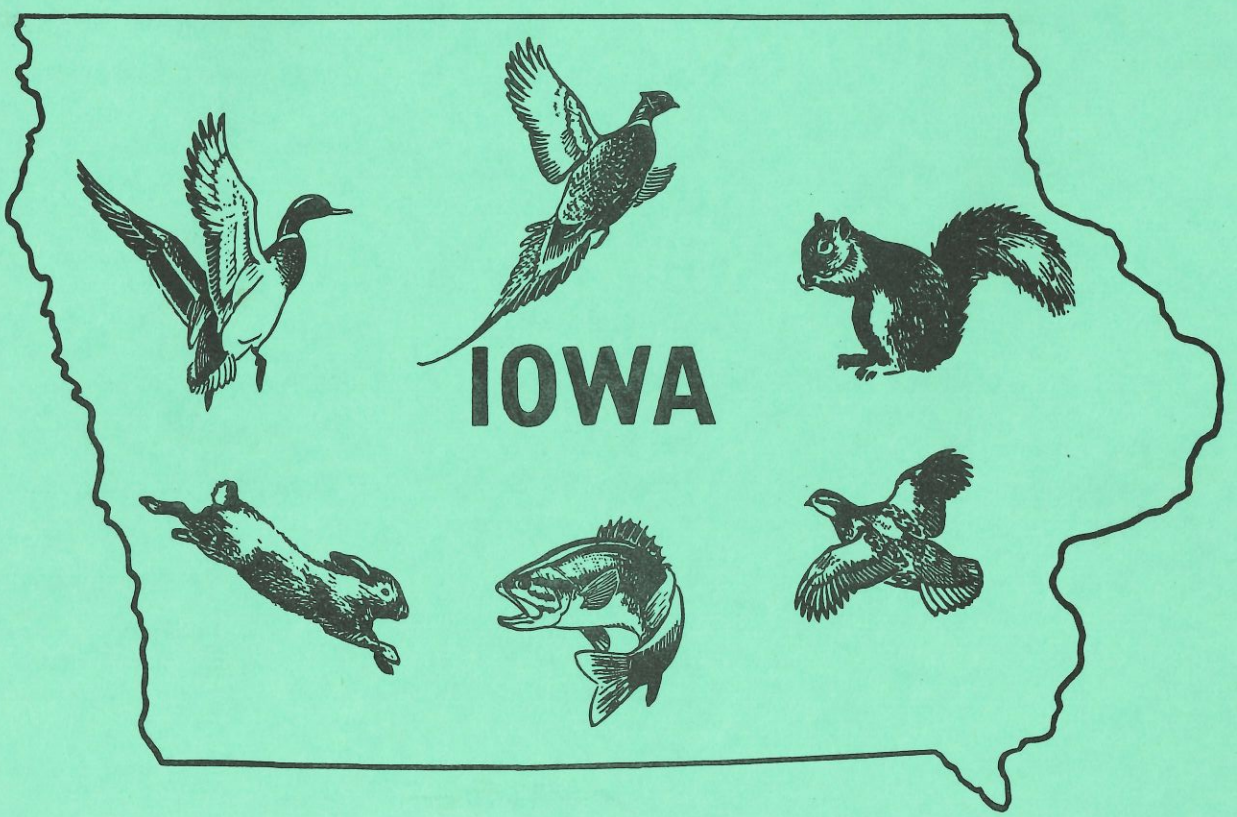
1966

QUARTERLY BIOLOGY REPORTS



FISH AND GAME DIVISION — BIOLOGY SECTION

STATE CONSERVATION COMMISSION

TABLE OF CONTENTS

THE 1965 ANGLER SUCCESS AND HARVEST IN IOWA MAN-MADE LAKES

Jim Mayhew
Fisheries Biologist

For the sixth consecutive year Conservation Officer contacts during routine patrol were used to measure angler success and harvest in Iowa artificial lakes and reservoir. The data were analyzed in the simplest form: number of contacts made, hours fished, and number and species of fish caught. Interviews were obtained from 4,501 fishermen. These people fished 8,107 hours and caught 9,952 fish. Bluegill comprised 37 per cent of the anglers catch. Bullhead, crappie, largemouth bass, and channel catfish followed in order of importance. Angling success ranged from 1.6 fish per hour in recreational lakes to 0.91 fish per hour in municipal reservoirs. The average man-made lake angler caught 2.3 fish after fishing 1.8 hours.

CREEL CENSUS RESULTS OF FOUR, NATURAL, IOWA LAKES - 1965-66

Terry Jennings
Fisheries Biologist

Data are presented on the results of a comprehensive type creel census conducted on four natural lakes in Dickinson County, Iowa. The census period on Spirit and West Okoboji Lakes extended from May through February while East Okoboji and Center Lakes were censused only from May through October. These four lakes, totaling about 11,152 acres, sustained an estimated fishing pressure of 124,208 angling trips totaling 363,734 hours. An estimated 768,111 fish, totaling 288,081 pounds, were harvested during these trips. Each fishing trip lasted an average of 2.9 hours and produced about 6 fish, caught at a rate of 2.11 fish per hour. Bullheads, yellow perch and bluegills were the most abundant fish harvested, comprising 51, 21 and 15 per cent of the creel respectively.

FIELD CONTACT CREEL CENSUS FOR NORTHEAST IOWA

Robert Schacht
Fisheries Biologist

Creel census data was collected in the field by contacting fishermen at the fishing site. Data was collected by Conservation Commission personnel. Data collected includes the date, stream or lake fished, the hours fished, and the number and kind of fish caught. A total of 1,124 fishermen were interviewed on the trout streams. They caught 2,172 trout at the rate of .97 fish per hour. This is the highest catch rate on the trout streams since the creel census began in 1960. On the Cedar, Iowa, Maquoketa, and Wapsipinicon Rivers a total of 1,785 fishermen were interviewed. They caught a total of 1,970 fish at the rate of .64 fish per hour. Bullheads and channel catfish ranked high in importance on the Cedar, Iowa, and Wapsipinicon Rivers, where both species comprised over 60 per cent of all fish caught.

MISSOURI RIVER COMMERCIAL FISHING STATISTICS: 1960-1964

Bill Welker
Fisheries Biologist

Between 1960 and 1964 a minimum of 39 fishermen and a maximum of 60 fishermen were annually licensed by Iowa to commercially fish the Missouri River. Few, if any, were full-time fishermen. Wooden box traps were the most numerous fishing gear used each year between 1960 and 1962, while hoop nets, trot lines and trammel nets ranked second, third and fourth during the same period. During 1963 and 1964 hoop nets were the most numerous gear licensed while box traps ranked second. Trot lines ranked third in 1964 and were tied with trammel nets for third in 1963. Fewer than eight gill nets, pound nets or seines were licensed during any year.

Between 26.7 per cent and 56.8 per cent of the fishermen annually reported their catch. Carp were the most abundant fish caught each year. Channel catfish and buffalo annually ranked second and third between 1961 and 1964. During 1960, buffalo ranked second and channel catfish third. Suckers, paddlefish, freshwater drum, and sturgeon also contributed to the annual catch. The total estimated annual catch by Missouri River commercial fishermen licensed by Iowa would probably be between 40,000 and 50,000 pounds.

1965 ANNUAL SURVEY OF THE CORALVILLE RESERVOIR FISH POPULATION

Don Helms
Fisheries Biologist

The 1965 annual survey of the Coralville Reservoir fish population indicated a radical change in the population structure. This was attributed to a fish kill the previous winter in combination with increased water storage throughout most of the summer.

Rough fish made up 67 percent of the total weight and 41 percent of the total number sampled compared to 85 percent and 70 percent respectively the year before. Carp and bullhead dominated in the reservoir while buffalo replaced the bullhead in importance in the tailwaters of the outlet structure. Crappie and channel catfish (the major game species for 1963 and 1964) appeared in minor numbers in the reservoir.

Survival and growth of spring-stocked largemouth bass, walleye and northen pike were excellent, and a good hatch of crappie and white bass was evident. Channel catfish young-of-the-year and yearlings did not appear in the survey. Young-of-the-year bigmouth buffalo were extremely abundant until mid-summer when a parasitic copepod (Lernaea) nearly eradicated them.

IOWA'S SPRING PHEASANT POPULATION - 1966

Richard C. Nomsen
Game Biologist

The 1966 crowing count showed a statewide increase of 39 per cent. All regions recorded increases in crowing intensity, indicating an adequate supply of cocks. The statewide hen index, obtained by multiplying the winter sex ratio of 3.2 by the crowing count of 13.1, was 41.9 which is 27% above last year. There were 4,737 pheasants sighted on 184 routes - an average of 2.57 birds per mile compared to 1.97 birds per mile in 1965. This part of the spring survey showed an increase of 31 per cent in the number of roosters sighted and 30 per cent more hens when compared with the 1965 results. Substantial gains were recorded in the southern half of the pheasant range.

RED FOX RESEARCH PROJECT: PROGRESS REPORT

Robert Phillips
Game Biologist

A fox tagging study began in the spring of 1966 to learn more of movement and mortality of juvenile fox pups. A wire ferret was used effectively to remove 85 fox from their dens. Foxes were tagged primarily in north central and northeast Iowa. As of July 10, 5 of the tagged fox are known to have been removed from the spring population.

EVALUATION OF IOWA'S DUCK WING SURVEY

Richard Bishop
Game Biologist

Four years ago, Iowa initiated a duck wing survey to gain more information on state water fowl kill statistics. The Fish and Wildlife Service conducts a similar survey; however, it was felt that the federal data may not have correctly represented Iowa in some aspects. The data was evaluated for the last three years and is presented in the paper. The data received from the state survey was not found to have any advantage over that provided us by the Fish and Wildlife Service. Since it is not practical to duplicate data, it is recommended that the state survey be discontinued.

POSTAL CARD SURVEYS OF QUAIL HUNTERS FOR THE 1965-66 SEASON

M. E. Stempel
Game Biologist

During the 87-day 1965-66 quail hunting season, longest in Iowa in recent years, all of the state was open for quail shooting. Of all licensed hunters, 17 per cent, or 46,450 hunters, took 513,760 quail at a rate of 1.4 hours per quail. Of that number of hunters, 1,260 were non-residents who took 10,275 quail at a rate of 1.0 hours per quail. Most of the quail and the best of the shooting are in southern Iowa.

POSTAL CARD SURVEYS OF COTTONTAIL, JACKRABBIT AND CROW HUNTERS FOR THE 1965-66 SEASON

M. E. Stempel
Game Biologist

The 1965-66 Iowa cottontail and jackrabbit season was open statewide. The bag was 1,602,060 cottontails by 49 per cent of licensed hunters, of whom there were 138,379. Nine per cent of hunters sought jackrabbits, of which 133,000 were taken. Crows were shot by 8 per cent of licensed hunters, who bagged 178,535 birds. Best cottontail shooting is in southern Iowa while jackrabbits are found in the north and the west portions of this state.

RINGNECK PHEASANT PRODUCTION AT WILDLIFE RESEARCH STATION

Eugene D. Klonglan
Asst. Supt. of Biology

Approximately 1,600 ringneck pheasants were reared at the Wildlife Research Station at Boone in 1965. Of these, 1,474 were released in the Winfield area of southeastern Iowa as part of the Commission's experimental program to increase pheasant populations in this part of the state. The remainder were held for various purposes at the Station. A comparison of the egg laying and hatchability of 2 year old vs. 1 year old wild hens that compare the brood stock at the station. It was found that the older hens laid eggs at nearly twice the rate of the younger hens and that hatchability was also better. This means it will be possible to capture fewer wild hens each fall for brood stock, since the hens can be used for more than one year. The same birds will be held over again next year and comparisons made between 1, 2, and 3 year old wild hens and 1 year old "one generation from the wild" hens held out from the 1,600 chicks reared the past year.

SOME PROS AND CONS OF FALL VS. SPRING RELEASES OF GAME BIRDS

Eugene D. Klonglan
Ass't. Supt. of Biology

An important question confronting wildlife specialists concerned with programs involving the stocking of game birds into the wild is that regarding the best time of year during which to make such releases. This revolves primarily around the relative merits of fall vs. spring releases. Since it is presumed in this discussion that the objective of such a release program is to establish self-sustaining populations of the species involved, the ultimate test of the comparative value of these two periods will be in the amount of reproduction, as expressed by the production of offspring per unit area, that results from the particular release. Because of the short life span of most species of game birds, it is almost essential that significant reproduction be achieved during the first season after the birds release if the project is to be successful. There are a multitude of factors that may have a significant bearing on which release period would be best to select for a given set of circumstances. This paper lists and discusses briefly some 22 pros and cons of fall vs. spring releases that should be taken into consideration in making a choice between the two.

THE 1966 INDEX OF WOODCOCK ABUNDANCE FOR THE BREEDING POPULATION EQUALS FIVE-YEAR AVERAGE

Gene Hlavka
Game Biologist

The 1966 index of woodcock abundance for the breeding population is 0.23 birds per stop. This index almost equals the 5-year average and is 44% greater than the 1964-65 average. The singing-ground survey and sightings of adult birds still indicate that woodcock are widely distributed in Iowa. No broods were reported to the writer in 1966.

THE 1965 DEER SEASON REPORT

Keith D. Larson
Game Biologist

Gun permits were issued to 17,491 hunters in 1965 and bow permits were held by 4,342 hunters. "Any deer" were legal. Hunter report cards were received from 95.8% of both bow and gun hunters and indicated a kill of 6,589 deer by gun and 710 by bow. A total hunting season deer kill of 8,621 included 1,322 by non-permittees. Gun hunter success was 39% and bow success was 16.4%. The kill was a reduction of approximately 2,000 deer from the expected. Rain, fog and mud prompted many hunters to hunt near home the first two days of the gun season, but conditions improved and were good the last two days in the long zone. The per cent of the population killed from all causes was 23%.

QUARTERLY PROGRESS REPORT OF COOPERATIVE PESTICIDE RESEARCH PROGRAM OF STATE HYGIENIC LAB & CONSERVATION COMMISSION

Wayne Patton, Research Chemist
State Hygienic Laboratory, S.U.I.

In the area of pesticide studies, the final report on the 1965 river water-pesticide survey was completed. Six sampling points on larger streams are sampled approximately monthly from Februray through October. These samples are analyzed for chlorinated hydrocarbon insecticides. The analytical method used gives a lower sensitivity limit of about 0.1 part per billion, this being chosen because little or no effect on aquatic life is found at this level. Of 45 samples tested only one - that for the Iowa River at Iowa City in May - showed any measurable results. The positive values of 0.4 ppb DDT and 0.1 ppb DDE were possibly caused by mosquite control operations in a residential area several miles upstream. The generally low levels of chlorinated insecticide found in this survey is somewhat reassuring. The normal situation, in our major streams at least, is of minimal hazard to fish or other life from pesticides. Since the chlorinated hydrocarbons are the most persistent of the common pesticides as well as the most heavily used, we can expect the concentrations of others to be lower still.

THE 1965 ANGLER SUCCESS AND HARVEST IN IOWA MAN-MADE LAKES

Jim Mayhew
Fisheries Biologist

Beginning in 1960 all Conservation Officers were instructed to obtain basic information on catch statistics from Iowa anglers during routine patrol. As the Officers interviewed anglers a small card was filled out for the number of anglers in the party, hours fished, and number and species of fish caught. These data are returned to the Biology Section for compilation and reported annually in Quarterly Biology Reports.

This type of census is most valuable in taking the "fishing pulse" of Iowa recreational lakes. There is no effort made to expand these data into total catch statistics. The information is also of value in interpreting fish inventory data. Annual fishery surveys are conducted on all Iowa artificial lakes and reservoirs. Data are obtained on relative abundance, physical condition, age composition, and growth for major species of fish. Catch success of many species of game-fish in these lakes is dependent upon relative year class abundance. By combining catch data with inventory data it is often possible to evaluate the contribution of different year classes to the sport fishery. Any failure of immature year classes can also be detected readily through catch statistics.

