RESULTS OF LONG-TERM DIRECT COUNTS OF UPLAND GAME SPECIES ON THREE INTENSIVE STUDY AREAS IN IOWA

Study Completion Report
Wildlife Research and Surveys Project
Federal Aid Project No. W-115-R

by

Ronnie R. George, James B. Wooley, Jr.
and William Rybarczyk

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Job IV Upland Wildlife Population Surveys on the Decatur-Wayne Quail Study Area

James B. Wooley Jr., Ronnie R. George
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Job V Post-hunting Season Winter Pheasant Census on the Winnebago and Union-Adair Pheasant Study Areas

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DECATUR-WAYNE AREA

STUDY TITLE: Upland wildlife population surveys on the Decatur-Wayne Study Area

OBJECTIVE: Monitor long-term population fluctuation of quail and other upland wildlife on a 4,739 acre study area in Decatur and Wayne Counties.

ABSTRACT: An analysis of spring and fall quail census data since 1935 on the Decatur-Wayne Quail Research Area (DWQRA) revealed differences in population estimation methods which allowed direct comparison of data only for the periods 1949-56 and 1964-80. Changes in acreage of habitat types from 1941 to 1977 has been minimal. Mean fall to spring quail mortality on the north portion (4,739 acre) of the study area was 49.6% over 23 years, and populations increased an average of 151% from spring to fall during the same period. Overwinter mortality was lower, spring populations were higher, and spring to fall population gain was smaller in the 1949-56 period than in the 1964-80 period, but mean fall population did not differ. DWQRA quail data were significantly correlated ($P < .05$) with statewide and regional quail population and harvest indices. Correlation analysis indicated relationships between January weather (snow and temperature) and overwinter mortality, and June rainfall and percent spring-fall population gain. Severe winter weather in 1975 and 1979 was followed by the lowest spring quail numbers ever observed on the area, but populations recovered in 1 and 2 years, respectively, when mild winters and good nesting weather followed population lows.

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INTRODUCTION

Research on the ecology of the bobwhite quail has been conducted intermittently on the Decatur-Wayne Quail Research Area (DWQRA) since 1935 by personnel of the Iowa Conservation Commission (ICC) and the Iowa Cooperative Wildlife Research Unit (CWRU) of Iowa State University. Several tracts of privately-owned farmland located in Decatur and Wayne Counties in south-central Iowa were organized into two adjoining Game Management Areas in 1933 and 1934. In 1935, the State Conservation Commission further organized the areas into an Experimental Bobwhite Game Management Area of 7,713 acres (Fig. 1). CWRU personnel conducted the first bobwhite census of this area in fall 1935 (Green and Beed 1936). Subsequently, annual spring and fall censuses or population estimates were made with the exception of the years 1945-48 and 1957-63. Counts were made in conjunction with graduate studies dealing with the development of the Management Area (Sanders 1940), nesting ecology (Moorman 1942), fall and winter mortality (Mangold 1950), winter movements and cover use (Boehnke 1954, Gooden 1952), whistling behavior (Elder 1956), and summer habitat utilization (Herke 1957). In years between studies, CWRU personnel conducted spring and fall counts and from 1964-1980 ICC personnel carried out annual census work on the area.

This report is an attempt to summarize existing spring and fall bobwhite quail population data for the DWQRA, illuminate the census methods used, and examine habitat and weather relationships on the area relative to quail numbers.

METHODS

Several methods were employed in arriving at population figures for bobwhite on the DWQRA. There was a decided difference in methods between the 1935-44 period and the 1949-80 period. The initial census of the area in fall 1935 and spring 1936 was apparently a direct count (Green and Beed 1936). These data resulted from close observation through the winter of 1935-36. Many workers who followed the 1936-44 period utilized farmer estimates of coveys and quail numbers to arrive at spring and fall population estimates. In some cases, these estimates were adjusted by comparing them with direct counts. An exerpt from Sanders (1940:22) illustrates this:

> "When the farmers were asked to give their estimate of the number of quail on their farms, the writer did not influence their replies in any way. No suggestions were given to assist them to give their estimate. Almost always they also gave the location of each covey. This information in the autumn of 1936 enabled the writer to check most of their estimates and covey locations with his data. From these data, covey and bird duplications of eight coveys containing 143 birds were checked. This duplication amounted to 15.38 percent of the coveys and 16.27 percent of the birds. When these deductions were made for 1936 this gave a total of 44 coveys containing 736 birds or an average of one bird per 10.46 acres. These percentages of duplications have been used as correction factors for each of the succeeding estimates by the farmers. These estimates could not be checked against known census data until the fall of 1939."

