are unrestricted by physical or chemical barriers. This results in an expansion of the population into previously unpopulated regions of summer stagnation. Like the spring overturn, there is also a progressive movement of fish into deeper strata as the surface waters are cooled.

Gill netting in the fall of 1959 and 1960 produced a total catch of 1624 fish in 51 net days (1,224 hours). The number of fish caught by species was as follows: golden shiner, 1,090; crappie, 96; bullhead, 323; bluegill, 81; yellow perch, 21; and channel catfish, 12.

The vertical distribution of fish in the fall overturn was quite similar to that of the spring overturn, except the fish were slightly more concentrated in the deeper strata. However, both bullhead and golden shiner were found at all depth intervals (Table 2). Definite concentrating of bullhead, bluegill, yellow perch and channel catfish occurred in the 16-18 foot depth interval. The per cent of occurrence of these species in this depth was 65.9, 62.9, 71.4, and 50.0 per cent, respectively. Golden shiner were the exact opposite of this with a 57.5 per cent occurrence in the 0-2 foot interval. Crappie were fairly evenly distributed from the surface to bottom except from 10 to 14 feet where no crappie were found.

Table 2. The vertical distribution of six species of fish in Red Haw Lake during fall overturn

	Species					
Depth	G. Shiner	Crappie	Bullhead	Bluegill	Y. Perch	Channel Catfish
0-2	57.5	18.7	1.8	-	-	-
2-4	12.0	2.0	0.6	3.7	9.5	-
4-6	11.6	21.8	0.9	3.7	19.0	-
6-8	11.8	9.3	1.8	7.4	-	25.0
8-10	0.3	4.1	1.8	1.2	-	25.0
10-12	0.7	-	5.5	-	-	-
12-14	2.0	-	2.7	6.1	-	-

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14-16	1.9	12.5	18.5	14.8	-	-
16-18	1.6	31.2	65.9	62.9	71.4	50.0

(Individual depth distribution sample is expressed in per cent of occurrence)

SUMMARY

The vertical distribution of six species of fish was studied during spring and fall overturn by gill netting in Red Haw Lake. Spring netting produced a sample of 1,086 fish in 604 hours, and fall netting produced a sample of 1,624 fish on 1,224 hours. Golden shiners comprised the largest sample followed by bullhead, crappie, bluegill, yellow perch, and channel catfish. The results of the study were as follows:

1. Both fall and spring overturns were highly unstable periods of fish distribution.

2. There was a progressive movement of fish into the warmer strata in the spring and cooler strata in the fall.

3. Golden shiner were found most abundant in the shallow strata during both periods.

4. Channel catfish, bullhead, and yellow perch were concentrated in deeper depth intervals.

5. Crappie and bluegill were fairly evenly distributed during both periods with a marked increase of numbers found in the shallow depth intervals when the water was warmed in the spring.

SUMMARY OF AQUATIC WEED TREATMENTS, 1960-61

BY

Tom Moen
Fisheries Biologist

During the past 2 seasons several companies have made chemicals available for experimental tests for the control of aquatic weeds. In addition to this, a number of aquatic weed control treatments were carried out as part of the authors duties as Biologist for the Commission. It is the purpose of this paper to present a brief description of the chemicals used and a summary of results obtained in experimental applications as well as routine treatments.

Aquathol

Aquathol is the trade name of an herbicide marketed by the Pennsalt Chemical Corporation. It is a disodium salt of 2,6-endoxophesahydrophthalic acid, and was first used on aquatic weeds in 1953. Aquathol is a contact killer and normally effective in 3 to 7 days. It is available in both liquid form (water solution) containing 2 pounds of technical disodium endothol per gallon, and in granular form as a 5 per cent technical material. Recommended dosage rates range from 0.5 to 5.0 ppm and it is effective against a wide range of submergent aquatic weeds. This material has shown relatively low toxicity to fish with the same level indicated at above 100 ppm for bass, bluegill and several species of minnows.

Methods of application Most of the areas requiring aquatic weed control are limited in size and occur along the margin of the lake. Thus liquid forms of any chemical are less desirable because of the diffusion from the area treated. Granular material has the advantage of reducing this diffusion and producing better kill for the same dosage. Granular material offers less problems in application for small areas but some additional problems if large areas are to be treated. In treating large areas the amount of material, (as much as 500 pounds per surface acre) may present problems of transportation and in the actual application. Small areas are easily treated by broadcasting with a small scoop or even by hand. An endgate seeder mounted on a boat offers the best method of applying large amounts of granular material. Liquid treatments are pumped on with stard weed spraying equipment.

Results Applications in northwest Iowa have been largely limited to experimental plots during the past 2 seasons. Granular material was used in 7 treatments and liquid solutions in 6 (Table 1). Results varied from very poor to 100 per cent successful. Good control was obtained on narrow-leaved pondweeds and coontail at dosage rates of 2.0 ppm and stronger. Water milfoil (Myriophyllum sp.) was difficult to control at recommended dosage. From the printed material on hand it appears the manufacturer had found this true and recent recommendations have increased from 1.0 ppm to 3-4 ppm. One application of granular material at 1.4 ppm produced excellent control of a moderate stand of broad-leaved pondweeds (P. Illinoiensis, Richardsonii, and americanus). These trials indicated the material works best on narrow-leaved pondweeds and other plants early in the growing season and that Chara and water milfoil presented the most difficult weeds to control.

General considerations Aquathol is a comparatively expensive chemical. In a number of the troublesome weed areas on West Okoboji Lake the average depth is near 6 feet. At a dosage rate of 2.0 ppm the granular Aquathol wood cost about $180.00 per surface acre. Sodium arsenite, by way of comparison, at 10 ppm would cost about $40.00.

2,4-D Pellets and Related Products Organic herbicides include such compounds as 2,4-D, 2,4,5-T and silvex. These organic plant hormones have been used extensively on terrestial vegetation in recent years. Still more recently they have come into prominence as useful aquatic weed control agents. For aquatic weed control small clay pellets are impregnated with the pure chemical. The normal 2,4-D granules contain about 20 per cent active ingredient. By theory, at least, the plants absorb the chemical through the lateral root system, instead of through the leaves as happens in terrestial plant applications. Recommended dosage rates range from 100 to 200 pounds per surface acre. In this form and at these dosage rates the toxicity to fish is relatively low, but additional investigation is needed along these lines. Limited checks at the Biology Station at Spirit Lake indicated that up to 300 pounds per acre of 20 per cent 2,4-D granules were not detrimental to fathead minnows over a period of 3 days.

Methods of application The clay pellets or granules can be spread with a small hand scoop over the small areas but for even distribution on larger areas the endgate spreader should be used. Even distribution is more important in these applications than in the case of granular Aquathol, because of the slow release of the active ingredient and the need for the plants to pick up the hormone as it grows. This close association of plant and chemical is more important than when the active chemical is immediately dispersed or dissolved in the water.

Results Among the pelleted growth-regulatory chemicals tried in northwest Iowa lakes and marshes were 14 applications of 2,4-D granules, 3 trials of a combination 2,4-D and 2,4,5-T (10 per cent each), and one trial of 20 per cent silvex (Table 2).

Granular 2,4-D was applied at dosage rates of 100 to 600 pounds per acre. These trials indicated that the high dosages were of secondary importance. The combination of biological and physical surroundings of the application are of prime importance. The most effective control was attained when the plants were in their early stages of growth and when the pellets came in close contact with the root system of the plant. Cattail growth was not altered in the typical marsh habitat, even with applications up to 600 pounds per acre. In each of these cases the primary trouble was traced to lack of contact of the pellets with the root system because of excessive amounts of dead plant material lodged above the roots.

An interesting situation concerning cattails occurred at Five Island Lake early during the summer of 1961. The city of Emmetsburg had made a heavy application of 2,4-D pellets in the southern end of this lake about May 25th. Considerable amounts of vegetation had already reached the surface in most parts of the lake, including a 50 to 100 foot margin of cattails. These cattails looked normal and healthy on June 5. During the following few days these cattails were removed by a mechanical weed cutter to within a foot or so of the bottom. By June 12 the cattails had reappeared as thick as ever but some showed evidence of brown leaves. By July 10th there were no cattails to be seen. The new growth had drawn heavily on the 2,4-D and the results were quite evident. This cattail growth occurred on fairly firm bottom in the absence of any large accumulation of dead and decaying material.

The combination of 2,4-D and 2,4,5-T on clay pellets proved quite successful in three limited trials on water milfoil in West Okoboji Lake in 1961. These plots were treated at rather high dosage rates due to the fact that lighter dosages of 2,4-D granules the year before had not achieved the desired degree of control. Further investigation appears warranted.

The one application of clay pellets impregnated with silvex was only moderately successful. The lack of success was apparently due to an advanced stage of growth at the time of application. This material also deserves further investigation.

General considerations A granular aquatic herbicide has several advantages over more conventional aquatic weed control chemicals, particularly those that require solution before becoming effective. If effective to any degree, there is a longer lasting effect; regrowth seldom occurs within the same year. Claims of control for up to 18 months have been made, but such has not been shown in our work. At the present time these granular materials can compete in cost with most of the aquatic herbicides, including sodium arsenite. They are relatively easy to apply and have a low fish toxicity. No special precautions are necessary when applied to public use areas, such as bathing beaches, or where water might be pumped out for water plants. The requirements for certain biological and physical conditions for effective use are important disadvantages.

Dalapon

Dalapon (sodium dichloropropinate), manufactured by Dow Chemical Co. as Radapon, is a plant regulatory type chemical recommended for cattail control. The powders is mixed with water at the rate of about 4 oz. per gallon of water and sprayed on the cattails. A small amount of detergent is added to each gallon of mixture as a wetting agent. Two applications are recommended, about one week apart; three applications of lighter dosages can be made, perferrably within one week.

Only two trials were conducted. One achieved temporary control, but the second treatment was not applied and the effects of the first were lost. The second trial was conducted according to recommendation on a small plot of cattails and roundstem bulrush at the Humboldt Fish Hatchery. The treatment was considered a complete success (Table 3). Treatment just prior to fruiting provides the best results.

Garlon

Garlon is another product of Dow Chemical Co. and is especially formulated for general vegetation control around industrial sites and etc. This product contains several plant growth control chemicals. The results of one trial were limited and inconclusive (Table 3).