Fish harvest was analyzed for only the major species of fish: largemouth bass, bluegill, crappie, bullhead and channel catfish. Several other species of fish such as redear sunfish, carp, walleye and white bass contributed significantly to the catch in several lakes, but in the majority of the impoundments they were unimportant to the total catch and are listed in the tables as "others".

The man-made lakes in southern Iowa can be separated into groups based on primary and secondary use or purpose. Many of the lakes were constructed principally for outdoor recreation. This includes state and county park lakes and a few private lakes that have public access available. Other impoundments were constructed for municipal or commercial water supply with recreation a secondary activity. There are also countless small agricultural ponds of multiple use. The final group consists of abandoned coal strip mine, gravel pits and commercial pits that have been flooded.

Preliminary analysis of the catch statistics was completed for each group of lakes. Further analysis of angler catch at individual impoundments are listed in Tables 3, 4, and 5.

Angler Catch and Harvest

During 1965 Conservation Officers contacted 4,501 fishermen in Iowa artificial lakes and reservoirs. These people caught 10,067 fish after fishing 8,107 hours (Table 1). More fishermen were contacted at municipal reservoirs than any other group of lakes. Recreational lakes, gravel pits and farm ponds followed in order of importance. Bluegill was the most frequently caught species, comprising more than 37 per cent of the total catch. Species composition of the remainder of the fish harvest was as follows: bullhead, 29 per cent;

crappie, 21 per cent; largemouth bass, 6 per cent; channel catfish, 3 per cent; and others 4 per cent.

Table 1. Angler success and harvest in 4 different types of Iowa man-made lakes and reservoirs in 1965.

Type of Lake	Total Contacts	Total Hours	Total Fish	Fish /Hr.	Species					
					Bass	B'gill	Crappie	B'Head	C. Cat	Others
Recreation	1,867	3,484	5,584	1.6	230	1,997	972	2,141	51	193
Mun. Res.	2,078	3,836	3,485	0.9	242	1,223	1,017	600	214	189
Farm Ponds	235	402	532	1.3	61	255	66	105	7	38
Comm. Pits	321	385	466	1.2	96	211	32	116	9	2
Total	4,501	8,107	10,067	1.3*	629	3,686	2,087	2,962	281	422

* Mean catch success

Mean catch rate for all types of lakes was 1.3 fish per hour. This is substantially lower than the high of 1.6 fish per hour in 1964, but about average for the 6 year census period. Recreational lake anglers had the best success averaging 1.6 fish per hour. Farm pond and commercial pit anglers followed with a mean of 1.3 and 1.2 fish per hour respectively. Poorest angling was reported at municipal reservoirs where the mean catch rate was 0.9 fish per hour (Table 2).

Table 2. Comparison of the angler success and species composition of the harvest in Iowa man-made lakes - 1960-1966.

Year	Total Contacts	Total Hours	Total Fish	Fish Hr.	Species					
					Bass	B'gill	Crappie	B'head	C. Cat.	Others
1960	4,316	7,901	10,312	1.3	481	3,803	1,929	4,198	80	481
1961	3,826	7,642	8,909	1.2	812	2,325	1,299	3,942	87	459
1962	4,213	5,736	8,258	1.5	667	2,808	1,110	2,997	78	608
1963	4,824	9,338	12,017	1.3	893	4,929	1,506	3,425	74	1,190
1964	3,373	5,455	8,548	1.6	466	2,749	1,000	3,641	220	472
1965	4,501	8,107	10,067	1.3	629	3,686	2,087	2,962	281	922

Discussion

Since the beginning of the Conservation Officer contact census more than 26,000 Iowa anglers have been interviewed. This method has proved to be an effective, accurate means to annually determine angler success and harvest in Iowa artificial lakes and reservoirs. An additional value of this type of census is information is obtained on a wide-spread basis over a complete fishing season. It is also valuable as supplemental data to fisheries inventories, particularly in measuring the contribution of individual year classes to the sport fishery. This information is not available by any other practicable means.

During the 1965 census there were several changes in the preference and general fishing habits of the artificial lakes angler. This is particularly true when annual comparisons are made of catch data. Some of these observations are as follow.

1. For the first time since the beginning of a Conservation Officer contact census more anglers were contacted at municipal reservoir than any other group of lakes. Prior censuses revealed an angler preference for the lakes constructed for recreation. Part of this is undoubtedly due to the lengthy closing of some recreational areas for road construction, dam repair, and various other reasons.

2. In comparison to 1964 there was a 25 per cent increase in the number of fishermen contacted. The number of anglers interviewed in 1965 was the second highest recorded.

3. Angler catch success of 1.6 fish per hour in recreational lakes was the second highest since the beginning of these censuses. Farm pond angling has always been most productive in previous years. The mean catch rate, 1.3 fish per hour, was identical with that established during the previous census years.

4. Bluegill was the most frequently caught species. The trend for this species to become ever-increasingly popular has been evident since the start of the census. The rank of importance of other fish remained unchanged from other censuses.

5. The catch of crappie increased from a mean of 12 per cent of the angler catch during the previous 5 years to more than 29 per cent of the reported catch in 1965. There was also a slight increase in the catch of largemouth bass and channel catfish. Bullhead decreased significantly in importance.

Table No. 3. The 1965 angler catch and harvest in man-made Recreational Lakes

Lake	Total Contacts	Total Hours	Total Fish	Bass	B'gill	Crappie	B'head	C.Cat	Others
Lucas Forest P.	46	49	9	1			4	3	1
Red Haw	121	217	1242	21	931	258			32
Cold Springs	69	83	143	4	121	16	2		
Williamson	15	24	5	1				4	
Walnut Creek	28	71	44	6	8		30		
Wapello	188	178	423	16	186	114	93	2	12
Nine Eagles	105	166	179	19	102	27	30		1
Colyn	26	72	95	34	7	4	47		3
MacBride	31	47	114	1	2	74	28		9
Keomah	24	27	29	6	15		8		
Viking	67	67	149	7	4	33	102		3
Odessa	46	132	143	1	46	13	68		15
Spring Lake	105	130	28	6	8				14
Geode	33	77	62	11	39	9			3
Iowa Lake	134	302	230	9		1	220		
Rock Creek	114	107	447	6	6	2	429	4	
Bays Branch	85	335	257	5	90	39	120		3
Thayer	20	54	63	2	55		6		
Darling	13	32	31				20	11	
Keosaqua	4	5	3	2		1			
Three Fires	70	193	333	19	21	291	2		
Prairie Rose	56	173	56	7	5	16	5	22	1
Green Valley	366	643	852	8	10	63	735	4	32
Ahquabi	101	300	647	38	341	11	192	1	64
Grand Total	1,867	3,484	5,584	230	1,997	972	2,191	51	193

Table 4. The 1965 angler catch and harvest in Municipal Reservoirs

Lake	Total Contacts	Total Hours	Total Fish	Bass	B'gill	Crappie	B'head	C.Cat	Others
Lucas Pond	90	170	46	1			16	27	2
Morris	30	97	127	8	94	5	4		16
Ellis	54	135	158	3	54	37	58	1	5
Loch Ayr	31	58	29	5			21	3	
Upper Albia	43	78	143	26	35	68	13		1
Wilson	195	270	549	67	481	1			
Chatfield	44	31	80	4	76				
Dale Maffitt	424	796	400	13	203	118	4		62
Diamond Lake	51	101	35	1	14	13	6		1
McKinley	76	139	117	2			76	15	24
Summit	41	74	51	2			16	4	29
Afton	15	37	41	8	30		3		
Allerton	51	97	43	3	24	1	1	14	
Seymour	9	3.5	1		1				
Corydon	25	45	31			1	13	4	13
West Lenox	17	32	1	1					
Griswold	4	3.5	4				4		
Lewis	5	5	0						
Fairfield	23	34	94	13	15	54	12		
East Osceola	90	97	164	14	66	66	18		
West Osceola	351	924	489	30	18	21	289	128	3
Binder	143	201	418	32	56	306	8	8	8
Centerville	37	53	86	3	38	2	26		17
Moulton	9	4	1		1				
Mystic	6	22	13	1			12		
Fisher	219	329	364	5	17	324		10	8
Grand Total	2,078	3,836	3,485	242	1,223	1,017	600	214	189

CREEL CENSUS RESULTS OF FOUR NATURAL IOWA LAKES - 1965-66

Terry Jennings
Fisheries Biologist

SPIRIT LAKE

The 1965-66 censusing period marked the 21st consecutive year that creel census data have been collected from Spirit Lake, Iowa's largest natural lake (5,660 acres). It was not until 1956 that the present comprehensive type census was first employed on this lake. This type of census has been thoroughly explained by Earl Rose in previous Quarterly Reports. The census period for this lake covers ten months of fishing extending from May through Februrary. A limited amount of fishing occurs during March and April but the pressure is too light to warrant a full scale census. To conform with past reports, this segment is divided into an open water fishing period covering May through November and a winter fishing period of December through February..

Open water fishing, 1965

During this census period bullheads continued (as in the past) to dominate the creel catches, making up 78 per cent of the estimated harvest. Walleyes and yellow perch ranked second and third, accounting for 10 and 7 per cent of the creeled fish respectively.

Even though walleyes were the second most abundant species harvested during this fishing period, the total harvest was one of the poorest since 1956. Since Spirit Lake has a reputation of being a walleye lake, the poor walleye fishing may have contributed to the decrease in angler trips which was experienced in 1965.

In 1961 there were over 11,000 white bass in the creel. Each year since, the white bass catch has declined - to a low of nearly 880 in 1965. The average weight of these fish has leveled off at about 2.1 pounds per fish from a low of 0.7 pounds per fish. Indications are that until another successful year class comes along, white bass fishing in the lake will be very poor.

Only 11 channel catfish were estimated to have been harvested but their presence is significant in that this is the second successive year they have shown up in the creel following 4 years of intensive fingerling stocking.

When listed by total weight, creeled bullheads, walleyes, and yellow perch head the list. These three species comprised 49, 28, and 8 per cent of the total estimated weight harvested. Eight remaining species combined to form only 15 per cent of the weight creeled.

The catch rate or number of fish creeled per hour remained quite steady through the open water fishing period with the exception of August when the rate climbed to 2.35 fish per hour and November when it dropped to .49 fish per hour. The good fish per hour rates tend to reflect the good bullhead fishing rather than fishing for the other species creeled.

Winter fishing, 1965-66

Yellow perch and walleyes were the most abundant fish in the creel during the winter fishing period making up 57 and 39 per cent respectively (Table 2). Northern pike, crappie, and largemouth bass, in that order of relative abundance, made up the remaining 4 per cent of the fish creeled. Fishing was quite poor throughout this period when on the average only .83 fish were creeled per hour.

Of the total estimated fish taken during the ten-month census period, only about 6 per cent were creeled during the winter months. However, considering the poor winter fishing and the large number of bullheads harvested during the open water fishing period, this is not surprising.

During the ten-month census period, Spirit Lake provided an estimated 42,352 fishing trips and 112,489 hours of fishing recreation. This amounts to approximately 7 trips and 20 hours per surface acre. Nearly 28 fish weighing a total of 15 pounds were harvested from the lake during the ten-month period.

WEST OKOBOJI LAKE

West Okoboji Lake is a rather deep lake for this region (maximum depth approximately 130 feet). It is highly eutrophic and normally provides good fishing for several species. The census period on this 3,788 acre lake extends from May through February. A limited amount of fishing occurs during March and April but the pressure is too light to justify a full scale census. Once again these data are divided into open water fishing and winter fishing periods. The open water fishing period encompasses the months from May through November and the winter fishing period extends from December through February. The present comprehensive type census was put into operation on this lake during 1957.

Open water fishing, 1965

Yellow perch dominated the fishing, comprising 48 percent of the 205,055 fish estimated to have been taken during this period. Bullheads and bluegills followed perch in abundance, comprising 31 and 15 per cent of the harvested fish respectively. Together these three species contributed 94 per cent of the total estimated catch. Nine other species combined to make up the remaining 6 per cent.

Channel catfish are becoming a regular member of West Okoboji's creel composition. The 1965 census period was the fourth consecutive year these fish have been found in creel catches of this lake. The 31 fish estimated to have been caught from the lake is insignificant in the total catch but it does indicate the intensive stocking of sub-adult catfish from the Mississippi River into East Okoboji is paying dividends.

Fishing for each of the major game species was up considerably from a year ago with bullheads showing the greatest jump, nearly 56,000 fish. The catch rate, ranging between a low of 1.53 fish per hour in June to a high of 4.26 fish per hour in September and averaging an excellent 2.33 fish per hour

for the seven months of fishing, reflects the good fishing. During the first 3 months of the census period, bullheads dominated the catch while yellow perch were the dominate fish creeled during the remainder of the census period.

Winter fishing, 1965-66

Yellow perch were by far the most abundant fish creeled during the winter fishing period, comprising 91 per cent of the total estimated harvest (Table 4). Bluegills were next, making up only 5 per cent of the catch. Walleyes, crappies, northern pike, and bullheads combined to make up the remaining 4 per cent.

Fishing was best during December when on the average 2.74 fish per hour were creeled. However, there were nearly twice as many fish creeled during January. This may be explained by the type of weather which was experienced during the early part of the winter. The ice was very thin on the lake until about the middle of the month and most people avoided it, thus decreasing fishing pressure. Fishing remained quite good during January and February with catch rates of 1.94 and 2.35 fish per hour creeled respectively. Throughout the entire winter period of fishing, fish were harvested from the lake at an average rate of 2.18 fish per hour.

On the average for the whole ten-month fishing season, each surface acre of water in West Okoboji sustained nearly 10 angling trips totaling 27 hours. During these trips 63 fish, or 32 pounds, were harvested.

EAST OKOBOJI LAKE

East Okoboji Lake, one of a six-lake chain in Dickinson County, Iowa, has a surface area of approximately 1,800 acres. Although this lake has a maximum depth of 26 feet, the upper one-third (above the narrows) only has an average depth of 6 feet. This lake is highly eutrophic and subject to very heavy blooms of blue-green algae. A creel census program is not new to East Okoboji since one type or another has been in operation each year since 1945. The comprehensive type census presently used has been in operation since 1957.

East Okoboji normally supports several species of fish that are important in the winter sport fishery of other lakes, but during the past 15 years of legal winter fishing the winter fishery has failed to develop to a point where the fishing pressure would warrant the cost of the censusing operation. Consequently, the census period extends only from May through October.

Open water fishing, 1965

Each year since 1949 bullheads have dominated the catch and 1965 was no exception, since they accounted for 83 per cent of the creeled fish (Table 5). The 41 pounds per acre harvested by hook and line fishermen during 1965 is approaching the 68 pound, average, per acre harvest during each of the 6 peak bullhead fishing years in this lake, 1957 through

1962. The bullhead harvest was nearly 6 times higher in 1965 than during the same period in 1964.

Yellow perch was the second most abundant species harvested, accounting for 9 per cent of the total catch. Walleyes at 3 per cent and bluegills at 2 per cent rank third and fourth respectively in numbers creeled. Nine other species accounted for the remaining 3 per cent of the harvest

During 1965 the estimated catch of channel catfish was the highest on record for this lake. This is the third straight year the estimated catch of channel catfish has increased Indications are the stocking of sub-adult catfish is beginning to pay dividends.

As a whole, fishing throughout the 6-month census period in East Okoboji was quite good. The total estimated harvest of most individual species was up from previous years. The harvest of walleyes and yellow perch was the second highest since 1957. Fishing was excellent during the month of May when the highest catch rate of 4.24 fish per hour was recorded. The rate dropped each successive month through August when it fell to 1.67 fish per hour. Even though August was the poorest fishing month, the fish were biting very good as indicated by the number of fish taken per hour. On the average, each of the 30,412 estimated angling trips made to the lake during 1965 produced about 8 fish caught at a rate of 2.46 fish per hour.

