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Pheasant Nesting and Production in Winnebago County, Iowa, 1940 versus 1954[1]

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The Iowa Cooperative Wildlife Research Unit has conducted research on the ring-necked pheasant (*Phasianus colchicus*) since 1935 on the Winnebago Research Area. From 1939-41 intensive nesting studies were made (Baskett, 1947) and again from 1950-54. However, during this latter period, other investigations curtailed a complete nesting investigation, and it was not until 1954 (Klonglan, 1955) that time was available for a complete study with comparable spring pheasant populations. Since fall pheasant population levels in the 1939-41 period were estimated at 140 to 400 birds per section as compared to 100 to 110 birds from 1950-54, an intensive nesting study was deemed advisable for comparative purposes.

The 1520-acre Winnebago nest study area lies within Sections 13, 14 15, 23, and 24, Eden Township, Winnebago County. A general description of the area has been recorded by Baskett, 1947. Except for a few changes in land ownership, the same farms existed in 1940 as in 1954. Changes were apparent in size of fields and the drainage of certain areas, which is a reflection of intensification of agricultural practices during World War II (Tables 1 and 2). Hayfield acreage in 1954 is about the same as in 1940 with a greater emphasis on red clover and larger individual fields. Small grain acreages are very similar with larger individual fields and the disappearance of flax as a crop. Pasture acreage shows a marked reduction (208.1 to 125.9 acres) with the increase in tractor mechanization of agriculture. Corn and soybean acreage shows an increase. Non-agricultural lands reflect a decrease in acreage, especially in sloughs, idle land, and gardens. Road ditches have increased in acreage with the development of wider farm to market roads. The number of fields shows a marked reduction with a consequent loss of edge between them. Whereas, there were 108 fields or land units in 1940, excluding non-agricultural land, this number was reduced to 67 fields in 1954. The importance, if any, of this reduction in

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Table 1.

Acreages, Pheasant Nesting Densities and Nesting Success, Winnebago Area, 1940

	Cover Type	No. of Acres	No. of Fields	No. of Nests	% of All Nests	Acres Per Nest	No. of Nests Succ.	% of Nests Succ.
I.	Hayfields	212.6	27	64	45.71	3.3	13	20.3
	A. Alfalfa	65.8	9	26	18.57	2.5	4	15.4
	B. Alfalfa and Sweet Clover	13.7	1	.....	.....	....	....	.....
	C. Alfalfa and Timothy	12.9	1	.....	.....	....	....	.....
	D. Quack Grass	7.0	2	.....	.....	....	....	.....
	E. Native Grasses (meadows)	58.5	9	9	6.43	6.5	3	33.3
	F. Native Grasses and Mixed Herbaceous (road ditches)	20.4	.....	12	8.57	1.7	1	8.3
	G. Canary Grass	22.8	2	13	9.29	1.8	4	30.8
	H. Oats	2.9	1	.....	.....	....	....	.....
	I. Bluegrass and Red Clover	2.3	1	.....	.....	....	....	.....
	J. Sweet Clover	6.4	1	4	2.86	1.6	1	25.0
II.	Small Grains and Flax	478.4	28	32	22.86	15.0	13	40.6
	A. Oats	405.4	19	30	21.43	13.5	13	43.3
	B. Flax	73.0	9	2	1.43	36.5	....	.....
III.	Pastures	208.1	17	10	7.14	20.8	4	40.0
	A. Bluegrass	129.6	11	3	2.14	43.2	1	33.3
	B. Brome Grass	22.1	1	4	2.86	5.5	2	50.0
	C. Canary Grass	19.5	1	.....	.....	....	....	.....
	D. Oats	3.9	1	.....	.....	....	....	.....
	E. Native Grasses	22.8	1	3	2.14	7.6	1	33.3
	F. Alfalfa	10.2	2	.....	.....	....	....	.....