Borax Compounds

Two borax compounds were tried, Borascu and D.B. Granular. The Borascu was applied at an extremely high level (two plots, each at 2,170 pounds per acre) for the control of Chara sp. There were no visible effects (Table 3). The D.B. Granular material was applied to a small stand of cattails growing in about 18 inches of water. Excellent success was obtained in the area treated and the effects appeared to be spread to other parts of the stand. This product should have further investigation.

Aqualine

Aqualine, manufactured by the Shell Petroleum Co., was applied to a one-half acre pond at 1.0 ppm in an attempt to control blue-green algae. A mixture of pondweeds, including P. pectinatus, Ceratophyllum demersum, and Myriophyllum sp. was also present. Control of the blue-green algae was very temporary, lasting about one week. Although this low concentration was not intended for control of higher plants, there was some control noted. This material is highly lethal to fish.

Kuron

Kuron is manufactured by the Dow Chemical Co. with silvex as the active ingredient. It was originally designed as a brush killer. The one application noted in Table 3 was completed just as the cattail growth first showed above the water. Definite results

were noted in the curtailed growth of cattails, the lack of pondweeds where they had occurred the previous year, and the reduction in the amount of filamentous algae normally occurring in this pond. A large bed of Chara vulgaris was unharmed. The use of Kuron needs further expansion into larger applications. The relatively high cost is a disadvantage.

Table 1. Review of several applications of Aquathol in both granular and liquid form during 1960 and 1961

Form	Dosage rate	Date	Predominant Vegetation	Per cent Control	Dimensions of treated area	Total area (acres)
Granular	2.8 ppm	6-10-60	P. pectinatus	95	100' X 100'	80
	1.0	6-10-60	P. pectinatus	50	100' X 100'	80
	1.0	6-9- 60	Mixture of pondweeds	75	150' X 300'	55
	12.0	7-17-61	Chara vulgaris	0	20' diam.	1
	1.4	8-1- 61	Mixture of pondweeds	95	100' X 512'	4,000
	2.0	8-11-61	" " "	0	200' X 200'	360
	4.0	8-18-61	Myriophyllum sp. and broad-leaved pondweeds	50	50' X 80'	4,000
Liquid	5.0	8-12-60	P. pedtinatus & Chara vulgaris	100 ?	100' X 150'	1
	1.0	6-16-61	C. demersum and mixture of pondweeds	80	8 acres	55
	1.5	6-23-61	Myriophyllum sp. and P. Richarsonii	50 100	2.5 acres	600
	.3	6-23-61	Mixture of pondweeds	50	40' X 80'	600
	2.0	8-4- 61	Myriophyllum sp. mixture of pondweeds	10 50	150' X 1000'	4,000
	2.0	7-15-61	P. pectinatus	90	0.8 acre	1.4

Table 2. Review of several applications of 2,4-D granules and related products

Chemical	Dosage rate lbs. per acre	Date	predominant vegetation	Per cent Control	Dimensions of treated plot	Total area, acres
2,4-D (20%)	145	5-17-60	P. pectinatus	100	80' X 100'	80
(Weed Rhap 20)	150	5-13-60	Myriophyllum sp.	25	25' X 80'	4,000
	200	5-13-60	" "	60	25' X 80'	4,000
	100 to 300	5-26-61	Typha angustifolia	0	(5 plots) 15' X 100'	450
	300	6-1- 61	" "	0	15' X 400'	1,000
	600	6-1- 61	Typha and bladdewort	10	10' X 225'	1,000
	500	6-1- 61	" "	10	10' X 400'	1,000
	115	6-9- 61	P. pectinatus	95	37,000 Sq. ft.	80
	430	6-15-61	Cattails	100	10' X 10'	1
	430	6-15-61	"	50	10' X 10'	1
2,4-D & 2,4,5-T	420	6-9- 61	Myriophyllum sp.	95	12' X 25'	4,000
(10 per cent	210	6-9- 61	"	90	12' X 50'	4,000
each)	600	6-9- 61	" and mixture of pondweeds	100	30 ft. diam.	4,000
Silvex (20%)	200	6-9- 61	Mixture of emergents including typha and Scirpus spp.	60	40' X 200'	80

Table 3. Review of the application of several chemicals in the experimental control of aquatic vegetation in 1960 and 1961

Chemical	Dosage Rate	Date	Predominent Vegetation	Per cent Control	Dimensions of treated area	Total acres
Dalapon	50#/A	6-30-61	Cattail	Temporary	20' X 400'	450
	50#/A	6-30-61	Cattail and bulrush	99	300 Sq. ft.	300 Sq. ft.
Garlon	10 gal/A	6-30-61	Cattail	limited	20' X 400'	450
Borascu	2,170#/A	6-13-61	Chara vulgaris	0	10' X 20'	1
	2,170#/A	6-13-61	" "	0	10' X 20'	1
D.B. Granular	430#/A	6-13-61	Cattails	90	10' X 10'	½
Aqualine	1.0 ppm	7-29-60	Blue-green algae	90 (temporary)	½	½
			mixture of pondweeds	10	½	½
Kuron (liquid) (silvex)	2.0 ppm	5-12-61	Typha and	75	1	1
			Chara	0	1	1

PHEASANT COUNTS ON PROPOSED RELEASE AREAS IN SOUTHEASTERN IOWA

BY

Eugene D. Klonglan
Game Biologist

Four roadside pheasant counts were conducted by the Biologist in early August of 1961 as groundwork for future phases in the project to increase pheasant populations in southeastern Iowa. These were made in the standard manner and were taken in those parts of Henry and Des Moines counties currently being considered as potential pheasant release sites. Crowing cock counts and roadside counts have been taken in these counties for several years by the local Conservation Officers. These counts were analyzed to furnish further information on which to base later comparisons. Evaluation of the success of the proposed experimental program requires a knowledge of general population levels at the start of such a program. Data reported herein will furnish at least a partial basis for this.

A mean of 0.18 pheasants per mile was seen on 120 miles of route during the four mornings (Table 1). Of the 22 birds sighted, 10 were cocks and 5 were hens, for an observed sex ratio of 2 males:1 female. It is debatable whether this is close to the true sex ratio because of the small number of birds counted and the greater ease in sighting cocks. It seems certain, however, that the usual cock to hen ratio of 1:3, or greater, typical in the best Iowa pheasant range is not duplicated in this southeastern Iowa area where there is no open hunting season. Only one brood with seven chicks was seen during the four mornings, a further manifestation of the very low pheasant population found in this part of the state.

Late summer roadside counts have been taken in early August since 1954 by Conservation Officers. Three 30-mile routes are run in each county. Results of these counts made over the 1954-1961 interval clearly depict the low pheasant population found in Henry and Des Moines Counties (Table 2). The north routes shown in the table are the most comparable to the area checked by the Biologist, though not including exactly the same area.

In Henry County only 32 pheasants have been sighted on 210 miles of route in the northern part of the county, only 1 bird on 210 miles in the central part and 18 birds on 180 miles in the southern part. In Des Moines County 70 pheasants were seen in 210 miles in the northern part of the county, none on 180 miles in the central part and none on 210 miles in the southern part. Thus only 121 pheasants have been counted in 1200 miles of route in the two counties over the 8-year period, an average of 0.10 per mile. More birds than this would likely be sighted on a single count on one 30-mile route in the primary range in northern Iowa.

Only five broods were observed on the 600 miles of route in Henry County, and only seven broods were sighted on the 600 miles of route run in Des Moines County--12 broods in 1200 miles, or only one brood per 100 miles of driving. This compares well with the one brood sighted in 120 miles on the Biologist's counts. There were 27 adult cocks and 21 adult hens sighted in the two counties on these counts. This observed sex ratio of 1.3 males:1 female was perhaps a more accurate indication of the true sex ratio in the population than the 2:1 ratio of the four 1961 counts.

The spring crowing cock count has been used statewide since 1940 as a measure of the pheasant population. Two 20-stop routes are run in each county by Conservation

Officers. Results of these counts further substantiate the presence of a low pheasant population in Henry and Des Moines Counties (Table 3). There is evidence of a slightly higher population during the 1956-1961 period as opposed to the 1950-1955 interval. This is in agreement with the general statewide trend during this time.

In order to better show what is meant by "very low population", data on roadside and crowing cock counts in Winnebago and Adair Counties were analyzed for comparison. Winnebago County lies in the heart of the best north-central Iowa pheasant range. Adair County lies in the center of a high, but somewhat isolated, pheasant population occurring in a rather small area in southwestern Iowa. Both counties include areas on which intensive pheasant studies have been done.

The differences are quite striking. Whereas only 51 pheasants were sighted in 600 miles in Henry County and 70 birds in 600 miles in Des Moines County, nearly 4000 pheasants were counted in 720 miles in Winnebago County (8-year mean of 5.47 per mile) and about 2500 in 540 miles in Adair County (mean of 4.62). Only 101 cock calls have been heard on 480 2-minute stops in 12 years in Henry County and 106 calls in the same number of stops in Des Moines County. This compares to more than 17,000 calls heard on 440 stops in Winnebago County (12-year mean of 34.5 calls per stop) and nearly 6,600 calls on 420 stops in Adair County (mean of 15.5).