During 1965 there were 16 fishing trips made, 56 fishing hours spent, and 140 fish, or 56 pounds, harvested per surface acre of water in East Okoboji.

CENTER LAKE

Center Lake is a small (264 acre), highly eutrophic lake. It was treated with toxaphene in the fall of 1958 with a complete kill obtained (Moen, 1962). Since then the lake has been restocked with largemouth bass, bluegills, crappies, yellow bullheads, and northern pike. Due to the slow growth experienced by the extremely large 1960 year class of bluegill and crappie, these fish did not become desirable to the angler until late 1962. As a result, in 1963 a comprehensive type census was first employed and it has been used each year since.

Bluegills lead the list as the most abundant fish in the creel, accounting for 74 per cent of the total estimated harvest (Table 6). Crappies were next, making up 21 per cent of the creel. Bullheads were third, totaling 4 per cent of the hook and line harvest. Largemouth bass and northern combined to fill in the remaining 1 per cent of the fish caught.

Fishing was excellent in Center Lake during 1965 as indicated by the average catch rate of 2.58 fish per hour. However, it was considerably below the level of the previous year and could account for the decided reduction in angling trips to the lake in 1965.

During the 1965 season, Center Lake sustained an average fishing pressure of 57 angling trips and provided 172 hours of fishing recreation per surface acre. Nearly 482 fish, or 132 pounds, were estimated to have been harvested by fishermen per acre during the census period.

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Table 1. Total harvest of fish, as determined by comprehensive creel census methods, from Spirit Lake, May through November, 1965

Species	May	June	July	August	Sept.	Oct.	Nov.	Total	Per Cent of Total Fish
Bluegill	13	126	2,277	817	25	60	0	3,318	2
Crappie	1,005	807	66	152	8	9	0	2,047	1
Walleye	3,982	6,620	1,603	687	830	1,461	515	15,689	10
White Bass	135	158	7	171	393	22	0	886	T*
N. Pike	822	406	143	123	127	209	37	1,867	1
Bullheads	20,898	18,997	20,208	39,803	9,337	7,178		116,421	78
L. M. Bass	39	22	84	39	8	0	0	192	T
S. M. Bass	12	7	11	10	0	0	0	40	T
Sheepshead	257	267	156	78	47	0	0	805	T
Perch	18	383	2,685	3,376	1,716	791	21	8,990	7
Catfish	0	0	0	11	0	0	0	11	T
TOTAL	27,181	27,793	27,240	45,267	12,491	9,730	573	150,266	99
Total angler trips	8,145	8,035	7,738	7,268	3,112	3,152	595	38,045	
Total Hours	21,501	23,477	20,543	19,658	7,666	6,964	1,194	101,003	
Fish Per Man	3.34	3.46	3.52	6.02	4.01	3.08	.96	3.95	
Fish Per Hour	1.26	1.18	1.32	2.35	1.63	1.39	.48	1.48	

* Less than 1 per cent

Table 2. Total harvest of fish, as determined by comprehensive creel census methods, from Spirit Lake, December through Februrary, 1965-66

Species	December	January	February	TOTAL	Per cent of total fish
Crappie	30	0	8	38	T*
Walleye	1,904	1,405	447	3,765	39
N. Pike	105	138	41	284	3
L.M. Bass	0	13	0	13	T
Perch	3,516	1,355	632	5,503	57
TOTAL	5,555	2,911	1,128	9,603	99
Total Angler Trips	2,226	1,499	582	4,307	
Total Hours	5,719	4,219	1,548	11,486	
Fish Per Man	2.50	1.94	1.94	2.23	
Fish Per Hour	.97	.69	.73	.83	

* Less than 1 per cent

Table 3. Total harvest of fish, as determined by comprehensive creel methods, from West Okoboji, May through November, 1965

Species	May	June	July	August	Sept.	Oct.	Nov.	Total	Per Cent of total fish
Bluegill	486	4,668	8,476	5,064	2,281	322	33	21,330	15
Crappie	1,295	260	197	314	551	2,388		5,005	2
Walleye	414	445	869	1,104	747	1,124	301	5,004	2
White Bass	84	16		300	1,159	211	13	1,783	T
N. Pike	194	180	83	76	305	578	113	1,529	T
Bullhead	13,895	21,264	19,073	8,523	1,521	2,889	408	67,573	31
L.M. Bass	329	213	16	68		33		659	T
S.M. Bass	40	142	114	161	15		81	553	T
Carp									
Sheepshead	165	192	695	430	81	13	26	1,602	T
Perch	138	584	2,972	9,925	24,733	37,358	24,260	99,970	48
Catfish				31				31	T
Sunfish			16					16	T
Total	17,040	27,964	32,511	25,996	31,393	44,916	25,235	205,055	98.0
Total angler trips	2,793	5,162	6,285	4,457	3,337	5,388	3,241	30,663	
Total Hours	7,973	18,330	19,567	14,407	7,361	13,187	7,164	87,989	
Fish per Man	6.10	5.42	5.17	5.83	9.41	8.34	7.79	6.68	
Fish per Hour	2.14	1.53	1.66	1.80	4.26	3.41	3.52	2.33	

*Less than 1 per cent

Table 4. Total harvest of fish, as determined by comprehensive creel methods, from West Okoboji, December through February, 1965-66

Species	December	January	February	Total	Per cent of total fish
Bluegill		1,897	141	2,038	5
Crappie		171	131	302	1
Walleye	177	331	83	591	2
N. Pike	24	134		158	T
Bullhead	36			36	T
Perch	7,461	14,379	3,401	31,547	91
Total	7,698	16,912	3,722	34,672	99.0
Total angler trips	1,311	3,029	1,296	5,636	
Total hours	2,811	8,710	4,276	15,797	
Fish per man	5.87	5.58	7.76	6.15	
Fish per hour	2.74	1.94	2.35	2.18	

Table 5. Total harvest of fish, as determined by comprehensive creel methods from East Okoboji, May through October, 1965

Species	May	June	July	August	Sept.	Oct.	Total	Per cent of total fish
Bluegill	130	796	1,707	1,741	786	651	5,811	2
Crappie	335	212	134	252	455	1,223	2,611	1
Walleye	1,115	1,373	1,363	1,124	983	1,610	7,568	3
White bass	450	175	149	468	315	324	1,881	T
N. Pike	30	67	35	29	126	191	478	T
Bullhead	59,440	79,688	32,279	26,265	5,764	6,804	210,240	83
L.M. Bass	10	85	25	27	7		154	T
S.M. Bass				19			19	T.
Sheepshead	194	718	645	281	201	11	2,050	1
Perch	631	2,294	2,624	2,406	3,790	9,151	20,896	9
Catfish		98	82	79			259	T
Carp		13	30				43	T
Sunfish				142			142	T
TOTAL	62,335	85,519	39,073	32,833	12,427	19,965	252,152	99.0
Total angler trips	4,615	8,417	5,483	5,921	2,609	3,367	30,412	
Total hours	14,690	32,666	21,902	19,698	5,694	7,437	102,087	
Fish per man	13.51	10.16	7.13	5.55	4.76	5.93	8.29	
Fish per hour	4.24	2.62	1.78	1.67	2.18	2.68	2.46	

Table 6. Total harvest of fish, as determined by comprehensive creel methods, from Center Lake, May through October, 1965

Species	May	June	July	August	Sept.	Oct.	Total	Per cent of total
Bluegill	20,949	32,408	8,789	16,310	5,697	2,806	86,959	74
Crappie	6,508	7,434	3,850	6,563	398	851	25,604	21
Bullhead		451	2,844	823	390		4,508	4
L.M. Bass	11	139	27	47			224	T
N. Pike					46	22	68	T
TOTAL	27,468	40,432	15,510	23,743	6,531	3,679	117,363	99.0
Total angler trips	2,733	4,061	3,057	2,975	954	1,365	15,145	
Total hours	8,393	13,044	7,194	10,155	3,360	3,226	45,372	
Fish per man	10.05	9.96	5.07	7.98	6.85	2.69	7.74	
Fish per hour	3.27	3.10	2.15	2.34	1.94	1.14	2.58	

FIELD CONTACT CREEL CENSUS

FOR NORTHEAST IOWA

Robert Schacht
Fisheries Biologist

Beginning in 1960 creel census data has been collected by Conservation Commission personnel in the field. Each year the vast majority of the contacts are made by the Conservation Officers with small contributions from the Biology and Fisheries Sections. Fishermen are contacted while fishing and data is recorded pertaining to the individual's fishing trip. The data collected include the date, the stream or lake fished, the hours fished, and the number and kinds of fish caught.

The numbers of fish taken per hour is used as a basis for weighing angling success. It would stand to reason that the greater catch per hour the greater the success rate will be. The numbers of each species taken is compared to the total catch to get the catch composition.

In 1965, 27 trout streams were sampled during the field contact creel census. There were 1,124 trips recorded totaling 2,247 hours. A total of 2,172 trout were caught at the rate of 0.97 fish per hour. This is the highest success rate since the creel census began in 1960. The catch rate has increased steadily since 1963 when the catch rate was 0.73 fish per hour to 0.83 fish per hour in 1964 (Table 1).

On the Cedar, Iowa, Maquoketa, and Wapsipinicon Rivers, 1,785 fishermen fish 3058 hours and caught 1,970 fish at the rate of 0.64 fish per hour. (Table 2). Angling success increased on the Maquoketa, remained average on the Iowa, and declined on the Cedar and Wapsipinicon Rivers. Bullheads and channel catfish ranked high in importance on the Iowa, Cedar, and Wapsipinicon Rivers where the two species comprised over 60 per cent of all fish caught (Table 3). Bullheads ranked first on the Iowa and Cedar Rivers and channel catfish ranked first on the Wapsipinicon. All of the contacts on the Maquoketa River were made in Delaware County where there are good numbers of crappies caught each year. This year over 66 per cent of the catch consisted of crappies.

On the Cedar River 404 fish were caught at the rate of 0.63 fish per hour. There were 476 trips recorded totaling 639 hours of fishing. Bullheads and channel catfish ranked one and two respectively followed by carp, crappie, bass (both largemouth and smallmouth), suckers, rock bass, bluegill, and walleye in that order of importance. Concentrations of anglers near the Cedar Rapids area accounted for a large number of contacts for Linn county.

On the Iowa River 862 fish were caught at the rate of 0.61 fish per hour. Eight hundred and twenty-two trips totaled 1,407 hours of fishing. Bullheads ranked first followed by channel catfish, crappie, carp, sucker, bass (both largemouth and smallmouth), walleye, flathead, buffalo, and bluegill in that order. Large numbers of channel catfish were taken in Marshall county. Most of the crappies were reported taken in Johnson county.

On the Maquoketa River all the data collected came from Delaware county. Four hundred and thirty four fish were caught at the rate of 1.34 fish per hour. The high catch rate is related to the large number of crappies taken, which comprised over 66 per cent of all fish taken. A total of 209 trips were recorded totaling 324 hours of fishing.

On the Wapsipinicon River 270 fish were caught at the rate of 0.39 fish per hour. The 1965 catch rate is the lowest in the 6 years of record. Two hundred seventy eight trips totaled 688 hours of fishing in 1965. Channel catfish ranked first with bullheads second followed by suckers, carp, crappie, bass (both largemouth and smallmouth combined), bluegill, and walleye in that order of importance. The majority of the catfish were reported taken in Buchanan and Clinton counties. Bullheads were taken in good numbers in all counties.

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Table 1. Angling success on the trout streams and four northeast Iowa rivers according to the field contact creel census

	1960	1961	1962	1963	1964	1965
Cedar	0.61	0.68	0.66	0.98	1.00	0.63
Iowa	0.83	0.81	0.55	*	0.69	0.61
Maquoketa	0.39	0.89	1.61	*	0.69	1.34
Wapsipinicon	0.57	0.56	0.75	0.90	0.69	0.39
Trout Streams	0.51	0.74	0.76	0.73	0.83	0.97

* Insufficient data for interpretation

Table 2. Total and averages for the field contact creel census in 1965

River	No. fishermen	Hours fished	No. fish caught	Fish per hour	Fish per fishermen
Cedar	476	639	404	1.63	0.85
Iowa	822	1407	862	.61	1.05
Maquoketa	209	324	434	1.34	2.08
Wapsipinicon	278	688	270	.39	0.97
Totals	1785	3058	1970	.64	1.10

Table 3. Number of fish caught by species and per cent of total fish caught for the Cedar, Wapsipinicon, and Iowa Rivers in 1965

Species	Wapsipinicon	Iowa	Cedar
Bass	4	13	29
	1.5	1.5	7.2
Crappie	7	160	37
	2.6	18.6	9.2
Bluegill	2	1	3
	0.7	0.1	0.8
Channel catfish	119	236	116
	44.1	27.4	28.7
Bullhead	102	294	127
	37.8	34.1	31.4
Carp	13	97	64
	4.8	11.2	15.8
Sucker	18	38	22
	6.7	4.4	5.4
Northern Pike	2	-	-
	0.7	-	-
Walleye	-	8	1
		0.9	0.3
Flathead Catfish	-	6	-
		0.7	-
Buffalo	-	4	-
		0.5	-
Rock Bass	-	-	5
		-	1.2
Misc.	3	5	-
	1.1	0.6	-
Total	270	862	404
	100%	100%	100%

MISSOURI RIVER COMMERCIAL FISHING STATISTICS, 1960-1964

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Each year Missouri River commercial fishermen licensed by Iowa with an owner's certificate are required by Iowa law to report their catch. This reporting is done by using forms furnished by the state. Each fisherman estimates the pounds of different fish caught each month by three categories of fishing gear: nets and traps, seines, and trot lines. This paper discusses the Missouri River commercial fishing statistics collected between 1960 and 1964.

The volume of commercial fishing on the Missouri River is not large. For instance, during 1964, 39 owners of commercial fishing gear were licensed by Iowa to fish the river. This same year 391 owners were licensed by Iowa to fish the Mississippi River.

The main factor limiting the volume of commercial fishing has been the channelization work by the Army Corps of Engineers, which has changed the river habitat. Until recent years, the river offered good catfish habitat including areas with a mud bottom, brush piles along the banks, and slow meandering channels crisscrossing the flood plain. Today, however, the main channel has been straightened and reduced to a uniform width of approximately 300 feet. Also, rock and pile riprap structures line the banks for many miles and there are no small meandering channels away from the main channel. Thus, the channelization work has greatly changed the habitat for several species of fish.

Number of commercial fishermen

There are two types of commercial fishing licenses issued by Iowa: owners and operators. The owners license is required of all fishermen using more than one box trap and/or one trot line. An operators license is required for each additional person needed by the owner to help fish his gear.

The number of owner's licenses issued annually between 1960 and 1964 varied from 39 to 60 (Table 1). The least number was issued in 1964. The number of operator's licenses issued annually varied little between 1960 and 1964; however, there was a significant decrease in 1964.

Table 1. Total number of owner's and operator's commercial fishing licenses issued by Iowa between 1960 and 1964 for the Missouri River

Year	Owner's Licenses		Operator's Licenses	Total
	Resident	Non-resident		
1960	49	7	100	156
1961	52	8	110	170
1962	44	-	112	156
1963	54	6	111	171
1964	38	1	76	119

Table 2. Total number and type of fishing gear licensed by Iowa for use in the Missouri River between 1960 and 1964

Year	Trot lines	Box traps	Hoop nets	Trammel nets	Gill nets	Fyke nets	Pound nets	Seines	Total pieces of gear
1960	68	117	104	41	2	2	-	-	334
1961	63	157	99	37	6	3	1	-	366
1962	80	159	92	42	-	3	1	-	377
1963	33	109	116	33	-	67	-	1	358
1964	37	55	81	26	-	1	-	-	200

Number and types of fishing gear used

Wooden box traps were the most numerous gear used each year between 1960 and 1962 (Table 2). Hoop nets, trot lines and trammel nets ranked second, third and fourth during the same period. During 1963 and 1964 hoop nets were the most numerous gear licensed while box traps ranked second. Trot lines ranked third in 1964 and were tied with trammel nets for third in 1963. Fewer than eight gill nets, pond nets or seines were licensed during any year. Although 67 fyke nets were licensed in 1963, fewer than 4 were licensed during any of the other years.