Table 1 (Continued)

Acreages, Pheasant Nesting Densities and Nesting Success, Winnebago Area, 1940

Cover Type	No. of Acres	No. of Fields	No. of Nests	% of All Nests	Acres Per Nest	No. of Nests Succ.	% of Nests Succ.
IV. Corn and Cane	426.1	22	.....	.....	....	....	.....
A. Corn	422.9	21	.....	.....	....	....	.....
B. Cane	3.2	1	.....	.....	....	....	.....
V. Manure Crops	18.5	3	.....	.....	....	....	.....
A. Oats	7.4	1	.....	.....	....	....	.....
B. Sweet Clover	11.1	2	.....	.....	....	....	.....
VI. Other Crops	65.0	10	1	.71	65.0	....	.....
A. Soybeans	65.0	10	1	.71	65.0	....	.....
VII. Indirect or Non-Agricultural Use	111.3	24	30	21.43	3.7	5	16.7
A. Fence Rows	7.9	.....	23	16.43	.3	3	13.0
B. Sloughs	14.4	12	2	1.43	7.2	1	50.0
C. Roads and Lanes	20.7	.....	.....	.....	....	....	.....
D. Gravel Pit	0.1	.....	1	.71	.1	1	100.0
E. Idle	11.3	2	.....	.....	....	....	.....
F. Farm Groves and Feed Lots	52.6	8	4	2.86	13.2	....	.....
G. Gardens	4.2	2	.....	.....	....	....	.....
VIII. Miscellaneous Early Cover Later Removed	(10.0)	.....	3	2.14	3.3	....	.....
Totals	1520.0	132	140	.....	....	35	25.0

Table 2.

Acreages, Pheasant Nesting Densities and Nesting Success, Winnebago Area, 1954

	Cover Type	No. of Acres	No. of Fields	No. of Nests	% of All Nests	Acres Per Nest	No. of Nests Succ.	% of Nests Succ.
I.	Hayfields	189.2	10	89	54.9	2.1	13	6.8
	A. Alfalfa	20.7	3	20	12.3	1.0	0	0.0
	B. Alfalfa-red clover	21.7	1	7	4.3	3.1	1	14.3
	C. Red clover	21.9	1	3	1.9	7.3	1	33.3
	D. Red clover-timothy	49.7	2	11	6.8	4.5	0	0.0
	E. Sweet clover-red clover	21.0	1	15	9.3	1.4	0	0.0
	F. Native Grasses	27.7	2	6	3.7	4.6	3	50.0
	G. Road ditches (alfalfa)	3.3	.....	13	8.0	0.3	1	7.7
	H. Road ditches (native)	23.2	.....	14	8.6	1.7	7	50.0
II.	Small Grains	402.8	18	48	29.6	8.4	9	18.8
	A. Oats	402.1	17	47	29.0	8.6	9	19.1
	B. Rye	0.7	1	1	0.6	0.7	0	0.0
III.	Pastures	125.9	10	5	3.1	25.2	2	40.0
	A. Alfalfa-timothy	15.6	1	4	2.5	3.9	1	25.0
	B. Timothy	33.4	2	.....	.....	....	....	.....
	C. Red clover-timothy	41.7	2	.....	.....	....	....	.....
	D. Red clover-sweet clover	15.0	1	1	0.6	15.0	1	100.0
	E. Bluegrass	8.6	2	.....	.....	....	....	.....
	F. Bromegrass	4.7	1	.....	.....	....	....	.....
	G. Canary grass	6.9	1	.....	.....	....	....	.....

Table 2 (Continued)

Acreages, Pheasant Nesting Densities and Nesting Success, Winnebago Area, 1954

Cover Type	No. of Acres	No. of Fields	No. of Nests	% of All Nests	Acres Per Nest	No. of Nests Succ.	% of Nests Succ.
IV. Corn	587.0	20	.....	.....	....	....	.....
V. Soybeans	124.6	9	.....	.....	....	....	.....
VI. Non-agricultural use	90.5	10	20	12.4	4.5	4	20.0
A. Fencerows	6.0	.....	17	10.5	0.4	3	17.6
B. Sloughs	9.6	2	.....	.....	....	....	.....
C. Roads and lanes	16.6	.....	.....	.....	....	....	.....
D. Farm groves and lots	58.3	8	3	1.9	19.4	1	33.3
Totals	1520.0	77	162	.....	9.4	28	17.3

edge and interspersion of field crops to pheasants is difficult to evaluate.

Techniques of Investigation

Although the nesting and production studies were conducted by Baskett in 1940 and Klonglan in 1954, every effort was made to follow the same field techniques. The spring population was derived by repeated enumerations of crowing cocks and their harems over the 1520-acre tract. Throughout the nesting season, the area was searched systematically for nests. Fencerows, road ditches, farm groves, sloughs and pastures were checked at weekly intervals until mid-June and again during early July and early August. Some time was spent in hay and oat fields in May and early June; but, during the mowing of hay, the fields were checked on foot at two-swath intervals and after raking at two-windrow intervals. The oat fields were searched for nests immediately after windrowing at two- to three-windrow intervals, depending on the size of the windrower.