Table 1. Results of Four Late Summer Roadside Pheasant Counts in Northeastern Henry and Northwestern Des Moines Counties

Date	Dewfall reading	No. miles	Cocks	Hens	Young	Total birds	Birds per mile
Aug. 4	4	30	3	1	0	4	0.12
Aug. 5	6	30	2	1	7	10	0.33
Aug. 6	6	30	3	0	0	3	0.10
Aug. 9	5	30	2	3	0	5	0.17
Totals		120	10	5	7	22	0.18

Table 2. Comparison of Conservation Officers' August roadside pheasant counts in Henry and Des Moines Counties, 1954-1961

Year	Mean Number of Birds Sighted Per Mile			
	North	Central	South	Total
		Henry County		
1961	0.00	0.00	----	0.00
1960	----	----	----	----
1959	0.10	0.00	0.30	0.12
1958	0.33	0.00	0.00	0.11
1957	0.23	0.00	0.30	0.18
1956	0.20	0.03	0.00	0.08
1955	0.20	0.00	0.00	0.07
1954	0.00	0.00	0.00	0.00
Mean	0.15	0.01	0.10	0.08
		Des Moines County		
1961	0.30	----	0.00	0.15
1960	----	----	----	----
1959	0.40	0.00	0.00	0.13
1958	0.27	0.00	0.00	0.09
1957	0.73	0.00	0.00	0.24
1956	0.43	0.00	0.00	0.14
1955	0.53	0.00	0.00	0.18
1954	0.00	0.00	0.00	0.00
Mean	0.33	0.00	0.00	0.12

Table 3. Comparison of Conservation Officers' Spring Crowing Cock Counts in Henry and Des Moines Counties, 1950-1961

	Henry County			Des Moines County		
	Mean Number of Cock Calls per Stop			Mean Number of Cock Calls per Stop		
Year	East	West	Total	North	South	Total
1961	0.4	0.0	0.2	0.6	0.0	0.3
1960	0.4	0.4	0.3	0.8	0.0	0.3
1959	0.4	0.2	0.3	0.8	0.0	0.4
1958	0.4	0.4	0.4	0.8	0.0	0.4
1957	0.4	0.5	0.4	1.2	0.0	0.6
1956	0.7	0.7	0.7	0.8	0.1	0.5
1955	0.0	0.0	0.0	0.1	0.0	0.1
1954	0.0	0.0	0.0	0.0	0.0	0.0
1953	0.1	0.0	0.1	0.1	0.0	0.1
1952	0.1	0.0	0.1	0.0	0.0	0.0
1951	0.0	0.0	0.0	0.0	0.0	0.0
1950	0.0	0.0	0.0	0.0	0.0	0.0
Mean	0.2	0.2	0.2	0.4	0.0	0.2
Mean, 1956-61	0.5	0.4	0.4	0.8	0.0	0.4
Mean, 1950-55	0.1	0.0	0.1	0.1	0.0	0.1

PHEASANT NESTING SUCCESS IN ROADSIDE COVER FRANKLIN COUNTY, IOWA

BY

Richard C. Nomsen
Game Biologist

The roadside nesting study was continued in 1961 to collect information concerning the use and value of roadsides as pheasant nesting cover. Previous studies in Iowa have indicated the importance of roadside cover as nesting sites for hen pheasants. Observations were also made on five nests sprayed with 2,4-D.

The study area occupies nine sections in the southeast corner of Wisner Township, Franklin County. The topography is level to very gently rolling and 95 percent of the land is intensively cultivated. Normally, about 60 percent of the area is planted to corn and soybeans. Roadsides occupy less than 1.5 percent of the total acreage.

All roadsides within the area and surrounding the nine sections were thoroughly searched for nests on May 22 - 24. The complete area was searched to locate additional nests which could be observed before and after spraying with a herbicide. Each active nest was checked at least twice a week until hatched or destroyed.

A total of 48 nests was found, including 6 which had recently been destroyed by predators. One nest had been burned. Four dump nests and six nest forms containing one egg each were located but were not included in the above total. Several fresh nest forms were also found during the search. It was quite obvious to the observers that nest establishment was at or near its peak during this period, and that the search was probably conducted 1 week too soon for best results.

The rate of nest success in roadsides was very poor in 1961. Only 5 nests (10 percent) hatched compared to 33 percent in 1960. Of the remaining nests, 15 (31 percent) were abandoned or deserted, 28 (58 percent) were destroyed by predators. In 1960, 54 percent of all nests were destroyed by predators which was similar to the findings in 1961. The rate of abandonment seemed very high compared with the results of the 1960 study when only one nest of 24 was abandoned.

Nest establishment began early in May but reached a peak about 1 week later than in 1960. Temperatures averaged 4 to 6 degrees below normal during April and May, which discouraged early nesting. Unfavorable weather might also help explain the high rate of abandonment.

Predators were most active during the last week of May and the first week of June. Of the 38 unsuccessful nests, 12 were destroyed by an unknown predator. All eggs or traces of eggs were removed from 11 of the 12 nests which indicates that crows were probably responsible for this loss. Eggs in two other nests were definitely taken by crows. Ground squirrels destroyed seven nests while skunks were smashing the eggs in five.

Observations were also made on five nests sprayed with 2,4-D in cooperation with the county weed commissioner. Four incubating hens and one clutch of eggs were sprayed. The four hens did not flush as the weed spray was applied, and all were present the following day. Much of the cover surrounding three of the nests soon

wilted and died, exposing the incubating hen. The three exposed nests were soon destroyed by predators - crows probably. The clutch of eggs which was sprayed appeared to hatch normally. Three of the four control nests hatched.

STATUS OF IOWA QUAIL 1960-1961

BY

M. E. Stempel
Game Biologist

From January to May 1960 we had an unusually high loss of quail. This occurred while there were severe winter winds, low temperatures, and snow. Conditions moderated thereafter, and the following period has been one of recovery.

When effects of weather are known, we had in the weather itself an early indication of its effects. Thus game managers can have early information to formulate regulations. They can answer with confidence the perpetual question, "What will this do to the quail?"

Our present knowledge indicates that fluctuations are based on the character of the bird, weather, availability of food and habitat. This brief report combines available information to serve as a guide in estimating results of winter weather. It also outlines conditions which accompanied recovery.

METHODS

Bases for this report are weather records, field notes, biology reports and reports from neighboring states. Climatological Data and Iowa Weekly Weather and Crop Bulletins were consulted for weather reports. Quarterly Biology Reports contain the information on censuses; they also contain hunting information. These latter data were gathered on contact cards through 1959 by Officers and the biologist. In 1960 and 1961 limited card information was gathered by Gene Hlavka, Area Game Manager, and myself. The Officers now use Field Contact Records (in booklets) for collecting statewide information and these data will be compiled later.

Some data from other states were in printed reports and in letters. Effects of the 1960 winter were extensively studied in Missouri and this was verbally described by Jack Stanford, game biologist. Information is presented chronologically so it will form a pattern to be used as an indicator in event of a future extended winter and a late, wet, cold spring similar to that of 1960.

RESULTS

The severe 1960 winter was preceeded by the moderate weather of 1959. The 1959 quail production was average and the quail shooting was rated as fairly good with very few unsuccessful hunts.

Winter began as fair to moderate. Heavy rains were followed by heavy snowfall and by March the weather became severe with deep snow and continued cold. Where there was good cover near unharvested corn (this grain was not picked in most rough areas), quail were concentrated. Early March counts indicated good supplies of birds, though some were believed to be in poor condition. By March 6 there had been 52 days of snow cover with more to come. Shortly thereafter, there were reports of weakened and dead quail, especially in western Iowa. Some local efforts to feed the quail were initiated.

The doubtful effects of emergency feeding were illustrated in Missouri where there was an organized feeding program, but dead and weakened quail were found even in the vicinity of the feeding areas. Also, in Missouri it was learned that during the severe weather quail continued to decline in weight and it was believed this continued through the cold, wet, late spring.

Nesting in Iowa was delayed, as indicated by late calling of males. Heaviest loss was now located by listening for the cocks which were calling "Bob-white", and it was learned that heaviest loss was in poor cover. This was shown by results of a whistling quail census along a 12-mile route south of Chariton. Here, in poor grade, scattered cover, in July 1959 there were 31 calling cocks, while in 1960 only 8 were heard. In plentiful cover of good quality near Ottumwa, in 1959 there were 28 callers, while in 1960 there were 23.

Total losses may be estimated from the following:

1. In 1959 the state average was 1.6 calling cocks per mile on about 1000 miles of route. The 1960 average was 1.0.

2. The 1960 fall count by Officers showed a loss of 50 per cent since 1957.

3. The 1960 fall check of selected 40-acre fields indicated a loss of 24 per cent by Officer's and biologist's counts, and a loss of 41 per cent by farmer's estimates, since 1959.

Low Population Reflected in 1960 Hunting

To compensate for losses, the hunting season was shortened to 30 days whereas it normally was about 45 days. The 1960 hunting success was 2.0 hours per quail. The 10-year average was 1.5 hunter-hours per bird.

More than 100 men were interviewed by the biologist and all agreed that the shooting was the poorest in many years. However, the most persistent of these gunners found quail almost every trip. Before the season opened these shooters had located game by asking farmers if they had seen quail, and hunting was done only where quail were sighted several times in late summer or in autumn.

An example of the 1960 hunting pressure is shown in a study on seven farms; here, in 1959, 27 parties asked permission to shoot quail, but in 1960 only 5 asked. Some of the farmers were sure some shooting was done without permission. A few farmers would not allow hunting in 1960 because they had seen very few quail.

After the 1960 quail shooting season closed, the winter weather remained favorable and cover and food were plentiful. The late winter count by Officers indicated that due to the 1960 losses in the bad winter, and due to lack of snow, there were few signs of quail even where coveys were flushed. Quail or quail sign were found on only about 50 per cent of the areas. The above may be compared to over 90 per cent occupancy of ranges in 1959 when all areas were covered with deep soft snow and quail and sign were easily found. Spring 1961 followed a belated snowstorm. April and May were cool and a delay in nesting activity was revealed in belated spring calling by males. In the best quail country there was a late July average of 1.5 callers per mile in 1960 while it was 1.8 in 1961.

Summer was cool in 1961. Persistent calling, however, indicated that nesting was extensive. The late summer roadside counts by Officers showed an increase since 1960 of 10 per cent in adults sighted, with an increase of 22 per cent in broods. Mail Carriers saw 100 per cent more quail in 1961 than in 1960. Checks by Officers and the

biologist on selected 40-acre fields indicated a 32 per cent increase in ranges occupied.

The 1961 Quail Shooting

Hunting regulations were liberalized because of the increase in quail and the season was open from November 4 to December 15, which was 42 days compared to the 30 days allowed in 1960.

The 1961 hunting season began just after a change from warm to cold weather. Corn and beans were not harvested in the quail range, and other cover was usually heavy. When coveys flushed they ofter disappeared into cover and the take per covey was low. There were few ideal quail shooting days. Ground was wet and cover was dense. Rainfall was extensive and it was followed by snow; these changeable conditions caused birds to be wild. The kill was light though birds were comparatively plentiful.

During the season on quail we make two types of hunter checks. These are mentioned under "METHODS". Results of the first method are compiled and include information from contact cards which indicate number of hunters, party hours, coveys sighted and quail killed. The 1961 season was regarded by the 104 quail hunters interviewed as the same or better than 1960. Not one who expressed an opinion thought it was poorer. Most of these travelled less than 25 miles to shoot. They hunted 137 party hours, flushed 86 coveys and shot 263 quail.

The 1960 season was considered the same or better than 1959 by 41 per cent of the 114 men interviewed. Fifty-nine per cent thought it was poorer than 1959. Most travelled less than 25 miles to hunt. They spend 194 hours to flush 72 coveys and bag 214 quail.