Estimated pounds and type of fish caught

It is difficult to get an accurate estimate of the total pounds of fish taken each year by Missouri River commercial fishermen since some do not report regularly. Also, some of those who do report either do not fish some months or do not report for those months. Fortunately, most of those fishermen catching the bulk of the total annual harvest do report. In an effort to increase the per cent of those reporting, a form letter was sent to all fishermen last year which reminded them of their responsibilities in reporting their catch.

Table 3 shows the per cent of fishermen reporting each year during the 1960 to 1964 period. The largest per cent (56.8) was recorded in 1962 and the smallest (26.7) in 1960.

Table 3. Total number and per cent of Missouri River commercial fishermen licensed by Iowa reporting their catch.

Year	Total licensed	Number reporting	Per cent reporting
1960	56	15	26.7
1961	60	29	48.3
1962	44	25	56.8
1963	60	17	28.3
1964	39	13	33.3

The total annual catch increased as the number of those reporting increased (Tables 3 and 4). The total estimated pounds caught in 1961 and 1962, when approximately 50 per cent of the fishermen reported each year, was 35,732 pounds and 36,308 pounds respectively (Table 4). Since most of those not reporting their catch contribute little to the total annual catch, the total pounds of fish caught by Commercial fishermen licensed by Iowa for the Missouri River would probably be between 40,000 and 50,000 pounds.

Carp were the most abundant fish caught each year. Channel catfish and buffalo annually ranked second and third between 1961 and 1964. During 1960, buffalo ranked second and channel catfish third. Suckers, paddle fish, freshwater drum, and sturgeon were other fish

contributing substantially to the annual catch. Miscellaneous fish generally contributing little to the catch were shad, northern pike, bullheads and yellow perch.

Discussion

The volume of commercial fishing on the Missouri River is not large. This volume may also decline in future years due to the unfavorable change in habitat caused by the channelization work of the Army Corps of Engineers. The annual collection of commercial fishing statistics is important, however, since this information can be used to promote favorable legislation and management of commercial fishing in Iowa.

Table 4. Total estimated pounds of fish caught by Missouri River commercial fishermen licensed by Iowa between 1960 and 1964

Year	Type of fish								
	Carp	Channel catfish	Buffalo	Suckers	Paddlefish	Drum	Sturgeon	Misc.*	Total
1960	5,851	1,478	1,504	100	24	-	150	-	9,107
1961	19,979	9,103	4,501	450	689	462.5	400	68	35,732.5
1962	16,321	5,653	3,653	1,816	921	433	473	7,038	36,308
1963	6,031	1,927	955	507	577	330	152	2	10,481
1964	12,996	4,891	2,772	628	1,037	295	-	30	22,649

* shad, northern pike, bullheads, yellow perch

1965 ANNUAL SURVEY OF THE CORALVILLE RESERVOIR FISH POPULATION

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Following the initial and somewhat extensive survey of the Coralville Reservoir made in the fall of 1963, it was deemed necessary to make annual surveys of the fish populations of this reservoir. The purpose was to maintain a continuous inventory and anticipate changes in the fish population in order that management techniques can be recommended and evaluated. This is a report of the 1965 annual survey.

Methods

Gear employed in sampling fish populations included the electro-shocker, pound net, bait net, basket trap and drag seine. All sampling was done during the period from August 19 through September 10, except that with bait nets and basket traps which were employed throughout the season in conjunction with a catfish tagging study.

Total effort expended in sampling the pool and headwaters was 2 hours of electro-fishing, 12 net days of pound netting, 777 net days of combined bait netting and basket trapping, and 17 hauls with 30 feet of 1/4-inch mesh drag seine. Sampling effort in the tailwaters of the outlet structure consisted of 3-3/4 hours of electro-fishing and 144 net days of combined bait netting and basket trapping.

Results and Discussion

Although no major changes in the population structure were anticipated, a radical change did take place. During the months of January, February, and March, severe oxygen depletion resulted in a fish kill which took an estimated 40 percent of the total population of the Coralville Reservoir. As would be expected of this type of kill, the game fish were more severely affected than were the rough fish. The only game fish surviving in any number was the black bullhead.

Following this kill, flood conditions on the Mississippi River required that water be stored in the Coralville Reservoir to lessen the effects of flooding down stream. Thus, the void created by the fish kill was exaggerated by an increase in volume of water stored in the reservoir from 15,000 acre feet on April 1 to a peak of 400,400 acre feet on May 6. Although there was a continuous release of stored water after May 6, the volume did not return to normal for the remainder of the season.

Spring conditions were particularly well suited for the spawning of bigmouth buffalo as young-of-the-year of this species were by far the most abundant during the early part of the season. On May 1, their numbers were estimated (by counting fry on the surface) at approximately 1,000 per square yard at all points around the entire margin of the reservoir. A seine haul on June 25 below the spillway structure of Lake MacBride with a 30-foot seine netted 24 bushels of this species. At that time, they averaged

2.3 inches in total length and weighed 4.9 pounds per 1,000. By July 15, an epizootic of the parasitic copepod Lernaea had begun; and by July 30, almost the entire population of age 0 bigmouth buffalo had been exterminated.

Young-of-the-year of other species seemed more tolerant of the disease and became proportionally more abundant toward the end of the season. By August, crappie, bullhead and carp were the most abundant species of age 0 fish (Table 1); while largemough bass, walleye, northern pike, white bass and carpsuckers were common. Bluegill, bigmouth buffalo and redhorse were rare. The walleye and northern pike are the result of spring stocking. The largemouth bass are from both stocking and natural reproduction.

Channel catfish failed to spawn. The author feels that this was due to the rapid expansion of the buffalo population to beyond the reservoir's carrying capacity prior to the catfish spawning season, which thus inhibited their spawning. This was effected jointly by the early spawning and rapid growth of the buffalo in conjunction with the decreasing water level throughout the month of June.

Pound netting in the pool and headwaters yielded a relatively high proportion of game fish to rough fish (Table 2). However, these were made up almost entirely of bullheads. Bluegill, crappie and largemouth bass were poorly represented and adult walleye and northern pike were absent. Carp was the second most abundant species by number and contributed nearly as much to the total weight of the catch as all other species combined. Carpsucker, bigmouth buffalo and smallmouth buffalo were also captured.

Electro-fishing methods obtained approximately the same representation with exception of the bullheads (Table 3). This is due to the inefficiency of this particular sampling tool in capturing them.

The composition of fish caught in the tailwaters (Table 4) was also noticeably different from results obtained in the 1963 and 1964 surveys. Adult largemouth bass, which composed a major portion of the game fish weight in previous years, were missing, and carp replaced the bigmouth buffalo in both total weight and numbers. There was also an unusually large number of age 0 walleye and northern pike. This is probably the result of drift from fry stocked in the reservoir above.

Bait nets and basket traps fished in both the pool and tailwaters in conjunction with a tagging study (Helms, 1966) indicated no change in abundance or size composition of the tailwaters channel catfish population. There was, however, evidence of a severe reduction in the density of the reservoir population of channel catfish. There were no fish of the 1964 year class obtained, and a population estimate based on the recovery of marked fish was 34,572. This is approximately 6 fish per acre, or at the average weight of 1.2 pounds would be 7.2 pounds per acre. For further details on this species, the author suggests a review of the previous report (loc. cit.) which deals entirely with them.

Table 1. Composition and abundance of age 0 fish in the Coralville Reservoir as indicated by electro-fishing and drag seining in the fall of 1965

Species	Size Range (inches)	Location	
		Pool	Tailwaters
Game Fish			
Crappie	2 1/2 - 4	Abundant	Abundant
Bullhead	2 - 4	Abundant	Absent
Largemouth bass	3 - 6	Common	Rare
Walleye	7 - 9	Common	Common
Northern Pike	13 -17	Common	Common
White Bass	6 - 8	Common	Rare
Bluegill	1 - 3	Rare	Absent
Channel catfish	-------	Absent	Absent
Rough Fish			
Carp	3 - 6	Abundant	Rare
Carpsucker	3 - 5	Common	Absent
Bigmouth Buffalo	2 - 6	Rare	Rare
Redhorse	5	Rare	Absent

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Table 2. Composition of fish caught in 12 net days of pound netting in the pool and headwaters of the Coralville Reservoir in 1965

Species	Number caught	Average weight (lb)	Percent of total number	Percent of total weight
Game Fish				
Bullhead	1,539	0.39	59.5	37.2
Bluegill	37	0.11	1.4	0.3
Crappie	26	0.41	1.0	0.7
Largemouth bass	5	0.60	0.2	0.2
Sub Total	1,607		62.1	38.4
Rough Fish				
Carp	829	0.86	32.1	44.6
Carpsucker	125	1.42	4.8	11.2
Bigmouth buffalo	22	3.95	0.9	5.5
Smallmouth buffalo	3	2.77	0.1	0.5
Subtotal	979		37.9	61.8
Total	2,586			

Table 3. Composition of fish caught in 2 hours of electro-fishing in the pool and headwaters of the Coralville Reservoir in 1965

Species	Number caught	Average weight (lb.)	Percent of total number	Percent of total weight
Game Fish				
Largemouth bass	4	0.70	2.4	1.1
Bluegill	3	0.13	1.8	0.2
Crappie	2	0.75	1.2	0.5
Sub Total	9		5.5	1.8
Rough Fish				
Carp	126	1.78	76.8	80.6
Carpsucker	24	1.41	14.6	12.2
Bigmouth buffalo	5	3.24	3.0	5.8
Sub total	155		94.5	98.6
Total	164			

Table 4. Composition of fish caught in 3-3/4 hours of electro-fishing in the tailwaters of the Coralville Reservoir in 1965.

Species	Number caught	Average weight (lb.)	Percent of total number	Percent of total weight
Game Fish				
Crappie	38	0.25	3.8	0.8
Channel Catfish	9	0.31	0.9	0.2
Flathead catfish	1	20.00	0.1	1.6
Walleye	1	5.00	0.1	0.4
Bluegill	2	0.11	0.2	
Largemouth bass	1	0.47	0.1	
Subtotal	52		5.2	3.1
Rough Fish				
Carp	457	1.12	45.5	41.6
Bigmouth buffalo	248	1.83	24.7	36.9
Carpsucker	225	0.83	22.4	15.1
Smallmouth buffalo	12	2.67	1.2	2.6
Redhorse	9	0.75	0.9	0.5
White sucker	1	0.25	0.1	0.1
Sub total	952		94.8	96.9
Total	1,004			

IOWA'S SPRING PHEASANT POPULATION - 1966

Richard C. Nomsen
Game Biologist

Introduction

The crowing cock count is the primary method for obtaining information on the spring pheasant population in Iowa. A 10-mile roadside count was added in 1962 when routes were shortened to ten stops. There were 184 routes checked this year compared to 175 routes in 1965. Routes were checked by Conservation Officers, Unit Game Managers, and Biologists.

The winter of 1965-1966 was noted for its lack of snowfall - only 11 inches over Iowa for the winter and much of this was recorded in March. Temperatures during the last 2 weeks of January were extremely cold - February was near normal, and March was the mildest in 20 years. Another late winter snow storm occurred this year on March 23-24. The storm began with rain and drizzle - temperatures above freezing. Falling temperatures changed the precipitation to snow and sleet as strong winds caused extensive property damage. The mild temperatures as the storm began kept pheasant losses to minimum in the storm area. Birds had already sought shelter as the storm developed.

Methods

The technique for conducting the spring crowing and roadside counts remained the same as in previous years (see April-June - 1963 Quarterly Biology Reports, pp. 35-40). Results are given for the six major regions as well as statewide.

The winter pheasant count was conducted from January 1 to March 15, 1966, to determine the sex ratio of Iowa's post-season pheasant population. These results are presented and are used to complete the crowing cock count.

Results and Discussion

Sex Ratio Count

Conservation Officers, Unit Game Managers, and Biologists reported a total of 13,039 pheasants during the winter survey (Table 1). The only period with adequate snow cover and favorable checking conditions occurred during the last two weeks of January. Snow cover was lacking throughout the rest of the winter. The observed sex ration of 3.2 hens per cock indicated that hunters harvested 64 per cent of the cocks last fall. Hunters harvested 75 per cent of the available roosters in 1964. Hunter success cards had indicated a decrease of 22 per cent in the number of pheasant hunting trips in 1965. The lighter hunting pressure coupled with a decrease in pheasant numbers, resulted in a lower harvest in 1965. The rate of harvest was much below normal in northwest and north central Iowa.

west Iowa.

The statewide observed sex ratio on the 1966 roadside counts was 2.2 hens per cock which was about the same as in 1965 when 2.3 hens were reported. It should be remembered this is only an index showing trends and not a measure of the true situation in the population - which is more nearly reflected by the winter sex ratio counts.

Thus, when all counts are considered, Iowa's 1966 spring pheasant population was much higher than in 1965 (Table 5). Substantial increases were recorded for the southern half of the pheasant range, but the population in the northwest and north central regions apparently did not recover much, if any, of the loss suffered in 1965.

TABLE 2. Results of the 1966 spring crowing cock counts made by Conservation Officers, Unit Game Managers, and Biologists, and comparison with 1965 counts

Region of State	1966		1965		Change from 1965
	No. of Counts	Mean Calls per stop	No. of Counts	Mean Calls per stop	
Northwest	29	12.6	27	11.4	+11%
North Central	27	18.7	25	12.8	+46%
Central	32	11.9	29	9.5	+25%
Southwest	23	16.9	21	13.6	+24%
East	32	8.5	32	5.3	+60%
South	41	10.2	41	7.2	+42%
STATEWIDE	184	13.1	175	9.4	+39%

TABLE 3. Comparison of dates on which spring pheasant counts were taken and mean wind velocity during counts, 1966 vs 1965

Region of State	Mean Date of Counts 1966	1965	Mean Wind (mph) 1966	1965
Northwest	May 5	May 15	3.2	3.5
North Central	May 4	May 17	4.0	3.6
Central	May 8	May 13	3.0	3.1
Southwest	April 28	May 8	2.2	2.4
East	May 5	May 12	3.0	3.1
South	April 30	May 7	3.0	2.0
STATEWIDE	May 2	May 12	3.1	3.0

TABLE 4. Results of spring population counts, 1962-1966

Year	Calls per stop	Hen Index	Cocks Per Mile	Hens Per Mile	Birds Per Mile
1962	11.6	36.0	0.74	1.02	1.77
1963	12.9	38.7	0.95	1.36	2.31
1964	11.9	42.8	0.80	1.96	2.76
1965	9.4	32.9	0.61	1.36	1.97
1966	13.1	41.9	0.80	1.77	2.57

TABLE 5. Results of the 1966 spring roadside pheasant counts.

Region of State	No. of Miles	No. of Cocks	No. of Hens	Total Birds	Cocks per Miles	Hens per Miles	Total per Mile	Sex Ratio
North-west	290	156	247	403	0.54	0.85	1.39	1.6
North Central	270	255	443	698	0.95	1.64	2.59	1.7
Central	320	277	538	815	0.87	1.68	2.55	1.9
South west	230	257	1008	1265	1.12	4.38	5.50	3.9
East	320	195	424	619	0.61	1.33	1.94	2.2
South	410	334	603	937	0.81	1.47	2.28	1.8
State-Wide	1840	1474	3263	4737	0.80	1.77	2.57	2.2

RED FOX RESEARCH PROJECT: PROGRESS REPORT

Robert Phillips
Game Biologist

Introduction

During the spring of 1966 a fox research project was initiated. The objectives of the study were to determine the extent of movement of fox pups from the denning site and to learn more about the effects of hunting and trapping on Iowa fox populations through tag returns.