Two or more eggs in a nest form were considered to constitute a nest. If one or more eggs hatched, the nest was considered successful. The approximate date of nest establishment, date and cause of nest destruction, and date of hatching were recorded, or estimated, if not known. Estimates were based on the number of eggs present, general appearance of eggs or shells in relation to previous weather conditions, age of embryos, age of brood observed in vicinity, or other available indicators. Brood counts were made by repeated field observations and by early morning and evening roadside counts. In 1940, fall censuses were conducted by roadside counts prior to and by flushing counts during the hunting season. In 1954, flushing counts with the aid of bird dogs and roadside counts were made prior to the hunting season.

Weather Conditions

The nearest official weather station is at Forest City, Iowa, about 15 air miles from the center of the Winnebago Area. The spring of 1940 represented a normal season with respect to temperature and rainfall; whereas, the spring of 1954 consisted of a warm, wet April; a cold, dry May; and a warm, wet June (Table 3). Evaluation of the fall roadside pheasant counts in northern Iowa, 1936-52, revealed that a cold May was not conducive to an increase in pheasant production (Kozicky, *et al.*, 1955). A possible explanation as to how a cold, wet May influences pheasant production was

shown in 1954. Frosts on May 5, 6, and 7 retarded the development of oats; consequently, the dearth of suitable oat cover type did not attract nesting hens. When the oat cover type became suitable to nesting hens, sufficient time was not available before the harvesting of the oat crop, mid-July, for a high percentage of successful pheasant nests. Though the cold May slowed the early development of oats, the peak of activity for the windrowing of oats occurred between July 14 and 26 in 1954 and in 1940. Further, nesting studies since 1949 indicated that the majority of annual pheasant production originated in the oat cover types. Therefore, a tentative biological explanation of low pheasant production in a year with a cold May may be the retardation of the growth of the oat cover type so that early nesting cover is not suitable to hen pheasants. The differences in success of pheasant nests with a normal May (1940) and a cold May (1954) will be discussed under nesting losses.

Table 3.

Weather Records for Forest City, Iowa.*

Year	Month			
1940	April	May	June	July
Mean Temperature	45.3°F.	57.1°F.	69.6°F.	76.0°F.
Deviation from Normal	–0.9	–0.7	+3.2	+3.8
Lowest Temperature	15	28	46	48
Total Rainfall	2.12″	1.67″	3.42″	2.17″
Deviation from Normal	–0.12	–2.72	–0.98	–1.18
1954	April	May	June	July
Mean Temperature	49.5°F.	53.9°F.	71.0°F.	74.5°F.
Deviation from Normal	+3.2	–4.5	+3.4	+1.4
Lowest Temperature	9	26	43	55
Total Rainfall	4.71″	2.84″	8.85″	4.72″
Deviation from Normal	2.53	–1.29	4.33	+1.41

*Iowa Climatological Data, U. S. Dept. Comm., Des Moines, Iowa.

Spring Population

The 1940 spring population on the 1520-acre tract was estimated at 80 birds per section (640 acres) with an observed sex ratio of 1.0 males to 2.1 females and in 1950, 75 birds per section with an observed sex ratio of 1.0 males to 2.8 females. Using these observed sex ratios and estimated spring populations, there were 129 hens on the 1520-acre tract in 1940; 131 hens in 1954.

Nesting

The mean number of eggs per successful nest and the mean number of eggs that failed to hatch per nest showed practically no differences between 1940 and 1954 (Table 4). The peak of nest establishment was about a month later in 1954 than 1940 (Figures 1 and 2), which might be explained by the later nesting season (cold May) in 1954. However, in reviewing nesting studies from 1949 through 1954 on the Winnebago Area, there was an apparent shift to a later peak of the nesting season from the 1939-41 period (Kozicky, 1951; Robbins, 1952; Klonglan, 1953).

Table 4.

Pheasant Nesting Statistics, Winnebago Area.