The early checks of shooting results indicate that some of the best hunting was between Chariton and a point north-west of Bloomfield.

Post-Season Survival

Several quail examined and weighed by the biologist were in excellent condition. Hunters found quail in most of the good coverts. Snow began to fall early in December but there were no severe storms before January. Previous to the snow and cold of January, there were 2 days of moderate weather. This offered an opportunity for quail to make use of the corn and beans which are unharvested in most of the southern Iowa quail country. Past observations indicated that long periods (two weeks or more) of foul weather will cause heavy losses in some places. If there are moderate intervals, the losses will be light.

Since the snow became deep, I have contacted Officers in the following counties: Appanoose, Monroe, Clarke, Decatur, Lucas, Wayne, Lee, Mahaska, Keokuk, Davis, Van Buren, Jefferson, Washington and Wapello. Not one of these has had reports of quail in distress. The Officer in Lee County did find two quail freshly shot by a poacher, and these were reported to be in excellent condition. No reports of quail in distress have come directly to me.

AGE AND SEX INFORMATION FROM BLUE-WINGED TEAL CAPTURED AND BANDED IN IOWA IN 1961

BY

James G. Sieh
Game Biologist

The blue-winged teal is one of Iowa's most common nesting waterfowl. Local production of this species in 1961 was considered as an important contribution to the continental population because prolonged drought in the Dakotas and in the Canadian prairies had temporarily eliminated much nesting and rearing habitat in the so-called "duck factory". Iowa's sloughs and marshes, recently inundated after recovery from drought, were ecologically prepared to produce a bumper crop of blue-wings. Excellent production was exemplified by the capture of 118 young teal in the small trappers Bay area of Silver Lake near Lake Park, Iowa.

Drive trapping efforts by the Game Section resulted in the capture and banding of 888 blue-winged teal in 1961. Of this total, "Locals" were represented by 293 males and 288 females, approximating a 1:1 sex ratio.* In several areas, such as Goose Lake in Greene County and Prairie Lake in Dickinson County, a preponderance of moulting males were captured (Table 1). The presence of moulting males ordinarily indicated additional production in outlying areas because prior to the moulting period adult males usually leave the females, seeking out more desirable habitat providing optimum food and cover conditions during their flightless period.

Table 1. The location, date, age and sex, and number of blue-winged teal captured and banded in Iowa during the summer of 1961.

Game Mg't. Unit	Location of capture	Dates of Capture	Age & Sex AF	AM	LF	LM	Totals
Mo. River Unit		July 18, 19, 25, & 26					
	Horseshoe Lake, Modale		3	5	2	3	13
	Badger Lake, Whiting		1	3	6		10
	Round Lake, Mandamin		6	26	7	12	51
			10	34	15	15	74
Bays Branch Unit		July 17, 19, 20 24, 26, 27, & 28 - Aug. 1					
	Christie's Pond, Coon Rapids			1			1
	Goose Lake, Jewell		1	1	7	9	18
	Green Valley Lake, Creston		1		10	12	23
	Long Pond, Jamaica		7	16			23
	Goose Lake, Jefferson		16	51	12	12	91
	Linn Pond, Jefferson		3	2	3	3	11
	Bays Branch, Panora		4		21	25	50
	Swan Lake, Carroll		3		13	20	36
			35	71	66	81	253

Game Mg't Unit	Location of capture	Dates of Capture	Age & Sex AF	AM	LF	LM	Totals
Sweet Marsh Unit		July 17, 18, 24 & 26					
	Sweet Marsh, Tripoli				2		2
	Ambrose Lake, Tripoli		3		6	8	17
	Vinton Area, Vinton		1		2	3	6
			4		10	11	25
Dewey's Pasture Unit		July 21, 22, 23, 25, & 26 Aug. 3					
	Mud Lake, Ruthven		2		13	14	29
	Silver Lake, Ayrshire		1				1
	Virgin Lake, Ruthven		4	2	10	6	22
			7	2	23	20	52
Rice Lake Unit		July 20, 24, 25, 27, & 28					
	Myre Slough, Thompson					2	2
	Ventura Marsh, Ventura		1		19	9	29
	Harmon Lake, Thompson		4	5	17	19	45
			5	5	36	30	76
Ingham High Unit		July 17, 18, 27, 28, 30, & 31 Aug. 1, 2, 6, 8, & 31					
	Trappers Bay, Lake Park		3		67	51	121
	Cross Slough, Armstrong		1		2	3	6
	Ingham Lake, Wallingford				1		1
	Jemmerson Slough, Spirit Lake		10	26	5	7	48
	Prairie Lake, Arnold's Park		28	62	29	35	154
	High Lake, Wallingford		2		26	29	57
	Pleasant Lake, Spirit Lake		1		4	7	12
	Marble Lake, Spirit Lake		1		4	4	9
			46	88	138	136	408
	GRAND TOTALS		107	200	288	293	882

DISCUSSION

The Mississippi Flyway Council has urged all of the cooperating States and Provinces to join in an organized waterfowl banding program. Where waterfowl research requires a larger banded sample of greater geographic distribution, individual States are assigned a quota by the Council. By this quota system, the largest sample of wood ducks in North America has been banded within the Mississippi Flyway States.

The Flyway Council is also promoting species management among waterfowl whenever practicable. Regulations permitting bonus ducks, thus increasing the bag limit of species in abundance, is already practiced in the Pacific Flyway. The blue-winged teal in years of abundance should, among others, be considered worthy of special regulations permitting "bonus blue-wings" or a special early "blue-wing season". First, blue-wings migrate south early in the fall (mid-August to mid-October) and adult males predominate during the early part of the migratory period. There is every reason to assume that many of these early migrants (adult males) constitute a surplus which cannot be harvested legally because of the closed during September. Second, in years of

overall waterfowl abundance and small bag limit, the blue-wing is lightly gunned in the prairie provinces, the Dakotas, and in Nebraska where most of the Mississippi Flyway blue-wings are produced. Third, Iowa and Minnesota also produce large numbers of blue-wings under suitable ecological conditions.

Iowa is in an enviable geographic location in regard to the fall migratory pathway of blue-winged teal. We are in the heart of both the north-south arterial migratory flow between the Mississippi and Missouri Rivers, and centered within the west to east pathway from the Dakotas and Nebraska. In that the Mississippi Flyway Council is endeavoring to encourage species management of waterfowl, it behooves us to continue our banding efforts and, if possible, to increase the sample of banded blue-winged teal from Iowa. Without adequate information which is well documented, we have little chance of obtaining special regulations on "blue-wings".

* In reporting banding data the term "locals" refers to young birds hatched in a known areas as opposed to "immatures" of unknown geographic origin. The term "juvenile" is no longer used in reporting banding data.

INFLUENCE OF PRODUCTION ON IOWA COTTONTAIL RABBIT POPULATIONS

BY

Paul D. Kline
Game Biologist

It seems traditional in Iowa that cottontail populations fluctuate. Most of the older, still active hunters refer to rabbit abundance in the "thirties". There can be little doubt they were numerous for a time during the 1934-1939 period. A more recent explosion in cottontail numbers occurred from 1957 through 1959. When rabbits abound hunters have little complaint. Unfortunately, the years of abundance seem to occur far less frequently than years of scarcity or moderation. Hunters tend to remember the best years. When scarcity occurs, they demand an explanation. Also, they can and do challenge, "Why don't you do something". This is a challenge which must be met by our wildlife profession if we are to justify our presence in a society where game belongs to all the people and we stand employed by these same people.

It is not easy to explain fluctuations in cottontail populations. The reasons for these "ups and downs" never have been explored properly and in depth. One reason we find difficulty in explaining fluctuations is that until recent years we have not been able to properly measure them.

Roadside surveys of cottontails were initiated in Iowa in 1950 and have been continued every year since. They had been used to survey pheasant populations with success for some time prior to 1950 (Kozicky, et al; 1952). One survey route 30-40 miles long on gravelled roads was selected by each Conservation Officer and Biologist. Counts were made twice annually, once in summer and once in winter.

The winter surveys were discontinued after 10 years in 1959. Varying snow cover conditions at the time of survey in various portions of the State and from year to year gave results which could not be evaluated when population indices were desired (Kline, 1959). Newman (1959), working in south-central Iowa, had previously demonstrated that snow cover was the most significant factor influencing winter surveys.

July roadside surveys of cottontails were first used and described by Hendrickson (1939). Summer counts are conducted in mid-July at present with methods similar to those used in Missouri (Wright, 1959). Most rabbits are seen during the first two hours following sunrise at that time of year (Lord, 1959 and 1961). Participants are asked to begin their counts at sunrise. They drive at a speed of 25 miles per hour and count and record every rabbit sighted along the route. The number of rabbits observed per 10 miles surveyed gives indices which are used to compare populations from various portions of the State and from one year to another. Weather factors are considered.

Surveys are not made when the wind blows over 8 miles per hour or when the sun is obscurred by cloudiness. These factors have been found to depress roadside activity of cottontails during summer daylight hours (Unpublished data, Iowa Conservation Commission). Voris (1956), using statistical methods, found wind the only weather factor significantly regulating cottontail roadside indices during the summer.

In conjunction with the roadside counts all participants are asked to class every cottontail counted during the survey period (July 10 - 20 inclusive) as an adult or juvenile, or as age unknown. From this information it is possible to obtain age ratios which may be used in measuring reproductive success for each year.

Analysis of the roadside surveys reveals the Iowa cottontail population varied little from 1950 through 1956. Populations increased each year from 1956 (when the index was 3.94 cottontails per 10 miles surveyed) until a peak was reached in 1958 (6.86 cottontails per 10 miles). The population declined in 1959 (Table 1) and again in 1960. Average index for the 12 years of survey work is 4.61.

Table 1. Results of July roadside rabbit surveys, 1958-1961

Year	Number of routes	Total miles driven	Number of cottontails observed	Cottontails per 10 miles
1958	62	2,108.8	1,446	6.86
1959	68	2,362.1	1,466	6.21
1960	64	2,293.5	1,032	4.49
1961	69	2,347.6	1,124	4.79

Hunting success has followed rather closely the population fluctuations indicated by summer roadside surveys. Cottontails were bagged at a rate of 1.44 per gun hour during the 1958-59 hunting season following the peak in summer counts obtained in 1958. During the following season, 1959-60, when summer counts indicated a population decline, the success per gun hour dropped to 0.93 (Table 2). In 1960-61 the success dropped again, to 0.56 rabbits per hour, following another decline in the indicated summer population. The close agreement between summer indices and hunter success is similar to that reported by Wight (op. cit.) in Missouri. There can be little doubt that a population decline did occur from mid-summer 1958 to 1960.