It was originally intended to tag a large number of fox pups in a restricted area, but due to the limitations of finding dens in a short period of time, it was decided to tag pups wherever they could be found. All the tagging locations were in areas of intensive fox hunting.

Methods

Active fox dens were located by the following methods: 1) personal observations from walking through sections and driving roads, 2) checking old dens known to be used during the winter months, 3) contacting farmers who were working in the fields, and 4) conservation officers contacting interested fox hunters.

A wire ferret, 42 feet long, made of spring steel, proved to be the most effective method of removing pups from dens. It worked most effectively in shallow dens which lacked sharp curves. Dens which were in creek banks were the most difficult.

The average den length was approximately 20 feet, with a few exceeding the length of the 42 foot ferret. The ferret worked best in dens with 2 or 3 openings. The more complex dens with more than 4 openings were difficult to work. When these dens were encountered, padded No. 1 steel traps were used to capture the pups. Other dens with complex tunnel systems were partially dug-up before the ferret would work.

In some instances fox pups would run out of the den as the ferret went down the hole. As they emerged, they were caught with a dip net or by hand. In other cases, the pups became twisted in the wire and were pulled out of the den.

National "clamp type" ear tags and ear buttons were used in marking individual animals. Each tag was numbered and stamped "Notify Wildlife Research Station, Boone, Iowa".

Results and Discussion

From April 20 to May 27, 85 fox (84 pups and one adult) were tagged and released in the field. The number of fox and the tagging location by county is listed in Table 1. Nine other fox were driven from their dens using the ferret, but were not captured.

Table 1. Location of tagged fox by county

County	Number of tagged fox
Clayton	23
Bremer	19
Cerro Gordo	16
Chickasaw	15
Floyd	6
Kossuth	5
Polk	1

Tagging efforts were most successful in the prairie areas of north central and north east Iowa. Fox dens in the prairie were generally not as complex as those found in the sinkholes and brushy draws of Clayton County.

Of the 84 fox pups tagged, 42 were males and 42 were females, giving an exactly even sex ratio. However, there were individual litters where a preponderance of one sex existed.

The average litter size was 5.7. This is based on 10 dens in which all the fox were believed to have been removed.

As of July 10, five of the tagged fox are known to have been removed from the population. One is in captivity, three were killed on highways and one was shot by a farmer.

Acknowledgement

Appreciation is extended to all Fish and Game Division personnel who assisted in the fox tagging program.

EVALUATION OF IOWA'S DUCK WING SURVEY

Richard Bishop
Game Biologist

Iowa has conducted a duck wing survey for the last four years in an attempt to gain added information on ducks killed in Iowa. The Fish and Wildlife Service also conducts a survey of a similar type. The survey in Iowa is conducted at considerable cost to the state in man hours spent, postage on envelopes, and man power expenses. Therefore, an evaluation of the information we obtain from our survey as compared to the Federal Survey was felt to be warranted at this time.

Procedure

Wing envelopes are distributed to all the officers and unit game managers prior to the waterfowl hunting season. In turn these men collect wings from ducks checked by them and also give envelopes to hunters with instructions to take only one wing from each duck killed, place each wing separately into an envelope, fill out the required information and deposit in the mail. The envelopes are then sent to the Wildlife Research Station at Boone where they are frozen. A wing bee session is then held after the season, where state personnel separate the wings into species and sex and age the different groups. Information obtained from these envelopes gives us location of kill, date, time of day, species, and sex and age. This information is then transcribed onto IBM data sheets and eventually evaluated by the waterfowl biologist.

Discussion

It has been the feeling in the past, that the Federal Survey was not giving Iowa characteristic data or a true picture of the species of kill and age data. Our survey results differ from the Federal Survey in per cent of each species killed in Iowa and age data of certain species. (Tables I, II, III, IV). Tables V and VI show the time of day and period of the season that ducks were killed. The differences in these data brings up the question as to which data are most reliable.

The Federal Wing Survey divides Iowa into five sections and selects a sample from each of these sections according to the number of duck stamps sold throughout the section. Each of the cooperators selected are sent a packet of wing envelopes and hunters returning over a certain number of wings from the previous year are sent two packets of envelopes. If more envelopes are needed, cooperators can order these and many do. This sample represents the entire state and gives proper weight to the heavier hunted areas. The sample is statistically sound and representative of the entire state. The data gives kill figures, hunter success, species taken, and sex and age data. Also, a total kill figure for Iowa can be obtained from the sample.

The Iowa Survey consists of wings collected by officers and unit managers on hunter bag checks, and by envelopes given out at random to individuals who are known to kill ducks. Our data is thus not always characteristic of the hunting public. In some cases it may indicate

which of our men are working the hardest collecting wings and giving out envelopes. This can, in turn, give us a distorted picture of area duck kill depending on the activity and location of our men. We do obtain species of birds killed and sex and age data. However, it has been pointed out to me that the collection of wings is not done uniformly throughout the season, and may not truly reflect the species of birds killed. The sex and age may also vary with wing collections taken mainly during one period of the season. The period of kill may be slightly biased by intense effort of our men on the first two week ends of the season. Due to the way our sample is obtained, we can not use this data for a total kill figure or hunter success.

After examining the many factors that could influence differences in the data. I do not think our survey is as accurate in many respects as the Federal Survey, though it is recognized there are inherent weaknesses in the latter also. Information needed to manage waterfowl in the Mississippi Flyway is obtained from the Federal Survey and used by all the states. Circumstances being what they are, I do not believe it is justified to continue expending effort that basically duplicates data obtained by the Fish and Wildlife Service, particularly when it appears much of it may not be as statistically sound.

Summary and Conclusion

Wing surveys have been adopted to obtain data on species of kill, sex and age, hunter success, area of kill, and total duck kill. The Fish and Wildlife Service conducts a statistically set-up survey to gather this data to manage ducks in the Mississippi Flyway. All the other states in the flyway use Federal Survey data in examining their state's position. Iowa has established an additonal survey of its own to obtain more detailed information on Iowa's duck kill. Due to the numerous chance of bias in the state survey, it is likely that our data is not reliable as the Federal data. It is therefore, my recommendation that we do not continue the duck wing survey on a yearly basis. If the time comes when we want to check a certain criteria, we can always use the wing survey to gather this information.

Table 1. Sex and age data 1963, 1964, and 1965, Iowa wing survey.

Species	Immatures/Adult			Males/100 Females			No. Wings		
	1963	1964	1965	1963	1964	1965	1963	1964	1965
Mallard	2.4	2.3	3.6	119	145	135	1107	1461	655
Black Duck	1.0	2.4	1.1	-	-	-	12	19	21
Gadwall	2.6	3.2	4.5	196	120	80	87	111	88
Widgeon	3.9	4.4	6.4	96	138	100	269	445	197
G.W. Teal	1.8	1.6	3.5	132	104	108	722	1113	302
B.W. Teal	5.1	3.5	2.1	87	68	94	1735	897	130
Shoveler	4.1	4.1	3.5	100	159	150	159	133	47
Pintail	3.6	2.0	6.3	160	152	162	327	208	90
Wood Duck	1.7	1.9	3.9	107	110	81	907	575	107
Redhead	4.3	2.2	1.6	125	144	93	18	58	54
Lesser Scaup	1.3	1.3	1.8	93	132	46	82	74	103
R.N. Duck	2.1	2.2	1.7	140	119	100	74	123	184
Canvasback	-	-	1.1	-	-	110	00	0	11
Greater Scaup	-	-	-	-	-	-	0	2	4
Bufflehead	0.7	1.2	2.3	-	83	150	5	11	10
Goldeneye	-	2.0	-	-	200	-	0	3	2
Common Scoter	-	-	-	-	-	-	1	0	3
Ruddy Duck	1.1	1.0	0.5	-	-	-	11	8	19
Big Mergansers	-	-	-	-	-	-	1	2	4
Hooded Mergansers	.25	4.0	1.8	150	67	140	5	5	12

Table 2. Species of kill in 1963, 1964, and 1965, Iowa wing survey

Species	1963		1964		1965	
	No. Wings	% of Sample	No. Wings	% of Sample	No. Wings	% of Sample
Mallard	1110	20.1	1450	27.7	655	32.1
Mallard Dom.					2	0.1
Black Duck	12	0.2	19	0.4	21	1.0
Gadwall	87	1.6	111	2.1	88	4.2
Widgeon	269	4.9	445	8.5	197	9.6
G.W. Teal	722	13.1	1120	21.4	302	14.7
B.W. Teal	1735	31.5	897	17.1	130	6.4
Shoveler	142	2.6	133	2.5	47	2.3
Pintail	327	5.9	208	3.9	90	4.3
Wood Duck	907	16.5	575	10.9	107	5.2
Redhead	18	0.3	58	1.1	54	2.6
Canvasback					11	0.5
Greater Scaup			2	Trace	4	0.2
Lesser Scaup	82	1.5	74	1.4	103	5.0
Ring-necked Duck	74	1.3	123	2.3	184	8.9
Goldeneye			3	Trace	2	0.1
Bufflehead	5	0.1	11	0.2	10	0.5
Ruddy Duck	11	0.2	8	0.2	19	0.9
Common Scoters	1	Trace			3	0.1
Lg. Mergansers	1	Trace	2	Trace	4	0.2
Hooded Mergansers	5	0.1	5	0.1	12	0.6
Total	5508		5245		2045	

Table 3. Species composition of Federal survey.

Species	Species Composition (% of Total Kill) 1963	1964	1965
Mallard	31.2	42.0	45.4
Black Duck	0.6	0.9	0.5
Gadwall	1.6	1.8	2.8
Widgeon	4.5	5.8	7.1
G.W. Teal	10.4	14.8	11.1
B.W. Teal	18.8	10.2	3.1
Shoveler	1.3	1.7	1.8
Pintail	5.0	4.0	4.3
Wood Duck	21.9	13.7	8.1
Redhead	0.0	0.6	1.6
Lesser Scaup	2.2	1.9	5.5
R.N. Duck	1.3	1.5	5.0
Canvasback	0.0	0.2	1.2
Greater Scaup	0.1	0.2	0.1
Bufflehead	0.1	0.2	0.5
Goldeneye	0.0	0.1	0.3
Scoters	0.3	0.0	0.0
Ruddy Duck	0.2	0.1	0.6
Lg. Mergansers	0.0	Trace	0.0
Hooded Mergansers	0.2	Trace	0.9

Table 4. Sex and age data of Federal survey

Species	Immatures/Adult			Males/100 Females			No. Wings		
	1963	1964	1965	1963	1964	1965	1963	1964	1965
Mallard	1.1	1.4	1.5	120	110	150	578	982	444
Black Duck									
Gadwall									
Widgeon									
G.W.Teal	1.9	7.2	2.7				158	320	103
B.W. Teal	4.7	2.9	4.0				349	229	30
Shoveler									
Pintail	2.2	3.6	4.5				93	101	45
Wood Duck	2.2	3.0	6.0				406	320	77
Redhead									
Lesser Scaup									
R.N. Duck									
Canvasback									
Greater Scaup									
Bufflehead									
Goldeneye									

	Mergansers	Black Duck	Gadwall	Widgeon	G.W. Teal	Mallard	B.W. Teal	Shoveler	Pintail	Wood Duck	Redhead	R.N. Duck	L. Scoup	Other Divers	
Before 8:00 a.m.	1	4	11	57	212	241	651	48	95	245	10	13	16	4	
8:00 a.m. - 11:59 a.m.		2	7	36	113	156	341	24	65	171	1	2	1		
12:00 p.m. - 3:00 p.m.		1	5	44	86	125	268	27	62	187	1	2			
After 3:00 p.m.			8	34	89	72	206	12	30	126	2	3	2	2	Total
	1	7	31	171	500	594	1466	111	252	729	14	20	19	6	3921
10/27/63 - 11/2/63															
Before 8:00 a.m.		1	12	38	99	126	99	22	25	48	3	23	28	1	
8:00 a.m. - 11:59 a.m.		3	7	19	23	99	36	10	16	48		7	3	2	
12:00 p.m. - 3:00 p.m.		1	10	12	26	36	68	3	7	22		4	3	1	
After 3:00 p.m.			12	14	38	41	58	2	9	22		10	3	2	
		5	41	83	186	302	261	37	57	140	3	44	37	6	1202
11/3/63 - 11/9/63															
Before 8:00 a.m.	1		1		3	21	1	1	3	20	1	2	10		
8:00 a.m. - 11:59 a.m.	1		2	1	2	32	1	1	4	1		3	2	3	
12:00 p.m. - 3:00 p.m.	1			2		4			1	1			1		
After 3:00 p.m.				1	1	6	1		1	9					
	3	0	3	4	6	63	3	2	9	31	1	5	13	3	146
11/10/63 - 11/16/63															
Before 8:00 a.m.			4	5	5	27		4		1			7		
8:00 a.m. - 11:59 a.m.	1		5	4	6	29	5		5	1		1	3		
12:00 p.m. - 3:00 p.m.			1	1	3	12		2	2			1	1		
After 3:00 p.m.			1		2	23				1		2			
	1	0	11	10	16	91	5	6	7	3	0	4	11	0	165

Table 5. The period of duck kill in 1963 continued

11/17/63-11/20/63														
Before 8:00 a.m.				2	8		1	1	1			1		
8:00 a.m. - 11:59 a.m.		1	1	7	26		2	1	1		1	1	2	
12:00 p.m. - 3:00 p.m.				2	7									
After 3:00 p.m.				3	5				2					
1	0	1	1	14	46	0	3	2	4	0	1	2	2	77

Grand total 5511

Table 6. The period of duck kill in 1964.

Fall-1964	Mergansers	Mallards	Gadwall	Black Duck	Widgeon	G.W. Teal	B.W. Teal	Shoveler	Pintail	Wood Duck	Redhead	L. Scoup	R.N. Duck	Other Divers	
Before 8:00 a.m.	1	536	48	10	230	659	603	85	131	333	22		63	9	
8:00 a.m.-11:59 a.m.		196	23	3	109	250	195	22	25	151	10	4	20	2	
12:00 p.m.-3:00 p.m.		36	3		16	30	30	6	8	17		2	3		
After 3:00 p.m.	1	49	3	1	27	56	56	5	9	38	5	2	3		
	2	817	77	14	382	995	884	118	173	539	37	8	89	11	4146
10/27/64--11/2/64															
Before 8:00 a.m.		101	11		23	29	3	4	12	8	6	11	8		
8:00 a.m.-11:59 a.m.		63	2	1	11	15	1	3	6	9		4	5		
12:00 p.m.-3:00 p.m.		12			1	2		1	1	2	1				
After 3:00 p.m.		24	2		5	7			3	3			1		
	0	200	15	1	40	53	4	8	22	22	7	15	13	0	400
11/3 /64--11/9 /64															
Before 8:00 a.m.		39	2		3	21	1	1		7	4	15	2		
8:00 a.m.-11:59 a.m.		44	2		2	11	2		4	2	2	4		5	
12:00 p.m-3:00 p.m.		7	1		2	3	4			1	1		7		
After 3:00 p.m.		16				4				1	1	5	2		
	0	106	5	0	7	39	7	1	4	11	8	24	11	5	228
11/10/64--11/16/64															
Before 8:00 a.m.	1	28	6		3			4		1	2	6	1	4	
8:00 a.m.-11:59 a.m.	1	53	5	1	3	10			2		2		2		
12:00 p.m.-3:00 p.m.	1	10		1		2						1			
After 3:00 p.m.		28	2		1	2	1		2					1	
	3	119	13	2	7	14	1	4	4	1	4	7	3	5	187

Table 6. The period of duck kill in 1964 continued

11/17/64--11/20/64															
Before 8:00 a.m.	53			1	7		2	3		1	7	1			
8:00 a.m.-11:59 a.m.	96			6		1		1		2	8	2	1		
12:00 p.m.-3:00 p.m.	28		2									2			
After 3:00 p.m.	37	1		2	3			1	1		5	1	2		
	214	1	2	9	10	1	2	5	1	3	20	6	3		274

POSTAL CARD SURVEYS OF QUAIL HUNTERS FOR THE 1965-66 SEASON

M. E. Stempel
Game Biologist

Introduction

This report of quail hunting success for the past season is based on a hunter postcard survey. About 5,000 hunters were contacted, and data are here expanded to represent the 1965-66 quail hunting success of all Iowa quail shooters.