Item	Year	
	1940	1954
Number of nests	140	162
Number of successful nests	35	28
Number of nests from which egg data was available	32	28
Mean number of eggs per successful nest	9.1	8.3±2.4
Mean number of eggs that failed to hatch per nest	1.9	1.1

Nesting Losses

A drop in the nesting success of pheasants in hayfields and road ditches from 20.3 percent in 1949 to 6.8 percent in 1954 is shown in Tables 1 and 2. Also a drop in the success of nesting in small grain fields, 40.3 percent in 1940 and 18.8 percent in 1954. It is

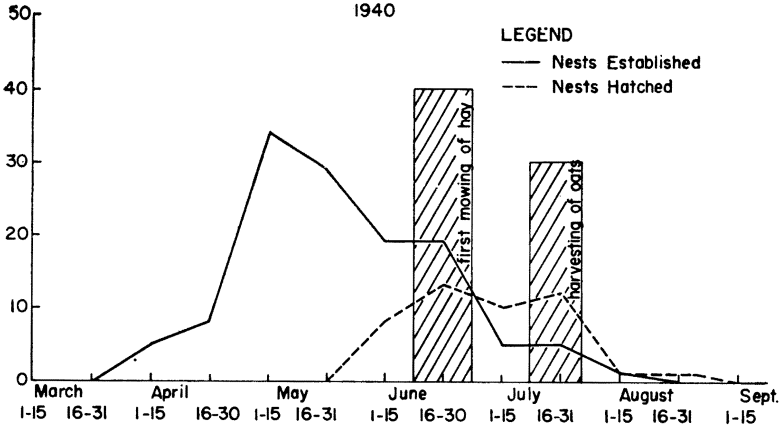

Figure 1. Semi-monthly pheasant nesting activity, 1520-acre Winnebago Area, 1940.

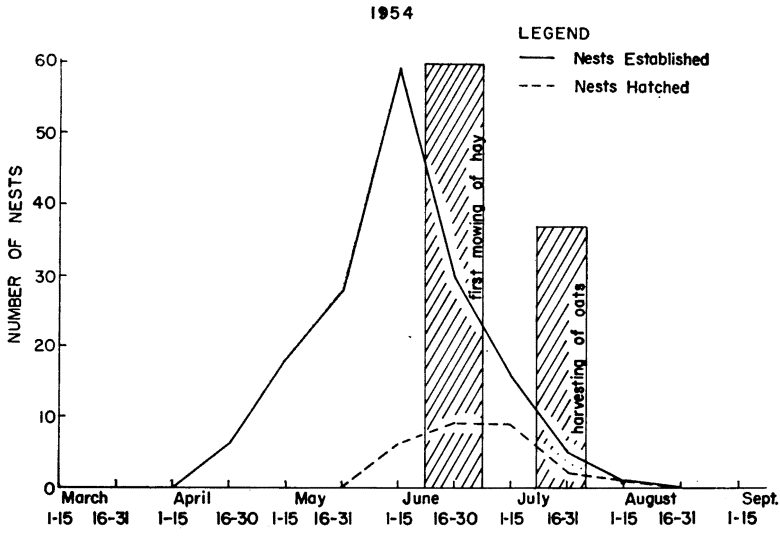

Figure 2. Semi-monthly pheasant nesting activity, 1520-acre Winnebago Area, 1954.

postulated that the reduced nesting success within small grain fields is the result of frosts in early May (Klonglan, 1955) that retarded the growth of oats and did not provide adequate nesting cover until late May. The delay in the development of oats precluded early nesting within this cover type and few nests had an opportunity to hatch before oat harvest in early July. In recent years, when May was more nearly a normal month, nesting success has been approximately 40-60 percent (Kozicky, 1951; Robbins, 1952; Klonglan, 1953).

The low success in hayfields is largely the result of the increase in the number of tractor mowers. In the years 1939 and 1940, the cutting of hay was done by horse-drawn mowers. In 1941, a tractor was used by one farmer; whereas, in 1954, all cutting of hay was accomplished with tractor mowers. The use of tractors for cutting hay has decreased the length of the mowing period by increasing the speed of mowing operation from two to three up to six to eight miles per hour. This increased speed gives the hen pheasant less time to fly as the mower approaches her nest and has resulted in an increased rate of injury and mortality to nesting hens in hayfields (Table 5). The increased speed through mechanization of the entire hay harvest operation has shortened the period of time for the first cutting of hay on any given farm, which in turn lowers the probability of a pheasant nest hatching in the last fields to be mown (Table 2).

Nest Destruction

The most significant increase in nest destruction has been by agricultural activities (Table 5). The complete mechanization of mowing activities has been the largest single factor in increasing the percentage of nest destruction by agricultural activity from 30 to 61 percent. Crows appear to have caused greater damage in 1940 than in 1954. This is believed to be in part a reflection of the early nesting in 1940 as compared to 1954. Crows are especially active on nests early in the pheasant nesting season, April and May, when cover conditions are poor and there is a relative scarcity of natural food. All other losses are of minor importance and show little change between the two periods.