Table 2. Cottontail hunting success in Iowa for 1958-59 through 1960-61 seasons

Season	Gun Hours recorded	Cottontails killed	Cottontails per gun hour
1958-59	806.0	1,163	1.44
1959-60	575.7	534	0.93
1960-61	896.0	483	0.56

A possible explanation for this decline appears in the summer age ratios (Table 3). The ratio of juveniles per adult has dropped from 2.67 and 2.75 in 1958 and 1959, respectively, to 2.42 and 2.27 for 1960 and 1961. These data indicated cottontail production was lower in 1960 and 1961 than during the two previous years. The average age ratio for 1950 through 1961 was 2.6 juveniles per adult. Hence, production for the two years, 1960 and 1961, was below average; the two previous years were above.

Table 3. Age ratios of cottontails observed in July

Year	Number of juveniles	Number of adults	Ratio of juveniles/adult
1958	3,236	1,211	2.67
1959	3,156	1,150	2.75
1960	2,133	882	2.42
1961	2,201	969	2.27

One discrepancy appears in the age ratio data. The July roadside survey indicates a population decline from 1958 to 1959. How this occurred if production actually was higher in 1959 is difficult to explain. A clue to actual production tendencies may be found in the sizes of embryonic litters examined from 1958 through 1961.

Many of the cottontails used for production studies were retrieved as road kills. Some were shot, and a number taken during an intensive box-trapping program in 1959. During the four years of study starting in 1958, 173 females have been examined, all taken during the early portion of the breeding season, February 1 to May 31. Techniques for examination of these female rabbits has been based on the work of Schwartz (1942) in Missouri. Embryonic litter sizes from 73 were determined (Table 4).

Table 4. Sizes of embryonic litters, 1958-1961

Number of embryos	Number of occurrences			
	1958	1959	1960	1961
1	--	1	--	--
3	1	2	--	5
4	1	8	4	6
5	4	4	6	6
6	2	3	2	4
7	2	2	1	2
8	3	1	--	1
9	1	--	--	1
Total litters	14	21	13	25
Mean size	6.14	4.71	5.00	4.96
Standard deviation	1.69	1.55	0.88	1.59

Mean size of 14 litters taken in 1958 was 6.14. For the three following years, 1959-1961, the means were, respectively, 4.71, 5.00, and 4.96. There is considerable difference in the means from 1959 through 1961 as compared to 1958. Since the high mean occurred during the year when populations were highest, as indicated by summer roadside counts and hunting success, we can theorize that decreased production may have

been at least partially responsible for population decline after 1958. Also, we have indication that production may have actually declined in 1959 as opposed to the trend indicated by summer age ratio counts.

Whether or not these differences in mean litter sizes were statistically significant was determined by use of "t" tests (Table 5). The means of embryonic litter sizes for 1959 through 1961 were each found significantly lower at the 95 percent confidence level than the 1958 mean. The other three tests showed there were no significant differences between the 1959, 1960 and 1961 populations. We can conclude, therefore, that reduced populations followed lower production of juveniles.

Working with muskrats in Iowa, Errington (1954) has demonstrated that litter sizes were greater than average near cyclic peaks and smaller at the cyclic lows. Although considerable less data were evaluated, the same trend is demonstrated in Iowa cottontail populations. Whether or not the relationship between reproductive potential, as indicated by litter sizes or summer age ratios, and population trends continued in Iowa must be determined by further study.

Table 5. Statistical significance of yearly differences in mean litter sizes, 1958 through 1961

Years Compared	"t"	Degrees of Freedom	Significant at 5% level	Significant at 1% level
1958 with 1959	2.87	33	yes	yes
1958 with 1960	2.08	25	yes	no
1958 with 1961	2.23	37	yes	no
1959 with 1960	0.60	32	no	no
1959 with 1961	0.53	44	no	no
1960 with 1961	0.08	36	no	no

LITERATURE CITED

Errington, Paul L. 1954 On the hazards of overemphasizing numerical fluctuations in studies of "cyclic" phenomena in muskrat populations. Jl. Wildl. Mgmt. 18(1): 66-90.

Hendrickson, George O. 1939 Inventory methods for Mearns cottontail. Trans. 4th N. Amer. Wildl. Conf. 209-215.

Kline, Paul D. 1959 An evaluation of the winter roadside rabbit census in Iowa. Quar. Biol. Rep. 11(1): 50-57.

Kozicky, Edward L., George O. Hendrickson, and Paul G. Homeyer. 1952 The adequacy of the fall roadside pheasant census in Iowa. Trans. 17th N. Amer. Wildl. Conf. 293-305.

Lord, Rexford D., Jr. 1959 Comparisons of early morning and spotlight roadside censuses for cottontails. Jl. Wildl. Mgmt. 23(4): 458-460.

____ 1961 Seasonal changes in roadside activity of cottontails. Jl. Wildl. Mgmt. 25(2): 206-209.

Newman, Duane E. 1959 Factors influencing the winter roadside count of cottontails. Jl. Wildl. Mgmt. 23(3): 290-294.

Schwartz, Charles W. 1942 Breeding season of the cottontail in central Missouri. Jl. Mamm. 23(1): 1-16.

Voris, John C. 1956 Factors influencing the summer roadside count of the cottontail rabbit (Sylvilagus floridanus mearnsi) in south-central Iowa. Unpub. M. S. Thesis. 1-61 pp. Iowa State University Library.

Wight, Howard M. 1959 Eleven years of rabbit population data in Missouri. Jl. Wildl. Mgmt. 23(1): 34-39.

RESULTS OF IOWA'S 1961 BOW SEASON FOR DEER

BY

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Game Biologist

Iowa bow hunters participated in the 1961 open deer season for the ninth consecutive year. The general regulations governing the 48-day statewide season, which extended from October 14 - November 30, were unchanged from those of 1960.

Recipients of bow permits for deer were required to submit a hunt report card from which the following data were obtained.

RESULTS

Card Returns

A total of 2,191 bow permits were issued to hunters who wished to take part in the 1961 season for deer. Hunt report cards were submitted by 2,101 hunters for a 95.9 percent return. Of those who returned cards, 45 said they did not hunt. It was assumed, however, that the 90 permit holders who failed to return their cards did participate; therefore, 2,146 bow hunters hunted deer in the 1961 bow season.

Total Kill And Hunter Success Ratio

Bow hunters enjoyed their most successful season in 9 years bow hunting has been allowed. The reported kill of 367 deer yielded a hunter success ratio of 17.1 percent, which was slightly higher than the 16.0 percent success ratio in 1960.

Total kills and hunter success ratios for the 9-year period, 1953-1961, are found in Table 1.

Bow Kill By County

The bow kill and the approximate hunter success ratio of the hunters hunting each county is given in Table 2. Eighteen counties, comprising about 18 percent of Iowa's 99 counties, furnished 55.3 percent of the deer harvested in 1961. These counties contributed 203 of the total harvest of 367 deer. The hunters hunting these counties had a slightly greater hunter success ratio (17.8) than did the hunters for the state as a whole, however, those in some counties had extraordinary success. Counties included in the top 18 had 7 or more deer killed by bow hunters during the 1961 season.

Hours Of Hunting And Hours Hunted Per Deer Harvested

Bow hunters said they hunted 103,889 hours during the 1961 season, or an average of 48.4 hours per hunter. Deer were taken at the rate of one for each 283 hours of hunting which was somewhat better than the rate of one deer for each 311 hours in 1960 (Table 1).

Deer Observed

The average Iowa bow hunter observed 14.8 deer at the rate of 0.30 deer per hour. There has been little variation in the deer sighted per hour figure since 1957 (Table 1). A total of 31,684 deer was reportedly sighted by the group while engaged in hunting during the recent bow season for deer.

Sex and Age Ratios of Harvested Deer

A sex ratio of 174 males:100 females was observed for the deer harvested by the archers, who said they took 233 males and 134 females in 1961. This differs considerably from the 251 males:100 females reported in 1960; it may indicate the bow hunters are becoming less selective as to sex in choosing their deer.

An age ratio of 17 fawns:100 adults was indicated by the bow hunters for the 52 fawns and 311 adults they bagged in 1961.

Time Of Day and Part Of Season Deer Were Harvested

Bow hunters took 45.2 percent of their deer during the morning hours between 0630 and 1200 and 54.8 percent in the afternoon period from 1200 to 1730. As in past seasons, this amounted to about 50 percent of the kill occurring in each period, with a slight tendency to favor the afternoon period.

The 48-day season was divided into three 16-day periods: October 14-29, October 30 - November 14, and November 15-30. The percentage of the total deer kill, by period, was as follows: first period, 21.3; second period, 31.1; and third period, 47.6.

There are several reasons why almost 50 percent of the deer were reported taken during the last one-third of the season: (1) changes in cover conditions which favor the hunter occur, such as picked cornfields and loss of lush undergrowth and leaves; (2) the hours bow hunters are allowed to hunt, 0630 to 1730, more closely coincide with the times deer are naturally moving; (3) the hunter who is selective early in the season may become an opportunist and take the first deer he sees as the end of the open season approaches; and (4) a bias in the report filed by the hunter who in reality may harvest his deer early in the season, but wishes to continue hunting with his partners to insure their success (once a deer killed, under Iowa law the hunter is supposed to cease all deer hunting activities).

Deer Hit But Not Retrieved

The 232 bow hunters who claimed they had hit but failed to retrieve at least one deer constituted 10.8 percent of the hunters. These hunters said they had wounded a total of 261 deer during the 1961 season.

In 1960, 11.3 percent of the bow hunters reported they had hit but not retrieved 227 deer; the percent of hunters who wounded animals in the 2 years, 1960 and 1961, is therefore very similar.

When interpreting data pertaining to wounding losses, it should be remembered: (1) all wounded deer are not reported; (2) some report wounding deer when in reality they did not; (3) some of the wounded deer are later taken by other hunters; and (4) all wounded deer do not die.

SUMMARY

1. The ninth Iowa bow season for deer was 48 days in length (October 14-November 30) and was open statewide.

2. Permits were issued to 2,191 bowhunters; 2,146 participated in the season and harvested 367 deer for a hunter success ratio of 17.1 percent.