Also included is some comparable information from a field survey by conservation officers. Since 1960, the Iowa winters and most other seasons have favored survival and production of bobwhites. Hence Iowa could offer increasingly longer hunting seasons due to the comparatively high quail population. The 1965-66 quail hunting season extended from November 6, 1965 to January 31, 1966; shooting hours 8:30 a.m. to 4:00 p.m.; bag 8; possession limit 16. For 1964-65 the season was October 31, 1964 to January 3, 1965; hours, 8:30 a.m. to 5:00 p.m.; bag limit 8; possession 16. Both years the entire state was open for hunting quail.

The methods of survey outlined in the 1965 April-June Quarterly Biology Reports, with about 1.7 per cent of resident hunters and 2 per cent of non-resident hunters being contacted.

Results

Resident Licensees, Statewide

From the entire state, residents returned 1,674 cards of which 281 contained information on quail shooting. Seventeen per cent had thus shot quail. Resident hunters bagged 503,486 quail (Table 1). The 45,190 hunters made 191,187 trips involving 651,801 hours.

The average Iowa resident hunter who shot quail made 4.2 quail hunting trips during the 1965-66 season. The average outing for the individual was 3.7 hours, with 2.6 quail per trip and a success rate of 1.3 hours per quail bagged.

The material for the 1965-66 season is on a state-wide basis. In a similar 1965 quail hunting report, success was discussed for various portions of Iowa. As long as there are few regional weather upheavals, this will remain about the same, and for this reason the various parts of Iowa will not be discussed here. A survey of comparative success in various parts of the state is set forth in the 1965 April-June Quarterly Biology Reports.

Non-Resident Hunters

In addition to licensed resident quail shooters, 50 non-residents returned reports, and 8 of these shot quail. Non-residents bagged 10,275 quail last year (Table 1), with 1,260 such hunters making 2,518 quail hunting trips involving 10,604 hours.

Non-resident quail shooters recorded an average (per man) hunting trip of 3.4 hours with 4.1 birds per trip at a rate of 1.0 hours per quail (.97 bird per hour).

January Quail Hunting

Because the month of January was added to the season, a special question was asked regarding hunting during this month. It was found that 42 per cent of the reporting hunters were out hunting in January. Seventy-six per cent of those who hunted had bagged quail and 34 per cent of the trips made were made during January. Twenty-nine per cent of the take was in January (148,990 quail). Thirty per cent of non-residents hunted in January.

January weather was a factor in the late hunting. While January was one of the coldest on record throughout the state, in southern Iowa the weather was not severe until January 17 when night temperatures were below zero degrees Fahrenheit. Even then the high day-time temperatures at Bloomfield, Albia, Ottumwa and Chariton were above 4 degrees. About 3 weeks of January were suitable for quail hunting.

Discussion and Comparison With Related Surveys

The 1965-66 postcard survey provided a statewide sample of the improved quail hunting which will last as long as weather favors survival and production. The postcard survey indicated fairly good success, and the same was indicated in the Conservation Officers' field contact booklet record of the 1965-66 season.

Comparison of the success of hunters as given by the cards and by the booklets is as follows: of those reporting by card, the average shooters took quail at a rate of 1.4 hours per quail. Officers booklet records indicated a success rate for average shooters of 1.5 hours per quail.

This survey indicated that 17 per cent of all licensed resident hunters do shoot some quail, while of those living in the quail range (southern Iowa) about 50 per cent do some quail shooting. About 42 per cent of the quail hunters were out in January, and 29 per cent of the quail were taken then.

Summary

1. A sample of about 1.7 per 100 resident license holders and 2 per 100 non-residents was contacted in 1966.

2. Cards were filled out and returned by 1,674 residents and 50 non-residents.

3. Seventeen per cent of residents and 16 of non-residents hunted quail.

4. Residents took 503,486 quail at a rate of 1.3 hours per quail while for non-residents the rate was 1.0.

5. Twenty-nine per cent of the quail were shot in January.

Table 1. Results of 1965-66 Iowa quail hunting season (from hunter postcard questionnaire)

	Resident	Non-resident	Total
Statewide bag, quail	503,486	10,275	513,760
Total hunting hours	651,801	10,604	662,405
Total hunting trips	191,187	2,518	193,705
No. hunting this species	45,190	1,260	46,450
Per cent hunting this species*	17%	16%	17%
Avg. no. of trips per hunter	4.2	2.0	4.2
Avg. no. gun hours per hunter	14.4	8.4	14.3
Avg. no. of hours per trip	3.4	3.4	3.4
Avg. no. bagged per hunter Per Season	11.1	8.2	11.1
Avg. no. bagged per trip	2.6	4.1	2.7
Avg. no. bagged per gun hour	0.77	0.97	0.78
Avg. no. hours per bird bagged	1.3	1.0	1.4

* based on 275,500 resident hunting and combination hunting and fishing licenses and 6,500 non-resident licenses

POSTAL CARD SURVEYS OF COTTONTAIL, JACKRABBIT AND CROW HUNTERS FOR THE 1965-66 SEASON

M. E. Stempel
Game Biologist

Introduction

This paper contains the results of the 1965-66 Hunter Postcard Survey for cottontail rabbits, with a lesser amount of information on results of jackrabbit and crow hunting. Details of the methods are explained in the 1965 April-June Biology Quarterly Reports which also has additional information on relationship of snow to rabbit hunting. This item was not included in the 1966 questionnaire card.

Results

Response: In 1965, 275,500 hunting and combination resident licenses were sold and 1.7 per cent were contacted in this survey. Of the 6,500 non-resident license purchasers about 2 per cent were contacted. Resident hunters returned 1,656 cards(34 per cent), non-residents returned 50, (34 per cent).

Cottontails: For both residents and non-residents, of those reporting 49 per cent hunted cottontails. Tabulation of information on cottontails (also jackrabbits and crows) is contained in Tables 1, 2, 3. When the information is expanded for the cottontails, all licensed hunters expended 2,795,255 hours, took 1,602,060 cottontails, during 899,465 trips, at a rate of 0.58 per gun hour, compared to a success rate of 0.74 in 1964-65.

In 1964-65, 2,223,710 were bagged: The lower take of rabbits in 1965-66 is attributed to a lack of snow. Paul Kline, in 1965 Quarterly Biology Reports, indicated that 61 per cent of cottontail hunting was done on days when there was snow on the ground. In 1965 there was the least snow for many years, according to Iowa Climatological Data. Only 4 per cent of the 163-day season had 1 inch or more of snow and this in only a few areas. In 1964-65, 30.4 per cent of all days of the season had some snow.

Jackrabbits: Jackrabbit shooters made up 8 per cent of licensed resident hunters (Table 2); this figure was 10.5 in 1964-65. The harvest was 133,000 jackrabbits during 107,860 trips in 325,975 hours. The bag per gun hour averaged 0.43 as compared to 0.34 in 1964-65.

Data on non-residents are few, since only 2 cards were returned from jackrabbit hunters in the non-resident group.

Crows: Crows were shot by 8 per cent of resident licensed hunters. No non-residents reported hunting crows. A total kill of 178,535 was shown and 156,220 hunting hours were spent in the field; the bag rate was 1.14 per gun-hour.

Table 2. Statewide results of 1964-65 postal card survey of jackrabbit hunting success

Item	Resident	Non-Res. *	Total
Statewide bag. jackrabbit	132,468	532	133,000
Total hunting hrs.	303,156		325,975
Total hunting trips	107,860		114,745
No. hunting this species	25,558	522	26,080
Per cent hunting this species	8%	4%	9%
Avg. no. trips per hunter	4.2		4.4
Avg. no. gun hrs. per hunter	11.9		12.5
Avg. no. hrs per trip	2.8	3.3	2.8
Avg. no. bagged per hunter	5.2	1.0	5.1
per season			1.2
Avg. no. bagged per trip	1.2		0.41
Avg. no. bagged per gun hr.	.43		2.5
Avg. no. hrs. per animal bagged	2.3		

* Few data, only 2 of 50 cards indicated jackrabbit hunting.

Table 3. Statewide results of 1964-65 postal card survey of crow hunting success

Item	Total *
Statewide bag, crow	178,535
Total hunting hrs.	156,220
Total hunting trips	91,500
No. hunting this species	22,315
Per cent hunting this species	8%
Avg. no. trips per hunter	4.1
Avg. no. gun hrs. per hunter	7.0
Avg. no. hrs. per trip	1.7
Avg. no. bagged per hunter per season	8.0
Avg. no. bagged per trip	2.0
Avg. no. bagged per gun hr.	1.14
Avg. no. hrs. per animal bagged	.9

* No non-residents, reported hunting crows, so this represents all resident hunters

Summary

1. A sample of resident and non-resident 1965-66 hunting license holders was contacted in 1966.

2. The returns showed that 134,504 resident and 3,875 non-resident licensed hunters sought cottontails.

3. Forty-nine per cent of all hunters sought cottontails; 9 per cent sought jackrabbits and 8 per cent went after crows.

4. A total of 1,602,060 cottontails were taken at a rate of 1.7 hours per animal; for jackrabbits the rate was 2.5 and for crows, 0.9.

Table 1. Statewide results of 1965-66 postal card survey of cottontail hunting success

Item	Resident	Non-resident	Total
Statewide Bag - Cottontails	1,573,223	28,837	1,602,060
Total Hunting Hours	2,758,917	36,338	2,795,255
Total Hunting Trips	889,571	9,894	899,465
No. Hunting this Species	134,504	3,875	138,379
Percent Hunting this Species	49%	38%	49%
Avg. No. Trips Per Hunter	6.6	2.6	6.5
Avg. No. Gun Hours per Hunter	20.5	9.4	20.2
Avg. No. Hours per Trip	3.1	3.7	3.1
Avg. No. Bagged Per Hunter per Season	11.6	7.4	11.5
Avg. No. Bagged Per Trip	1.8	2.8	1.8
Avg. No. Bagged Per Gun Hr.	0.57	0.79	0.58
Avg. No. Hrs. per Animal Bagged	1.7	1.3	1.7

RINGNECK PHEASANT PRODUCTION AT WILDLIFE RESEARCH STATION-1965

Eugene D. Klonglan
Ass't. Supt. of Biology

This report summarizes the egg laying, hatching, and chick rearing aspects of the southern Iowa experimental pheasant program as conducted at the Wildlife Research Station near Boone in 1965. This information is compiled primarily from records furnished by the Game Section personnel responsible for this phase of the project. The aim of this 1965 program at the Station was to rear around 1500 ringnecks for release at selected areas in southeastern Iowa.

Brood stock pheasants were wild birds captured by spotlighting in Adair County in southwest Iowa. In an attempt to see if more "mileage" could be obtained from these wild hens, the birds captured in the fall of 1963 and used as brood stock in 1964 were held over for the 1965 season as well. Additional hens, plus all of the cocks needed, were captured in the fall of 1964. Adult hens of unknown age were removed from both groups, thus leaving a group of 2-year-old hens and another of 1-year-old hens for comparison purposes. If those wild hens held over the second year showed as good a rate of production as those young hens just caught, this would reduce the number of wild hens that must be captured each year for brood stock. Not only would this mean fewer nights of field work involved in the spotlighting operations, but also would help forestall any public relations problem that might develop from a program involving the removal of pheasants from an area over a period of years.

Egg Laying

Eggs were collected over a 52-day period extending from April 14 through June 4. A few eggs were dropped earlier, but no record was kept of these. The hens were still laying at a good rate when collecting was stopped on June 4 after the necessary eggs had been obtained to assure all rearing facilities being utilized to capacity. Thus the figures given here should not be construed to mean they represent the total ability of these hens to produce over an entire season; only a segment is portrayed.

During the 52 days, 2109 eggs were laid by the 2-year-old hens, an average of 40.6 per day. With an average of 128 hens present in this group (adjusted figure to allow for losses of birds during the interval), this meant a 31.7% rate of egg production - or roughly one egg for each three hens each day. The 1-year-old wild hens laid 833 over the same span, an average of 16.0 per day. With a weighted average of 95 hens present in this group, a 16.8% rate of egg laying was achieved - or about one egg for each six hens each day. It should be pointed out that the laying rate was higher for each group during a portion of the period - about 50% for the 2-year-olds and 30% for the 1-year-olds during the best production week within the 52 days.

From the foregoing figures, it is obvious that the hens in their second year of captivity produced eggs at almost double the rate of the newly captured 1-year-old hens (89% better to be more exact). This demonstrates that it is not only feasible to keep the wild hens a second year but also quite advantageous to do so. Genetically speaking, they are still the same wild birds as originally caught and their chicks should be just as "wild" as before.

Whether their better egg production is due to an inherent tendency of these older hens to lay better or to the fact that they have tended to "tame down" somewhat during their longer period in captivity is not known. Also, since records were not kept after June 4, and both groups were still laying well at that time, it is not known if the younger hens might have been able to make up their deficit over the entire season. The egg laying comparisons will be carried on again next year, with both of the current groups being held over (will then be 2 and 3-year-old hens) and a new 1-year-old group added.

Hatching

There were 2,020 eggs set from the 2-year-old group of hens and 1,304 of these hatched - or 64.6%. Candling at the time of transfer from the incubator to the hatcher resulted in the discard of 327 eggs; 389 of those placed in the hatcher failed to hatch. From the young, or 1-year-old, hens, 806 eggs were set and 438 hatched - or 54.3%. There were 278 candled out and 90 eggs failed to hatch. This meant that the rate of hatchability of the eggs from the older hens was 19% better than that of the younger ones. Coupled with their better rate of egg laying, this further pointed out the advantages to be gained in holding over these birds for brood stock.

The rate of hatchability for the two groups combined was 61.4%, as based on 1,795 of 2,907 eggs hatched (this includes an earlier setting in which separate records were not kept, hence the discrepency in the total from above). This percentage was achieved in spite of the fact that the egg storage room had no means of maintaining temperatures cooler than normal air temperature, and often had higher than air temperatures because of heat seepage from the adjacent incubating and hatching room. A cooling unit will be installed prior to next season. Since similar comparisons of age groups will again be made, it will be of interest to see if hatchability shows a significant increase.

Chick Rearing

Approximately 1,600 chicks were reared to full size (14-18 weeks) from the 1,795 hatched. Of these, 1,474 were released in southeast Iowa (east and southeast of Winfield) in early October. Another 115 hens were held over at the Wildlife Research Station in order to compare their egg laying and hatchability rates with those of the 1,2, and 3 year old wild caught birds. Such information will be of interest in the event it is not possible at some future time to obtain enough wild brood stock to keep the Station facilities operating at capacity. It might then be necessary to utilize some of these "one generation from the wild" young hens to supplement production. The remainder of the chicks reared were used for such purposes as cooperative blood typing studies with Dr. Paul Vohs of Iowa State University and for the Exhibit at the Station.

SOME PROS AND CONS OF FALL VS. SPRING RELEASES OF GAME BIRDS
(with special reference to pheasants)

Eugene D. Klonglan
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An important question confronting wildlife specialists concerned with programs involving the stocking of game birds into the wild is that regarding the best time of year during which to make such releases. This revolves primarily around the relative merits of fall versus spring releases. Juvenile birds hatched in the spring and reared during the summer do not reach adult size, thus becoming most suitable for release, until fall. The problem then arises as to whether they should be released at that time or if it would be more desirable to hold them over to be liberated in the spring just as the breeding season is commencing. Since it is presumed in this discussion that the objective of such a release program is to establish self-sustaining populations of the species involved, the ultimate test of the comparative value of these two periods will lie in the amount of reproduction, as expressed by the production of offspring per unit area, that results from the particular release. Because of the short life span of most species of game birds, it is almost essential that significant reproduction be achieved during the first season after the birds' release if the project is to be successful.