Table 5.

Causes of Pheasant Nest Destruction, Winnebago Area, 1940 and 1954

Cause of Loss	1940		1954	
	Number of Nests	Percentage of Total Loss	Number of nests	Percentage of Total Loss
I. Unknown	2	2.2	0	
II. Desertion because of				
A. Dump nests	1	1.1	7	5.2
B. Observer	5	5.4	12	9.1
C. Disturbance by farmer	0		2	1.5
D. Flooding	1	1.1	9	6.8
E. Undertermined reasons	8	8.6	4	3.0
III. Predation by				
A. Crows	18	19.3	4	3.0
B. Crows (probable)	18	19.3	0	
C. Skunk	0		2	1.5
D. Spotted skunk	0		1	0.7
E. Franklin ground squirrel	1	1.1	1	0.7
F. Raccoon	0		1	0.7
G. Badger	0		1	0.7
H. Housecat	0		1	0.7
I. Observer	0		1	0.7
J. Hog	2	2.2	0	
K. Farm dog	0		1	0.7
L. Undetermined reasons	9	9.7	5	3.7
IV. Destroyed by agricultural activities	28	30.0	82	61.3
	93	100.0	134	100.0

Pheasant Mortality

The increase in mechanization of farm machinery has also increased the rate of injury and mortality to nesting hens. In 1940 two hens (two percent) were killed, and eight (six percent) were injured. Whereas, in 1954, nine hens (seven percent) were killed and 21 hens (16 percent) were injured in hay mowing and oat combining activities. The 1954 rate of injury and mortality to nesting hens amounted to 23 percent of the estimated spring population (131 hen pheasants) on the Winnebago Area. This is in contrast to eight percent of the 1940 spring hen pheasant population.

Juvenile Mortality

An inspection of Table 6 shows very little difference in the number of pheasant chicks at hatching through the age period of more than six weeks. Certainly there is little apparent difference at 6 or more weeks of age between the mean of 5.9 in 1940 and 6.1 in 1954.

Table 6.

Observed Pheasant Broods, Winnebago Area

Year	Statistic	At Hatching	1-3 weeks	4-5 weeks	Over 6 weeks
1940	No. of broods	35	1	21	32
	Mean number of chicks	9.1	5.1	5.2	5.9
1954	No. of broods	28	18	25	49
	Mean number of chicks	8.3	7.5	6.3	6.1

Production

Baskett (1947) indicates 210 birds per section in 1940 and Klonglan (1955) indicates 100 birds per section in 1954 as the fall pheasant population on the Winnebago Area. However, the observed drop in nesting success (8 percent) and the increased rate of injury and mortality to nesting hens (15 percent) would only reduce the fall population 25 to 30 pheasants per section from 1940 to 1954.

Among the sources of possible error in estimating spring or fall pheasant populations on the Winnebago Area are observed sex ratios, daily movement of pheasants, and the percentage of birds observed one or more times. Also, pheasants are not disturbed homogeneously among sections of land, and there is considerable egress and ingress depending on seasonal agricultural activities and weather conditions. The source of error in calculating annual

pheasant production, based on nesting and brood studies, are those in estimating the spring population of nesting hens and the percentage of all nests that are observed.

Summary

1. Ring-necked pheasant production statistics for 1940 and 1954 for the 1520-acre Winnebago Area are compared.

2. The power mechanization of agricultural activities on the Winnebago Area reduced the number of fields, excluding non-agricultural land, from 108 to 67 fields. This reduction in number of crop units lessened field edge and the fencerow cover.

3. Spring weather, especially an abnormally cold May, delayed growth of oats in 1954 and reduced pheasant nesting success in this cover type from 43 to 19 percent.

4. Increased speed of tractor mowers over horse-drawn mowers has increased hay mowing speed and the power mechanization of the entire hay harvest operation has decreased the number of days required for the first cutting of hay. These farm operational changes have reduced nesting success from 20 to 7 percent in hayfields and increased the rate of injury and mortality to nesting hens from 8 to 23 percent between 1939 and 1954.

5. Calculated differences, based on nesting and brood studies, in pheasant production for 1940 and 1954 were about 25 to 30 birds per section. Fall pheasant population estimates, 210 per section in 1940 and 100 per section in 1954, are not commensurate with the measurable differences. Possible reasons for the discrepancy are discussed.

6. Other pheasant nesting statistics or rates of juvenile mortality have shown little to no change.

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