3. Bow hunters spent 103,889 hours hunting in 1961 for an average of 48.4 hours per hunter. It required an average of 283 hours of hunting for each deer reduced to possession.

4. A total of 31,684 deer were sighted by the bowhunters at the rate of 0.30 per hour and 14.8 per hunter during the 1961 season.

5. A sex ratio of 174 males:100 females and an age ratio of 17 fawns:100 adults was reported for the harvested deer.

6. Bow hunters shot 45.2 percent of their deer during the morning hours and 54.8 percent during the afternoon hours.

7. The 48-day season was divided into three 16-day periods, with hunters reportedly taking 21.3 percent of their deer during the first, 31.1 percent during the second, and 47.6 percent during the third.

8. Deer were hit but not retrieved by 232 (10.8 percent) of the bow hunters, who said they hit and lost 261 deer. Percentage-wise, this is quite similar to the 1960 season when 196 (11.3 percent) of the hunters hit but failed to retrieve 227 deer.

Table 1. SUMMARY OF DATA FROM BOW SEASONS FOR DEER, IOWA, 1953 - 1961

Item	Year								
	1953	1954*	1955	1956**	1957	1958	1959	1960	1961
Number of permits issued	10	92	414	1,280	1,228	1,380	1,627	1,772	2,191
Deer kill	1	10	58	117	138	162	255	277	367
Hunter Success Ratio (%)	10.0	10.9	14.0	9.1	11.4	12.4	16.2	16.0	17.1
Hours Hunted/Deer Bagged	--	--	--	432	370	363	252	311	283
Deer Observed/Hour Hunted	--	--	--	0.12	0.29	0.34	0.33	0.27	0.30
Length of Season (Days)	5	12	23	31	31	30	31	44	48

* 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, NUMBER OF HUNTERS, AND HUNTER SUCCESS FOR BOW HUNTERS, BY COUNTY, IOWA, 1961

	County	Deer Killed	No. Hunters Hunting County	Approx. Hunter Success (%)
1.	Adair	1	12	8.3
2.	Adams	2	15	13.3
3.	Allamakee	1	47	2.1
4.	Appanoose	1	10	10.0
5.	Audubon	0	6	0.0
6.	Benton	4	24	16.7
7.	Black Hawk	12	110	10.9
8.	Boone	4	33	12.5
9.	Bremer	3	42	7.1
10.	Buchanan	2	26	7.7
11.	Buena Vista	2	24	8.3
12.	Butler	7	44	15.9
13.	Calhoun	0	3	0.0
14.	Carroll	0	9	0.0
15.	Cass	6	20	30.0
16.	Cedar	0	4	0.0
17.	Cerro Gordo	1	19	5.3
18.	Cherokee	3	32	9.4
19.	Chickasaw	4	38	10.5
20.	Clarke	0	2	0.0
21.	Clay	7	39	17.9
22.	Clayton	13	102	12.7
23.	Clinton	8	76	10.5
24.	Crawford	2	9	22.2
25.	Dallas	5	45	11.1
26.	Davis	0	2	0.0
27.	Decatur	2	11	18.2
28.	Delaware	11	96	11.4
29.	Des Moines	7	42	16.6
30.	Dickinson	3	20	15.0
31.	Dubuque	4	55	7.3
32.	Emmet	7	44	15.9
33.	Fayette	3	39	9.4
34.	Floyd	8	47	17.0
35.	Franklin	1	14	7.1
36.	Fremont	1	16	6.2
37.	Greene	0	5	0.0
38.	Grundy	0	0	0.0
39.	Guthrie	4	41	9.8
40.	Hamilton	1	35	2.8
41.	Hancock	0	8	0.0
42.	Hardin	5	28	17.8
43.	Harrison	5	24	20.8
44.	Henry	0	9	0.0
45.	Howard	1	31	3.2
46.	Humboldt	2	15	13.3
47.	Ida	0	1	0.0
48.	Iowa	4	31	12.9
49.	Jackson	4	55	7.3
50.	Jasper	1	17	5.9

(continued next page)

51.	Jefferson	0	8	0.0
52.	Johnson	2	52	3.8
53.	Jones	3	44	6.8
54.	Keokuk	0	16	0.0
55.	Kossuth	4	34	11.8
56.	Lee	1	16	6.2
57.	Linn	5	92	5.4
58.	Louisa	1	15	6.7
59.	Lucas	7	40	17.5
60.	Lyon	17	45	37.8
61.	Madison	5	41	12.2
62.	Mahaska	1	20	5.0
63.	Marion	4	29	13.8
64.	Marshall	1	17	5.9
65.	Mills	3	18	16.7
66.	Mitchell	12	51	23.5
67.	Monona	14	29	48.2
68.	Monroe	4	25	16.0
69.	Montgomery	4	24	16.7
70.	Muscatine	0	9	0.0
71.	O'Brien	1	18	5.6
72.	Osceola	1	10	10.0
73.	Page	1	8	12.5
74.	Palo Alto	1	8	12.5
75.	Plymouth	4	25	16.0
76.	Pocahontas	0	1	0.0
77.	Polk	7	83	8.4
78.	Pottawattamie	32	144	22.2
79.	Poweshiek	3	10	30.0
80.	Ringgold	0	5	0.0
81.	Sac	6	22	27.3
82.	Scott	2	58	3.4
83.	Shelby	5	23	21.7
84.	Sioux	11	46	23.9
85.	Story	0	20	0.0
86.	Tama	1	7	14.3
87.	Taylor	0	7	0.0
88.	Union	0	8	0.0
89.	Van Buren	1	11	9.1
90.	Wapello	1	24	4.2
91.	Warren	7	40	17.5
92.	Washington	2	13	15.4
93.	Wayne	0	5	0.0
94.	Webster	1	29	3.4
95.	Winnebago	4	35	11.4
96.	Winneshiek	2	28	7.1
97.	Woodbury	16	68	23.5
98.	Worth	6	47	12.8
99.	Wright	2	19	10.5

CONSERVATION OFFICERS' DEER KILL REPORT - 1961

BY

Eldie W. Mustard
Game Biologist

During 1961, 834 deer were reported killed by decimating factors other than legal hunting (Table 1). The total includes 683 deer killed by traffic, 75 by miscellaneous causes, 74 by illegal hunting and 7 by dogs.

As in previous years, there were two apparent peaks when deer were killed (Table 2). These peaks occurred in the spring and in the fall of the year and were probably associated with carrying fawns in the spring and the rut in the fall.

Although the 1961 total is the greatest ever reported, it is known to be a minimal figure. Officer cooperation has improved greatly in the past few years and most deer are probably reported when the individual Officers know of them; however, there are still some that are not. It is hoped that each Conservation Officer will report every deer in 1962 which he has sufficient reason to believe has been killed. This will make our data even more useful and meaningful.

Traffic accounted for 683 or about 81 percent, of the deer fatalities in 1961 (Table 2). The total damage to vehicles amounted to $54,853, for an average of $148.65 to the 369 vehicles for which damage estimates were submitted. Damages ranged from none to $4,000.

At least one accident resulted in personal injuries to the occupants of the vehicle involved.

Data were received pertaining to the type of road on which each deer-traffic accident occurred, that is, hard-surface, gravel, or other. Almost 85 percent (84.6) of the 508 deer on which data were submitted were killed on hard-surface roads, with 14.6 percent on gravel and 0.8 percent on other or unimproved roads.

Conservation Officers also included in their reports on 507 deer the approximate time the accidents occurred. The data indicate, as would be expected, that the majority of deer-traffic accidents took place during the hours of twilight and darkness. As given in Table 3, 83.2 percent of the deer-traffic accidents took place from 5:00 P.M. to 7:00 A.M.. This corresponds closely to the time when deer are naturally moving.

Deer-traffic accidents are serious, not only because they incur tremendous losses to our deer resource, but, and more importantly, human lives are jeopardized. The State Conservation Commission, as the agency responsible for management of Iowa's wildlife resources, has an obligation to reduce these losses and minimize the hazard to traffic if possible to do so.

We do have these facts to work on: (1) most deer-traffic accidents occur on hard-surface roads; (2) most deer-traffic accidents take place during hours of twilight and darkness when cars should have their headlights lighted; and (3) there are two noticeable peaks, one in spring and one in the fall. It follows then that our efforts to reduce deer-traffic accidents should place primary emphasis on hard-surface roads and nighttime travel conditions - there is little we can do about the seasonal aspect of these accidents.

It is, therefore, apparent that to effectively reduce deer-traffic accidents we must work with some device which will stop deer from crossing highways in front of traffic during the night.

Fences, which could be placed at known deer crossings to either stop the deer from the crossing or cause them to "drift" and then cross in areas where they would be more visible to motorists, could be used. They are, however, expensive to construct and to maintain.

A mirror device, discussed briefly by Arthur Grahame in the December 1961 issue of Outdoor Life, which reflects the lights of an oncoming car onto the side of the road, thus causing deer to stop, seems to have some merit. It is apparently successful in Holland, where it was developed, and may be the answer to at least part of our problem in Iowa. The device should be relatively inexpensive to construct, install, and maintain.

Earl Allgaier, head of the AAA traffic and safety division, concluded the apparatus would in no way present a hazard to drivers.

We will be, in the very near future, engaged in an experimental program to determine the merits of the mirror device under Iowa conditions. It seems to offer at least a promise of being a successful means to reduce deer losses and protect persons using our public highways.