There are several factors that may have a significant bearing on which release period would be the best to select for a given set of circumstances. This paper will list and discuss briefly some of the pros and cons of fall vs. spring releases that should come under consideration in making a choice between the two. Comments made herein will apply most particularly to the lower part of what is generally referred to as the Midwest and to pheasants, since this is the area and species most familiar to the author. Many of the comments, however, will be applicable to other areas and other species.

Fall Releases

Pro - 1. Fall is a good time to release birds from the standpoint of available food supply. As done in Iowa, a fall release usually means in late September or October. Quantities of weed seeds are at a high level then, mast and berry crops are available for species utilizing such food sources, harvest of small grains (mainly oats in Iowa) has been completed and the resulting waste grain is accessible, the harvest of soybeans is usually well underway with considerable waste grain again at hand, and by mid-October the corn harvest is usually beginning - which provides probably our best food source, in the form of waste grain, for most game species in Iowa.

2. Cover conditions are very good at the time of release and usually for a considerable time thereafter. In Iowa, most corn is still in the field, as well as many of the soybeans, and this gives a large area of cover for feeding, loafing, escaping predators, etc.. Early frosts may have occurred, but seldom heavy ones, so vegetative cover is still generally fairly dense for some time after release.

3. Weather conditions are likely to be generally favorable for some time after release, giving birds time to become accustomed to the area - to select feeding, loafing, and roosting sites, etc. Very little snow or related severe winter weather occurs in Iowa prior to mid-December and quite mild weather occurs for considerable periods in October and November. Thus there is likely to be very little stress due to bad weather on newly released birds for at least a couple months after their liberation.

4. Birds released in the fall can become better oriented and more accustomed to their new habitat prior to their first breeding season in the wild. This means they will, in effect, be able to follow a rather natural transition pattern into the mechanics of breeding season behavior.

5. Birds of poorer health, weaker condition or tamer in disposition have a rather high chance of being eliminated from the population between the time of release and the onset of the next breeding season. This should then result in the better quality bird containing more of the traits of wildness comprising the brood stock for the first reproductive season following liberation. In effect, releasing in the fall allows time for a little "natural selection" to take place before the first production period.

6. Rearing facilities that may be adequate for raising large numbers of young birds to full size (or about 14-16 weeks) during the summer may not be adequate for holding the same number of birds several months over winter for spring release. Thus releasing a substantial number in the fall would make possible the release of a larger total number over the entire year than if only enough young were hatched to fill the winter holding facilities to capacity. If these particular circumstances prevailed, it would thus be possible to have both a fall and spring release. Such would be advantageous in that "all one's eggs would not be in the same basket" in the event one period turned out to be particularly adverse for some reason in a given year.

Con - 1. Birds released in the fall are subject to all the vagaries of winter weather before they can enter their first breeding season - up to and including blizzards that may even wipe out substantial portions of wild game bird populations. And birds with a pen-reared background are certain to suffer more severe losses than the native birds. During this over-winter period a much higher percentage of a specified number of birds could obviously be raised in pens with food and shelter provided, meaning that a greater number of birds would then be available to liberate to the wild at winter's end.

2. Fall-released birds are exposed to a longer period of predation and other mortality factors, possibly including even hunting, before they can begin their first breeding season. They would be protected from most of this if held until spring in pens. Thus of a thousand birds released in the fall perhaps only a fourth of these would still be alive and on the release area by the end of March, while if the thousand had been held in pens until then, most of them would still be alive.

3. Because of the several months lapse between the time of release and onset of breeding season, considerably more dispersal can take place. This would certainly have a depressing effect on efforts to build a nucleus of a population on a particular area up to the threshold level at which it can be self-sustaining.

Spring Releases

Pro - 1. A larger percentage of a given number of birds hatched at the beginning will be available for release to the wild, in the spring than would remain if the same number were stocked in the fall, since they will have been protected from the hazards of the wild confronting fall-released birds. Thus, at least at the immediate time of release, there will be more birds per unit area present in the spring.

2. Birds should be in excellent physical condition, having been well-fed and sheltered all winter, while birds released in the fall may have undergone considerable physiological stress if the winter was a severe one. Thus the latter might not be in as good a shape physiologically to commence the reproductive cycle.

3. Though the stress of being released just prior to, or even during the beginning of, the breeding season may well have a depressant effect on reproductive success of these newly liberated birds, the net effect to the population may still be on the positive side if the total number of young produced is greater than that produced by the smaller number of hens surviving from fall release even though a higher percentage of the latter hens may be successful.

4. Since the breeding season is right at hand at the time of release, there is a good likelihood most of the birds will be more inclined to stay closer to the release site and enter into typical breeding behavior. Thus dispersal should be less with spring-released birds.

Con - 1. If the birds are held until practically all danger of late severe winter weather is past (say about April 1 in Iowa), the first manifestations of breeding behavior have already begun and must then be interrupted. The question then arises as to what effect the abrupt release of the birds into an unfamiliar area and to a whole new set of stresses and conditions may have on the subsequent breeding pattern of these birds. Perhaps the shocks and stresses are of such magnitude that the amount of successful production by the population of birds newly liberated is seriously diminished to the point that total production would be less than would have been achieved by the smaller number of birds remaining from a release of similar magnitude made the preceding fall.

2. If the shock of being released so close to the breeding season does severely reduce the chances of the reproductive season immediately following liberation being a successful one, this would mean these birds would have to survive through a complete year in order to come into a breeding season in a more "natural" fashion. Thus they would have to survive a longer period than birds released in the fall in order to contribute significantly to the population.

3. Since there is good indication the bulk of losses of released birds occurs within a rather short time after their liberation, the situation may occur where even with a spring release there are actually not a significantly greater number of birds actually available for breeding purposes, and these would probably be at a disadvantage compared to fall released birds that have had time to become more acclimated to the wild environment.

4. If birds are released in the early spring, or perhaps even the tail-end of winter, in order to put them in the field just when their reproductive urges are rising, there is always the risk of a sudden late winter storm hitting the birds while they are still relatively bewildered and unfamiliar with the area. If such happens, severe losses could be suddenly sustained. The last 2 years in Iowa, for example, the worst blizzards of the season hit on March 17 in 1965 and March 23 in 1966. Relatively mild weather had preceded both, but had birds been liberated then they would probably have been wiped out en masse.

5. Food supplies are at a seasonal minimum in early spring. If quantity of food is likely to be an important factor in survival, which it may not be in all areas, this would be an important consideration.

6. Cover conditions are at a minimum in early spring, thus making it more difficult for the birds to find suitable roosting, loafing and escape cover. This will be a short-lived situation, however, since new spring growth will soon be taking over.

7. Holding a considerable number of birds in pens for several additional months increases the chance of major disease outbreaks or of individual birds becoming infected with or carriers of diseases typical of such confined situations.

8. Holding the birds extra months means they will be in close contact with human activity for a longer time. This might result in a tendency toward more tameness and lack of fear on the part of these birds. Such could be a detriment in the wild after release.

9. The cost in money and labor of holding birds over winter, as opposed to fall releases, will probably be a significant amount. In the event of budgetary or help limitations, this might well be an important factor in deciding upon a fall or spring release time.

The foregoing listing of pros and cons of fall vs. spring releases is probably not a complete one by any means, but should be comprehensive enough to instigate discussion at a meeting such as this one. The order of listing is not meant to reflect order of importance, for no attempt at placing a measure of relative importance on the various points was made. Some are no doubt of rather minor significance, while others may be of extreme importance to certain species under certain conditions. Concrete data or examples for or against several particular points are lacking for the most part. Thus many of them remain somewhat speculative in nature. Yet it is important that we obtain proof, be it for or against any aspect, for consideration in planning projects involving the release of game birds for the purpose of establishing self-supporting populations. It is hoped this paper and this meeting will stimulate efforts to find the answers to these questions.

THE 1966 INDEX OF WOODCOCK ABUNDANCE FOR THE BREEDING POPULATION EQUALS FIVE-YEAR AVERAGE

Gene Hlavka
Game Biologist

Two major surveys are conducted each year to obtain information about the population status of woodcock. In the spring a singing-ground survey is made in the states and provinces where woodcock nest. During the hunting season a wing-collection survey is conducted to obtain an index of reproductive success. Because Iowa does not have an open season on woodcock and because Iowa is one of the many states where woodcock nest, our survey in cooperation with the U. S. Fish and Wildlife Service is limited to the singing-ground survey. This work is done to obtain an index of abundance for the breeding population.

In the spring male woodcock "peent" while on the ground and "twitter and chirp" while in the air. These calls form the basis for the counts. Counts of the "singing" birds are made in the evening on the same routes each year. Routes are established along roads, and cars are used for transportation. Selected stops along the routes are at least 0.4 mile apart. The experienced observers are Game and Biology personnel.

Thirteen singing-ground counts were made in 1966 in the eastern half of Iowa. There were 26 woodcock heard on 113 stops --- a mean of 0.23 birds per stop (Table 1). This index of abundance for the breeding population almost equals the breeding 5-year average and is 44% greater than the 1964-65 average (Table 2). Woodcock were heard on 10 of the 13 routes. In 1966 three new routes were added (City Lakes, Lucas County; Sugar Creek, Lee County and Blakesburg, Wapello County). Two old routes were discontinued (Lick Creek, Lee County and Sand Cove, Allamakee County).

No woodcock broods were reported to the writer in 1966. The singing ground survey and occasional sightings of adult birds still indicate that woodcock are widely distributed in Iowa.

Table 1. Results of spring, 1966, woodcock singing-ground counts in Iowa

Route	County	No. of Stops	No. Woodcock Heard	Woodcock per Stop	
Klum Lake	Louisa	9	2	0.22	
City Lakes	Lucas	9	1	0.11	(new route)
Colyn Area	Lucas	9	3	0.33	
Wapsie Bottoms	Bremer	8	2	0.25	
Sugar Creek	Lee	10	0	0.00	(new route)
Rock Creek	Jasper	7	2	0.29	
Lick Creek	Lee	Discontinued in 1966			
Canoe Creek	Winneshiek	9	2	0.22	
Sand Cove	Allamakee	Discontinued in 1966			
Otter Creek	Tama	8	1	0.13	
Paint Creek	Allamakee	9	4	0.44	
Luster Heights	Allamakee	8	0	0.00	
Buck Creek	Clayton	10	5	0.50	
Sny Magill	Clayton	9	4	0.44	
Blakesburg	Wapello	8	0	0.00	(new route)
Totals		113	26	0.23	

Table 2. Indexes of woodcock abundance for the breeding population in the eastern half of Iowa, 1961-66

Year	No. of Stops	No. of Woodcock Heard	Woodcock Per Stop	
1961	46	10	0.22	(4 routes)
1962	42	9	0.21	(5 routes)
1963	92	32	0.35	(10 routes)
1964	108	17	0.16	(12 routes)
1965	84	14	0.17	(10 routes)
5-yr. Avg.	74.4	16.4	0.22	
1964-65 Avg.	96.0	15.5	0.16	
1966	113	26	0.23	(13 routes)

THE 1965 DEER SEASON REPORT

Keith D. Larson
Game Biologist

Introduction

The weather for the 1965 shotgun season was very unfavorable for a high kill. There was fog, rain and mud that prevented many hunters from getting to their areas and discouraged much travel the first day. The woods were quiet from the wet conditions on the 3rd and 4th day. For those that were out on these days the hunting was excellent.

There were 17,491 shotgun permits issued for the statewide "any deer" season, with landowners, tenants and their children allowed to hunt without a deer permit on property under their control. Only two deer were allowed per farm for the first time.

The state was divided into two zones bounded by highways. The north central area had a 2-day season, December 11 and 12. This area contained 27 counties wholly in this zone with parts of 19 additional counties also included. The remainder of the state had a 4-day season, December 11, 12, 13 and 14. Much of the data is presented for the complete zones for the first time.

Data used in this report were taken from compulsory hunter card returns and various Conservation Officer's Reports.

Hunter report cards were received from 16,769 shotgun hunters of the 17,491 for a 95.8% return. Of the 4,342 bow hunters, 4,159 returned their cards for an identical return, 95.8%.

Results and Discussion

Most of the data for this report has been prepared in Tables (Table 1, 2, 3) and includes both bow and shotgun information.

Deer Kill and Success Rate

The kill by shotgun hunters was 6,589 and is about 2,000 short of the expected kill probably primarily due to bad weather. With a 9.4% increase in hunters there was a 10% decrease in kill. Hunter success was 39% and in only 3 of the 13 years of the deer season was the rate lower.

Bow hunters killed 710 deer for a 16.4% success rate.

The Shotgun Season

There was a decline of success in the short zone from 37% to 22%. This area had the better weather of the season and also has better roads. The reduction in success is attributed to a decline in deer population in this area.

Hunter Distribution. Nearly 1,000 additional hunters hunted the short zone, probably because of poor traveling conditions which existed during the first 2 days. There was an increase in hunters who hunted both zones with 1,211 in 1965 compared with 772 in 1964. There was only a slightly disproportionate number of hunters who hunted their home county only.

Licensed Farmers. The number of licensed farmers increased 43% compared to the 1964 increase of 27%. Numerically this amounts to 1,844 permits which is greater than the increase of total permits authorized for 1965. Apparently, recruitment to the sport of deer hunting in Iowa is coming totally from the rural population and/or there is both a decline and turnover in the urban segment of the deer hunting fraternity. Although there were 5,568 unsuccessful applicants for permits, it is possible that future control of the deer herd will be determined by the rural population.

Deer Per Hunter. There was a reduction in the deer available per hunter in the short zone from 1.67 in 1964 to 0.98 in 1965. Correspondingly, there was an increase from 2.4 to 2.8 deer per hunter in the long zone. A hunting pressure of one hunter to one deer is considered to be the maximum permissible. Since this was the average this year for the short zone, the pressure may be excessive over much of the short zone. A continuing decline of the deer population and the success rate is likely in the face of this amount of pressure on the short zone deer population. An equivalent hunting pressure on the long zone deer population, which is much better situated as to vulnerability, would require 42,000 hunters in that zone. These data indicate that regulations designed to equalize hunting pressure are not yet effective.

Non-Permit Kill. A reduction of reported kill by farmers of 25% for 1965 contrasts to an increase of 62% in 1964. Since this occurred in a year when licensed farmers increased by 1,844 and the numerical decline was only 428, there may not have been a real reduction in "on farm" hunting.

The Bow Season

Participation in this type of deer hunting increased 18% in 1965. It is doubtful if this increase would be as great annually if all hunters could have a shotgun permit on request. The success rate annually approximates the 5-year average in spite of this annual large recruitment of hunters. Due to the high degree of hunting proficiency and weapons skill required, it would be expected that the success rate would decline because of this high per cent of inexperienced hunters.

Summary

The summary of the considerable data discussed in this report is found in Table 2 and 3.