Table 1. SUMMARY OF CONSERVATION OFFICERS' 1961 DEER KILL REPORTS, BY COUNTY AND CAUSE, IOWA, 1961

		Dog	Traffic[1]	Illegal	Misc.[2]	Total
1.	Adair			2		2
2.	Adams					0
3.	Allamakee	5	5	5	1	16
4.	Appanoose	1	2		2	5
5.	Audubon		1			1
6.	Benton					0
7.	Black Hawk		2			2
8.	Boone		4	5	1	10
9.	Bremer		4	1		5
10.	Buchanan		4			4
11.	Buena Vista		6			6
12.	Butler		5			5
13.	Calhoun		3			3
14.	Carroll		2			2
15.	Cass		18	1		19
16.	Cedar		8	2		10
17.	Cerro Gordo					0
18.	Cherokee		6	2	2	10
19.	Chickasaw		1		2	3
20.	Clarke		9	1	1	11
21.	Clay		4	1		5
22.	Clayton		9	1		10
23.	Clinton		7	1	1	9
24.	Crawford		6			6
25.	Dallas		7		1	8
26.	Davis		5	1		6
27.	Decatur		6		2	8
28.	Delaware		2		2	4
29.	Des Moines		16	1	7	24
30.	Dickinson				1	1
31.	Dubuque		11	1		12
32.	Emmet		3		4	7
33.	Fayette		6		2	8
34.	Floyd		5		1	6
35.	Franklin		2		1	3
36.	Fremont		7		1	8
37.	Greene		5			5
38.	Grundy					0
39.	Guthrie		2		1	3
40.	Hamilton		3		1	4
41.	Hancock		1			1
42.	Hardin		7			7
43.	Harrison		37			37
44.	Henry		1		1	2
45.	Howard		2	1		3
46.	Humboldt					0
47.	Ida		5		2	7
48.	Iowa		11		1	12
49.	Jackson		14			14
50.	Jasper					0

51.	Jefferson		3			3
52.	Johnson		10	1	2	13
53.	Jones		4	2	3	9
54.	Keokuk		2			2
55.	Kossuth		9		1	10
56.	Lee		4	2	3	9
57.	Linn		1			1
58.	Louisa		1	1		2
59.	Lucas		19	2	1	22
60.	Lyon		4			4
61.	Madison		12		2	14
62.	Mahaska		7			7
63.	Marion		7		1	8
64.	Marshall					0
65.	Mills		21	2	4	27
66.	Mitchell		5	1		6
67.	Monona		6		1	7
68.	Monroe		9			9
69.	Montgomery		13			13
70.	Muscatine		3			3
71.	O'Brien		3			3
72.	Osceola		5			5
73.	Page		2			2
74.	Palo Alto		2			2
75.	Plymouth		20	5	3	28
76.	Pocahontas		1			1
77.	Polk		26	1		27
78.	Pottawattamie		56	8	5	69
79.	Poweshiek		1			1
80.	Ringgold		1			1
81.	Sac		4		1	5
82.	Scott	1	11			12
83.	Shelby		14			14
84.	Sioux		4	4	2	10
85.	Story		4	2		6
86.	Tama		10	1		11
87.	Taylor		1			1
88.	Union		11			11
89.	Van Buren		9	2		11
90.	Wapello		10			10
91.	Warren		11	1		12
92.	Washington		3		1	4
93.	Wayne		2	3		5
94.	Webster		5		1	6
95.	Winnebago		4			4
96.	Winneshiek		16	1	4	21
97.	Woodbury		32	9	1	42
98.	Worth		5			5
99.	Wright		6		1	7
	Totals	7	683	74	75	839

1/ Includes auto, truck, and train-caused fatalities.
2/ Includes fatalities due to farm operations, wounding, unknown, etc.

Table 2. REPORTED DEER DEATHS BY MONTH AND CAUSE, IOWA, 1961

	Dog	Traffic	Illegal	Miscellaneous	Total
January	1	43	8	1	53
February	0	26	0	3	29
March	0	40	10	1	51
April	0	38	1	3	42
May	0	75	2	8	85
June	0	41	0	11	52
July	0	22	0	5	27
August	0	21	1	1	23
September	0	32	2	1	35
October	0	70	5	9	84
November	0	154	16	12	182
December	1	58	11	8	78
Unknown	5	63	18	12	98
Totals	7	683	74	75	839

1/ Includes auto, truck, and train-caused fatalities

2/ Includes fatalities caused by farm operations, wounding during legal hunting, deer caught in fences, unknown causes, etc.

Table 3. APPROXIMATE TIMES WHEN DEER-TRAFFIC ACCIDENTS OCCURRED, IOWA, 1961

Time	Number Deer	Percent of Total
1:00 AM	19	3.7
2:00	13	2.6
3:00	18	3.6
4:00	19	3.7
5:00	16	3.2
6:00	29	5.7
7:00	31	6.1
8:00	11	2.2
9:00	6	1.2
10:00	15	3.0
11:00	6	1.2
12:00 (Noon)	20	3.9
1:00 PM	6	1.2
2:00	9	1.8
3:00	6	1.2
4:00	5	1.0
5:00	20	3.9
6:00	52	10.2
7:00	54	10.6
8:00	60	11.8
9:00	34	6.7
10:00	35	6.9
11:00	17	3.3
(Midnight)	6	1.2
Totals	507	99.9

CONSERVATION COMMISSION STATE-WIDE MEETING
Biology Section Highlights

BY

E. B. Speaker
Supt. of Biology

With Contributions From the Entire Biology Staff

Fisheries

In this age of space travel, and other equally fantastic phenomenon so eloquently described by Mr. Rose this A.M., advances in wildlife research may seem rather slow. We are dealing with life, not machinery and electronic devices, and these forms of wildlife are social beings that react as individuals and communities to changes in their environment. You can't simply press a button and make them reproduce or thrive in a habitat not to their liking. If we are to succeed in a sound management program, we must learn as much as we can about the various kinds of fish and game. We must know the effects of food, cover, crowding conditions and weather on their reproduction; how diseases and parasites influence their lives; the effects of pesticides, herbicides, and other man-made implements designed to improve our way of life. We must know something about the physiology of the animal itself; and the requirements needed to increase these animals in the less favorable environment that is developing through clean and intensive farming practices, drainage programs, urban sprawl, great highway systems and many other developments that tend to cut down on favorable fish and wildlife habitat. Since time on the program did not permit a separate report from the individual men in the Biology Section, I asked each biologist to list a few projects under his direction which would be appropriate with our theme of future plans and programs.

We are still largely dependent upon old Mother Nature and the elements of weather to take care of the wild creatures, but we can assist by understanding the needs of these animals and attempting to improve the habitat in which they live.

Fisheries research by Jim Mayhew in the artificial lakes is by no means different from other fields of applied experimentation. Angling success and the physical well-being of fish in artificial lakes has been controlled by a previously misunderstood phenomenon, thermal stratification. It is not uncommon to find 50 per cent of the anglers in any of the stratified artificial lakes fishing at depths which are completely devoid of fish life. Studies of the effects of stratification on the distribution and growth of game-fish have resulted in the creation of an important angler service in Red Haw Hill Lake. The location of oxygen depletion and location of fish is posted weekly at all angler access areas. In the first year of this service, anglers using this posted information caught 4 times more fish than those who ignored the information. With this relative success, expansion of this service would greatly increase angler utilization of heretofore unexploited segments of the fish populations. It is entirely possible, through further experimentation, that we might be able to control these limiting factors through thermocline dissapation with artificial water currents.

Fish populations as they exist in nature are not necessarily best suited for recreational needs. Only the natural potential exists. This is the point at which man, armed with his best scientific knowledge, lends Mother Nature a hand. Through chemical and mechanical manipulation, fish growth and angling success have been vastly improved in several experimental artificial lakes. New stocking combinations are continually being tried and evaluated to develop combinations which would extend a high catch rate of different species throughout the fishing season. Together with the Fish Management

Section we certainly have achieved a portion of the basic knowledge required to improve and maintain angling success in the artificial lakes.

Three primary fisheries biology projects have been assigned to Tom Moen for the natural lakes area. They encompass a wide range of fisheries investigations. In addition to the routine information that is relayed into direct fish management there are new facets being added and/or substituted each year. The study of the walleye population in Spirit Lake is being expanded.

There are several items under the "Management Techniques" project that will receive special attention during the coming year or more. One of the more important is aquatic vegetation control. New chemicals for control of aquatics are arriving on the market every day. These chemicals need testing in local areas prior to recommending them for widespread use in our public waters. Some of this work has been completed. Other work, particularly the biological controls mentioned by Rose need further study. We hope to have a mimeographed manual or bulletin on aquatic weed and algae control ready for distribution to you folks later this spring.

Important steps have been taken along the line of introducing new techniques into certain phases of fish hatchery operation. Some of these need refining and/or further study. We feel that the pituitary injections of female northern pike and channel catfish is only a start along the line of furthering production. Experiments in through feeding live zooplankton to newly hatched northern pike fry indicates that this technique may be one of tha answers to the erratic production of fingerling. Further experiments will be an important part of this year's program, including experiments in trough feeding of walleye fry.

Harry Harrison's work for the coming year will be a continuation of current projects, including creel census, catfish transportation, stocking and survival studies, population inventories, rough fish and stream renovation studies. We will study walleye introductions in special alternate year stocking areas on several streams in an attempt, with the Fisheries Section, to increase this valuable fish in some of the larger rivers.

With regard to these projects, emphasis will be placed on making a detailed pre-impoundment inventory of the Red Rock Flood Control Project, and on studying the possibility of increasing the survival of channel catfish stocked from the Mississippi River.

The catfish transport, stocking and survival studies are of utmost interest. The channel catfish is our most important inland stream game fish. There is a substantial loss of catfish stocked in our inland waters. The reasons for this loss are not clearly understood, but may result from factors which can be corrected. One of the factors that could cause death, and it is being explored, involves something similar to nervous shock. This may occur during the time of handling, holding, or transportation. An attempt to reduce shock or mechanical damage, will be studied by the use of drugs. Catfish captured for stocking purposes will be treated with various stupefying, depressant, or tranquilizing agents to reduce shock. These studies are, of course, in co-operation with the men in the Fisheries Section.

Roger Schoumacher took over the fisheries biology work in northeastern Iowa on December 15. The programs to be followed this year will be, for the most part, a continuation of the work which was done in past years. New projects will be added as time goes by.

The major effort on the Mississippi River during 1962 will consist of an intensive creel census on pools 10 and 19, in cooperation with the Upper Mississippi River Conservation Committee. Exploratory fishing and inventory work with nets and electro-fishing gear will be continued. The walleye and sauger tagging studies will be continued. Age

and growth data will also be taken and we will attempt to locate the spawning grounds, presently unknown, of walleyes and sauger through egg collection. Commercial fishing statistics will be compiled as usual.

Electro-fishing and netting surveys will be run on major inland rivers and reservoirs in northeastern Iowa to determine the relative size and composition of the fish population. Smallmouth bass nursery streams will be seined, as in the past, to determine reproductive success and to act as a yardstick for stocking by the Fisheries Section.

Trout streams will be surveyed, with special attention given to the location of areas where stream improvement would be most beneficial, as well as to streams which would most benefit from chemical treatment to remove all fish, with the subsequent restocking of trout only.

Increasing usage of water resources all over the United States has been most evident during the past few years. We in Iowa are fortunate to have several new areas of water being made available through the channelization work of the U.S. Corps of Engineers on the Missouri River. There are at least nine cut-off lakes along this river in various stages of development and they range in size from approximately 100 acres to over 800 acres. Bill Welker, fisheries biologist, is responsible for the fisheries biology work in this area. We feel the future fishery of these new lakes has considerable potential for sportsmen, but due to the newness of most of these areas, extensive study will be required before the full potential can be realized. During the next few years considerable work will be conducted on these new waters in an effort to understand their ecological environments. Such things as species composition, food chain relationships, bottom fauna and chemical properties of the water must be studied and evaluated before we can control the population in a way that will give us the best fishing for the maximum number of people.

GAME

Gene Klonglan in cooperation with the Game Section is working on a project to increase pheasant production in the lightly populated counties in southeast Iowa. This essentially involves the mass planting of 1000 or more pheasants this fall and a similar mass planting in the spring on a different area. Results of fall vs. spring plantings can then be compared. Henry and Des Moines Counties will be the focal point for such releases. It is hoped a planting of Reeves pheasants can be made this fall on an area not yet selected. No releases of Blackneck pheasants are planned this year.

We will want to move cautiously on any importation of exotic game birds. Two obvious reasons for this are that we would certainly not want to do anything which would conflict with the welfare of our present valuable game birds. While the introduction of the ring-neck pheasant has been a boon to our game supply, we must not forget less desirable species like the English sparrow, starling and Asiatic carp! Furthermore, it is paramount that areas be selected that have suitable habitat if we are to succeed with new introductions.

One of the basic requirements for the welfare of Iowa's ring-neck pheasant population is adequate winter cover. These hardy birds can survive for some time without a square meal but perish in one stormy night without a good windbreak. Pheasants also favor Iowa's most fertile farmland where winter cover is limited to farmstead windbreaks. Unfortunately, many of these windbreaks are being thinned so that they offer no protection from the sub-zero winds and blowing snow.

Preliminary surveys are being conducted by Dick Nomsen of the distribution and quality of farm windbreaks this winter and spring to determine the use of farm groves

by pheasants in several areas of north central and central Iowa. The size of each grove is recorded as well as the type of woody cover, such as, deciduous and coniferous trees or shrubs. Particular attention is given to the density of ground cover. The number of pheasants wintering in each grove is recorded to obtain data on which type pheasants prefer. This information must be known if we are to encourage the planting and improvement of farm groves to shelter pheasants in winter.

Roadside nesting studies will be continued to learn more about the importance of this well distributed nesting cover. As our acreage of agricultural nesting cover types decrease, we must try to obtain maximum production from roadsides.

We are attempting to improve our game inventory techniques. We are presently working on the spring pheasant crowing cock and late summer roadside counts. Routes will be reduced in number and certain improvements in techniques will be made. This should be available for distribution very shortly.

In addition to the Conservation Officers winter inventory, deer will be counted each year by aerial flights, conditions permitting, by Eldie Mustard, game biologist and Bob Rollins, Supt. of the Conservation Officers Section, along transects located in 9 different counties. The object of these flights is not to see every deer in the counties sampled, but rather to obtain trend data on our deer populations, i.e., whether the winter deer population is up, down, or stable. No county will have a complete aerial census of its deer population.

Last year at least 677 deer were involved in accidents with traffic, primarily automobiles. This represents a great recreational loss to the people of Iowa when you realize that the traffic-kill represents almost two times the 367 deer taken by bow hunters. More importantly, deer are becoming a menace to travelers on our highways and involve thousands of dollars in damage and possible loss of life!

A device, recently developed in Holland, which reportedly worked well there will be tried in an attempt to reduce the incidence of deer-traffic accidents. This device is a simple mirror arrangement which casts the beam from an oncoming auto into the ditch and supposedly stops the deer from entering onto the highway. Eldie Mustard is just about to embark on a limited experimental program to see if it will work in Iowa--we hope it will.

A brief resume of the past deer season reveals the following:

> 8,000 gun and 2,191 bow hunters were issued permits by the Commission this past season. A total of 4,033 deer were taken by gun hunters; 367 by bow hunters; 964 by farmers hunting on their own farms for a total of 5,364 taken by hunters. If we add the 832 killed by automobiles, illegally taken or killed by miscellaneous other methods, we have a total of about 6,200 deer killed in Iowa in 1961.

Paul Kline will continue his work on production studies with cottontail, jack rabbits and squirrels. Aside from the establishment of the fact that cottontail breeding normally starts in early March, this research is beginning to show some trends which may have long term implication.

The most important information learned to date in these cottontail breeding studies is the possibility that production within the species may vary from year to year. Over a long period of time these variations are expected to show a pattern which may explain fluctuations in cottontail numbers in Iowa. The factor which Mr. Kline is using at this time concerns sizes of embryonic litters of pregnant female rabbits. All of us are aware that cottontail numbers declined seriously over much of Iowa following the 1958-59 season. To date sizes of embryonic litters also show a decline from 1958. This study

may in time prove that high cottontail populations potentially result from larger than normal litters produced by breeding females.

Another factor which may limit rabbit numbers is the effect of extended very cold weather in winter together with deep snow which inhibits rabbit activity and, hence, their efforts to seek food. It has already been learned that late winter snows and cold can delay breeding activity in rabbits as much as one month in spring or late winter. Kline initiated a study at Boone which may in time show whether or not severe winter conditions can so reduce cottontail vitality that production is reduced. In other words, litter sizes and numbers of litters may be reduced by winter stress.

In order to test this possibility, a number of cottontails were captured from a wild population and placed in pens at the Research Station. Half of them were given no food, the other half were given all the food they wanted. After the starved rabbits exhibited symptoms of severe stress, they were released along with the control animals in the original habitat. After breeding commences in late winter this population will be captured or shot. From these rabbits it will be possible to determine whether or not the enforced starvation reduced vitality enough to effect production in the early part of the breeding season.

An interesting sidelight of this study so far is the determination of the fact that cottontails in normal winter conditions cannot survive an extended period of starvation. Two of the seven rabbits without food in the above experiment died on the seventh day.

The 1959-1960 winter was destructive to quail. Elden Stempel found losses were 10 to 20 percent in good cover and up to 70 percent in poor cover. The 1960 production was low; however, the 1960-61 winter was favorable and survival was better than the previous winter. The late, cold 1961 spring delayed nesting but in spite of this the quail production was fairly good. Summer whistling quail counts and fall flush counts of quail indicated an increase of over 20 percent since 1960. Hunting success in 1961 was about 1.5 hunter-hours per quail or compared to the 1960 average of 2.7 hours.

Although it is too early to make predictions for the 1962 quail production, we are almost certain to sustain losses this winter, especially in the secondary ranges. Food was not a problem in many areas because of the domestic crops still in the fields in addition to wild foods. Long, sustained winters and heavy spring snows and cold weather reduce the condition of quail and it can materially effect reproduction. To date quail are being observed in fairly good numbers in the better habitat.

Controlled experimental releases will be made of pen-raised quail this year in an attempt to evaluate stocking efforts. A detailed plan will be forthcoming from the Game Section in the near future.

Although recent snows have been beneficial to the drought-stricken duck producing areas in the prairie provinces of Canada, the Dakotas and Minnesota, certain species of waterfowl are still far below normal levels. This is especially true of the Mallard which make up over 50% of all ducks harvested in Iowa.

According to Jim Sieh the annual winter inventory of waterfowl in January of 1962 in the 14 Flyway States showed that waterfowl numbers, including ducks, geese, coots, and swans were down about 14 percent compared with a year ago. There were 15 percent fewer ducks, about 19 percent fewer geese and swans, but 8 percent more coots. The mallard population was 38 percent below that of January, 1961, and 43 percent below the 12 year average. Four years ago more than twice as many mallards were recorded. Canvasbacks made a slight gain this year, but remain at levels 46 percent below the long-term average.

Prolonged drought in the prairie provinces is responsible for the poorer reproduction

of ducks since 1959. The population of mallards going north to breed in 1962 (estimated at 2 - 2½ millions compared with 8 million during the mid-fifties) is considered critical.

The "wing method" of determining the species, age and sex of ducks harvested within the Flyway now provides a double check on how good, or how bad, duck production was on the breeding grounds. Iowa has cooperated in tallying these age-ratio data from large numbers of wings (over 23,000 mallard wings since 1959) checked at central collecting points at Poynette, Wisconsin and Puxico, Missouri. They clearly indicate 3 years of poor mallard production on the breeding grounds.

Iowa will continue to cooperate with the Mississippi Flyway Council and the other states and provinces in an organized research program designed to implement species management within the Flyway.

BRIEF RESULTS FROM CONSERVATION OFFICER CONTACT CARDS

Fishing Success

The Biology Section has just completed tabulating the results obtained from the Conservation Officers Contacts. We want to thank the Officers for this huge effort since it is vitally important in the management of our fish and game.

Two years records (1960 and 1961) have now been tabulated. A detailed report will be forthcoming in the near future. Since all personnel are all assembled here today we thought you would be interested in some of the highlights of this project.

Our totals show that in 1960, 16,914 fishermen were contacted by the Officers Section. At the time of contact (incompleted trips) the anglers had spent 35,234 hours fishing and had caught 36,388 fish. This averages about 1.03 fish per hour and 2.3 fish per man at the time he was contacted. Bullheads headed the list with bluegills, crappie, channel catfish and other species following.

In 1961, 18,410 anglers were contacted. They had fished 38,807 hours at time of contact and had taken 44,670 fish. This reflects slightly better fishing than in 1960, with 1.2 fish per hour and 2.5 fish per angler at contact time.

The above data represents the State-wide fishermen success in all types of waters.

Hunting Success

The data below was also taken from the Conservation Officers Field Contact records.

TABLE I

(1960)

SPECIES	HUNTERS CONTACTED	GUN HRS.	GAME BAGGED	HRS./GAME
Pheasants	6,575	19,331	4,807	4.0
Cottontail	444	916.5	471	1.9
Squirrels	761	1,734.75	968	1.8
Ducks	2,230	10,123.5	2,501	4.0
Geese	447	1,647.25	293	5.6
Quail	165	549	205	2.7

TABLE II

(1961)

SPECIES	HUNTERS CONTACTED	GUN HRS.	GAME BAGGED	HRS./GAME
Pheasants	6,499	20,406	5,303	3.8
Cottontail	994	2,481.75	1,559	1.6
Squirrels	866	2,180	1,388	1.6
Ducks	2,934	14,220	2,447	5.8
Geese	957	3,188.75	544	5.9
Quail	244	841	383	2.2