Table 1. 1965 Iowa Deer Kill Data

COUNTY - % FOREST * = Short Zone ** = Long Zone *** = Both Zones	RESIDENT PERMIT HOLDERS REPORTING (SHOTGUN)	TOTAL SHOTGUN HUNTERS HUNTING THEREIN	PERMIT KILL BOW SH ZONE	PERMIT KILL BOW LG ZONE	PERMIT KILL GUN SH ZONE	PERMIT KILL GUN LG ZONE	FARM KILL TAGGED	FARM KILL UNTAGGED	MISC MORTALITY	TOTAL MORTALITY	% change from last year	Est. Fall 65 Pop.	% Fall Pop. Killed
1. Adair** 3%	136	180		3		76	13	4	10	106	5	503	21
2. Adams** 6%	99	156		2		67	7	1	7	84	2	348	24
3. Allamakee**32%	265	967		7		286	17	10	35	355	-10	1275	28
4. Appanoose**17%	104	133		5		38	2	4	16	65	2	195	33
5. Audubon**1%	76	131		1		46	14	7	8	76	21	236	32
6. Benton***4%	216	265		4	3	30	0	2	6	45	-40	82	55
7. Black Hawk***5%	512	251	5	8	6	18	3	2	13	55	-30	161	34
8. Boone*8%	125	186	11		45		11	2	7	76	52	357	21
9. Bremer***5%	161	252	1	1	3	53	3	0	1	62	-30	298	21
10. Buchanan**5%	153	152		4		22	0	5	3	34	-24	162	21
11. Buena Vista*1%	148	90	1		14		2	2	5	24	-25	90	27
12. Butler*4%	133	179	5		30		2	6	7	50	-12	196	26
13. Calhoun* 1%	66	36	2		7		1	0		10	-23	49	20
14. Carroll*** 1%	138	52			11	1	4		3	19	-39	87	22
15. Cass** 3%	170	195		8		88	14	10	23	143	0	493	29
16. Cedar**	106	179				36	2	5	8	51	16	204	25
17. Cerro Gordo*1%	178	46	3		6		1	0		9	12	43	21
18. Cherokee*** 3%	122	195	2	6	24	37	7	5	12	93	-35	354	26
19. Chickasaw** 5%	135	207		2		31	0	0	9	42	-35	289	15
20. Clark** 14%	109	217		7		56	6	10	9	88	-33	765	12
21. Clay* 2%	114	198	8		60		11	2	4	85	10	291	29
22. Clayton**24%	336	947		11		265	9		12	297	-34	1673	18
23. Clinton** 7%	260	346		4		69	5	28	16	122	-18	400	31
24. Crawford** 3%	138	311		7		139	21		3	170	-12	1190	14
25. Dallas*** 9%	253	391		7	19	121	6	3	22	178	9	510	35
26. Davis ** 16%	68	108				40	5	10	12	67	49	345	19
27. Decatur** 17%	102	284		4		116	28	15	10	173	-19	1360	13
28. Delaware** 7%	131	260		20		38	4	5	9	76	-16	315	24
29. Des Moines** 15%	326	424		46		230	10	12	60	358	9	1508	24
30. Dickinson * 2%	95	94	5		26		3	3	10	47	-47	51	9
31. Dubuque** 14%	554	268		5		40	2	20	12	79	11	340	23

COUNTY - % FOREST * = Short Zone ** = Long Zone *** = Both Zones	RESIDENT PERMIT HOLDERS REPORTING SHOTGUN	TOTAL SHOTGUN HUNTERS	PERMIT KILL BOW ZONE SH	BOW ZONE LG	GUN ZONE SH	GUN ZONE LG	FARM KILL TAGGED	FARM KILL UNTAGGED	MISC MORTALITY	TOTAL MORTALITY	% change	Est FALL 65 Pop	% FALL Pop Killed
32. Emmett* 2%	57	82	14		19		4	1	8	46	-12	190	24
33. Fayette** 8%	272	413		8		104	6	0	8	126	-21	298	42
34. Floyd*** 3%	153	158	3	3	17	10	4	6	7	50	-26	272	18
35. Franklin* 1%	66	43			7		0	4	2	13	-35	95	14
36. Fremont** 9%	21	70		6		23	8	3	19	59	31	163	36
37. Greene * 3%	113	106	5		41		7		12	65	20	156	42
38. Grundy * 2%	87	5					0	0				9	0
39. Guthrie ** 10%	162	652		12		269	45	14	28	368	5	1411	26
40. Hamilton *2%	128	126	4		30		3	1	2	40	-22	189	21
41. Hancock * 1%	75	52	3		13		1		6	23	44	167	14
42. Hardin * 4%	113	163	3		43		3	1	14	64	23	187	34
43. Harrison ** 10%	181	379		5		175	22	125	42	369	-6	1445	26
44. Henry ** 13%	102	141		6		45	5	8	15	79	75	296	27
45. Howard ** 4%	100	147		5		14	0	5	5	29	-57	292	10
46. Humboldt *2%	53	60	5		9		2	1		17	-26	114	15
47. Ida*** 1%	49	29			7	6	0	1	3	17	21	60	28
48. Iowa *** 8%	158	206	3	2	19	5	4	0	17	50	-26	230	22
49. Jackson ** 20%	241	506		8		147	9	64	15	243	16	989	25
50. Jasper *** 7%	220	152		4	11	31	4	3	15	68	62	527	13
51. Jefferson ** 13%	41	86		2		25	3	3	14	47	21	182	26
52. Johnson *** 10%	315	310	2	3	16	48	2	4	24	99	15	238	42
53. Jones ** 11 %	193	337		5		69	6	15	13	108	-11	553	20
54. Keokuk ** 9%	130	191		1		36	4		5	46	-40	284	16
55. Kossuth * 1%	117	108	7		25		1	0	3	36	-45	250	14
56. Lee ** 24%	238	322		25		142	12	1	11	191	4	590	32
57. Linn ** 10%	826	414		16		73	0	4	7	100	14	332	30
58. Louisa ** 16%	79	123		5		36	5	10	10	66	25	179	37
59. Lucas ** 18%	189	546		8		220	26	12	21	287	-6	1641	17
60. Lyon *** 1%	131	283		13	11	72	6	4	8	114	-40	451	25
61. Madison ** 14%	137	437		18		150	31	8	22	229	14	680	34
62. Mahaska ** 8%	146	179		1		68	10		2	81	-21	418	19

COUNTY - FOREST * = Short Zone ** = Long zone *** = Both Zones	RESIDENT PERMIT HOLDERS REPORTING SHOTGUN	TOTAL SHOTGUN HUNTERS	PERMIT KILL BOW SH	BOW LG	GUN SH	GUN LG	FARM KILL TAGGED	FARM KILL UNTAGGED	MISC MORTALITY	TOTAL MORTALITY	% change	Est FALL 65 Pop	% FALL Pop Killed
			ZONE		ZONE								
63. Marion ** 14%	199	356		10		102	7	4	11	134	6	238	56
64. Marshall * 4%	124	102	7		14		9		5	35	-12	134	26
65. Mills ** 9%	104	147		11		61	7	17	37	109	-23	687	16
66. Mitchell *** 3%	94	105	3	5	24	5	2	5	9	53	-20	233	23
67. Monona ** 11%	156	322		6		159	41		5	211	-1	2210	10
68. Monroe ** 26%	85	583		10		188	14	10	16	238	-7	1615	15
69. Montgomery ** 4%	110	156		6		58	7	15	6	70	-29	466	15
70. Muscatine ** 11%	156	168		3		40	0	0	10	53	4	179	30
71. O'Brien * 1%	132	98	7		34		5	1	3	50	39	126	40
72. Osceola * 8%	61	31	2		12		1		1	16	33	51	31
73. Page ** 4%	101	78		5		30	2	4	13	54	15	325	17
74. Palo Alto * 2%	86	94	3		20		4		4	31	-28	134	23
75. Plymouth *** 2%	132	164		10	2	48	6	0	18	84	-18	292	29
76. Pocahontas * 2%	79	12	1		2		2	2	2	9	-31	65	14
77. Polk *** 8%	942	207	3	18	20	20	2	12	67	142	53	315	45
78. Pottawattamie ** 4%	322	393		46		168	9	7	72	302	-20	2451	12
79. Poweshiek *** 5%	140	57		2	2	6	0	1	7	18	20	110	16
80. Ringgold ** 8%	103	171		1		78	8	5	4	96	3	172	56
81. Sac *** 2%	119	59	3	2	8	4	5	1	7	30	20	126	24
82. Scott **5%	470	211		5		23	0	1	8	37	-27	116	32
83. Shelby ** 1%	75	210		11		87	16	45	20	179	-20	843	21
84. Sioux *** 1%	139	223	2	11	1	78	9	0	13	114	-20	296	39
85. Story * 4%	169	69	5		19		0	0	4	28	-24	49	57
86. Tama * 6%	150	170	2		43		2	3	3	53	-24	136	39
87. Taylor ** 7%	72	96		3		40	8	1		52	4	298	17
88. Union **	137	258		7		118	10	0	17	152	-13	235	65
89. Van Buren ** 21%	118	189		1		66	14	22	12	115	0	522	22
90. Wapello ** 18%	167	72		3		59	6		31	99	10	578	17
91. Warren ** 12%	233	464		27		132	14	6	36	215	19	257	84
92. Washington ** 10%	165	238		5		65	1	4	12	87	4	282	31
93. Wayne ** 8%	96	109		3		33	5	4	4	49	-11	556	9
94. Webster * 6%	171	157	6		29			8	10	53	-4	204	26
95. Winnebago * 1%	61	118	12		36		2	0	3	53	-10	129	41

COUNTY - % FOREST * = Short Zone ** = Long Zone *** = Both Zones	RESIDENT PERMIT HOLDERS REPORTING SHOTGUN	TOTAL SHOTGUN HUNTERS	PERMIT KILL BOW SH ZONE	PERMIT KILL BOW LG ZONE	PERMIT KILL GUN SH ZONE	PERMIT KILL GUN LG ZONE	FARM KILL TAGGED	FARM KILL UNTAGGED	MISC MORTALITY	TOTAL MORTALITY	% change	Est FALL 65 Pop	% FALL Pop Killed
96. Winneshiek** 13%	282	563		8		204	18	10	27	267	-10	986	27
97. Woodbury ** 4%	322	473		19		170	19		37	245	-9	722	34
98. Worth * 2%	69	126	3		30		2	0	12	45	-27	122	37
99. Wright * 2%	108	63	3		17		6		5	31	-14	163	19

Table 2. Summary of 1965 deer kill data, with comparisons to 1964 data

		1964		1965
Resident Permit Holders reporting - gun		15,419		16,769
Resident Permit Holders reporting - bow		3,455		4,159
Total Hunters				
Short Zone		2,847		3,830
Long Zone		13,334		14,032
Hunting Both Zones		772		1,211
Hunting Home County only		7,035		7,652
Licensed farmers		4,302		6,146
Bow Permit Kill		670		710
Short Zone				154
Long Zone				556
Gun Permit Kill		7,274		6,589
Short Zone	(33 Co's)	966	(44 Co's)	835
Long Zone	(66 Co's)	6,308	(77 Co's)	5,754
Farm Kill				
Tagged		910		692
Untagged Estimate		840		630
Misc. Mortality (up 4.6%)		1,170		1,224
Total Mortality		10,864		9,844
% change, Long Zone		+33.5%		-8.4%
% change, Short Zone		+ 8%		-18.2%
% change, Statewide		+31%		-9.4%
Est. Fall Populations		36,694		43,500
Per cent Fall Population Killed				
All Causes		29%		23%
Short Zone (Killed 1454 of 4750, '64) (Killed 989 of 3747 in '65)		31%		26%
Long Zone (Killed 9410 of 31944 in '64) (Killed 8855 of 39753 in '65)		29%		22%

Table 3. Summary of misc. statistics from 1965 data taken from hunter reports for the 1965 bow and shotgun seasons

	Bow	Shotgun		
		Sh Zone	Lg Zone	Statewide
Hunter Success				
1965	16.4%	22%	41%	39%
5-Year Avg.	17.5%			47.1%
Wounded Deer Ratio				
1965	65/100			23/100
1964	72/100			20/100
Hours Hunted				
Season	195,100	46,392	253,124	299,516
Per Kill	274	48.8	45.1	45.7
By Successful Hunter	52.8	14.6	17.0	16.7
Deer Per Hunter (in Pop)	10	0.98	2.8	2.4
Hunter Distribution				
Counties Hunted	1.41			1.29
No. Hunters Hunting	4,159	3,830	14,032	16,761
Home County Only	2,212			7,652
Home Co. & Others	1,195			3,266
Other than Home Co.	695			5,733
Both Zones	172			1,211
Period Killed (by %)*				
1st	26.5%	46.3%	27.6%	30.3%
2nd	30.1%	53.7%	30.8%	33.3%
3rd	43.4%		22.4%	19.6%
4th			19.2%	16.8%
Deer Observed	55,701	20,639	87,005	107,644

* By day for shotgun (2 day season in short zone, 4 days in long zone) and by 17 day periods (1/3 of 51 day season) for bow.

QUARTERLY PROGRESS REPORT OF COOPERATIVE PESTICIDE RESEARCH PROGRAM OF STATE HYGIENIC LAB. AND CONSERVATION COMMISSION

Wayne Patton, Research Chemist
State Hygienic Laboratory, S.U.I.

1965 River Water-Pesticide Survey
(Final Report)

Sampling

As a part of our efforts to evaluate background levels of pesticides in Iowa waters, six sampling points were selected to cover a significant portion of the Iowa watershed. These were all on larger streams. The points were:

Mississippi River at Dubuque
Mississippi River at Davenport
Cedar River at Cedar Rapids
Iowa River at Iowa City
Raccoon River at Des Moines
Missouri River at Council Bluffs

The cooperation of water plant operators at Dubuque, Davenport, Cedar Rapids, and Council Bluffs was obtained in collecting and sending in the samples. The other two points were covered by SHL staff. The water was collected in glass gallon jugs which were thoroughly washed and then rinsed with solvents. The caps had metal or Teflon liners to prevent absorption of the insecticide from the water. The bottles were sent from Iowa City each month and returned filled by the collector by U.S. mail. A total of 33 samples were mailed in this way with only 3 broken.

Analysis

A total of 45 samples collected from February through October, 1965 were received and analyzed for chlorinated hydrocarbon insecticides. The analytical method was selected to give a lower sensitivity limit of 1ppb. This was chosen because little or no effect on aquatic life is found at this level and because the analysis could be performed with a minimum time-consuming "cleanup". After the analyses were begun it was found that a limit of 0.1 ppb could be reached in nearly all cases. The procedure used was as follows:

> A 1000 ml. portion of each sample was taken after thorough mixing. This was placed in a 2000 ml. separatory funnel and 24 drops of conc. hydrochloric acid added. The sample was then extracted once with 100 ml. and 4 times with 50 ml. of high purity petroleum ether by gentle shaking for four minutes with each portion of solvent. The extracts were combined and dried by passage through a 2 inch column of anhydrous sodium sulfate. The dry extract was passed into a Kuderna-Danish evaporative concentrator and concentrated to about 5 to 10 ml. Portions of this concentrate were injected into the gas chromatograph for analysis. Each sample injection was followed by an injection of an appropriate standard solution when peaks characteristic of an insecticide were noted. Positive values were confirmed by thin-layer chromatography. The results of the analyses are shown in the following table.

confirmed by thin-layer chromatography. The results of the analyses are shown in the following table.

Table of Results

	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.
Dubuque	*	*	-	*	*	*	*	*	*
Davenport	*	*	-	*	*	*	*	-	-
Cedar Rapids	*	*	-	*	*	*	*	*	*
Iowa City	*	**	-	0.4ppb DDT 0.1ppb DDE	*	*	*	*	-
Des Moines	*	-	*	*	*	*	*	*	*
Council Bluffs	*	*	-	*	*	*		*	*

* less than 0.1 ppb of any insecticide
** less than 0.3 ppb of any insecticide
\- no sample

Summary

The positive value shown for Iowa City in May was possibly caused by mosquito control operations in a residential area several miles upstream of the sampling point. The generally low levels of chlorinated insecticide found is somewhat reassuring. The situation, in our major streams at least, is of minimal hazard to fish or other life from pesticides. Since the chlorinated hydrocarbons are the most persistent of the common pesticides as well as the most heavily used, we can expect the concentrations of others to be lower still.

A recent report by the Public Health Service of chlorinated insecticide levels at many of the stations of their Water Quality Network on September 23, 1964 shows comparable values. The highest concentration found in the Upper Mississippi Basin was 0.072 ppb of DDT at Grand Forks, N.D. In the Missouri River Basin the highest was 0.024 ppb of DDT at Yankton, S.D. The most frequently found materials were dieldrin, endrin, and DDT. This study indicates that the situation on the major rivers of Iowa is comparable to that elsewhere in the country.