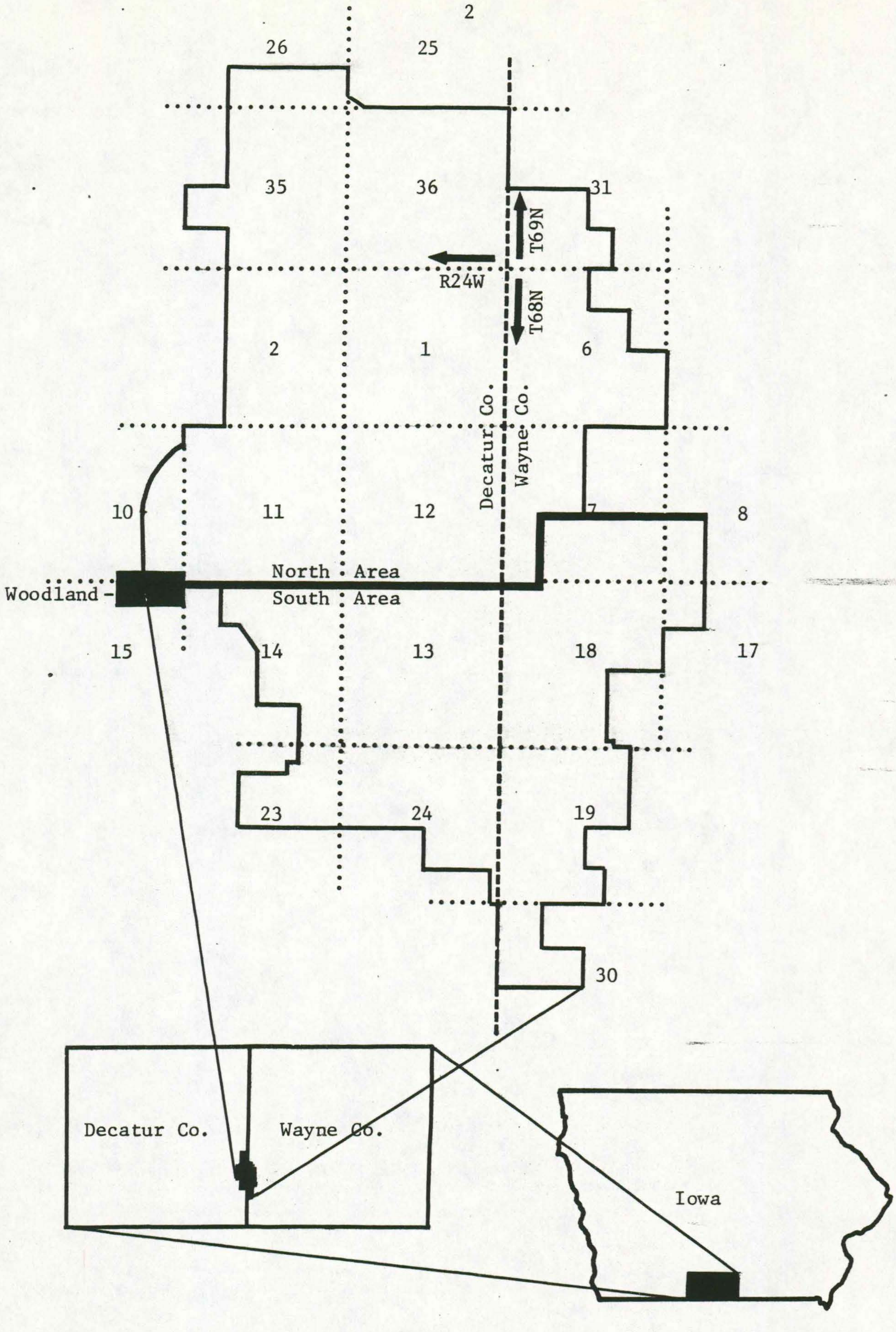

Figure 1. Location of 7,713 acre Decatur-Wayne Quail Research Area in Decatur and Wayne Counties, Iowa.

Some estimates were apparently arrived at by assumption, taking into consideration possibilities of ingress and egress, some portions of farmer estimates, probable levels of production and mortality, etc. (Moorman 1941). Other estimates were based on direct census of part of the area and extrapolation of those figures to cover the entire area. For the period 1935 to 1944, census figures were calculated for the entire 7,713 acre area.

DWQRA data for the period 1949-56 were separated into census segments for the North Area (4,739 acres) and South Area (2,964 acres) (Fig. 1). Estimation of North Area populations was accomplished by direct counts of quail flushed during a complete census of the area. These counts were made twice annually: 1) just prior to or in the early stages of the hunting season, and 2) each spring prior to covey breakup and dispersal of pairs. Complete counts of as many coveys as possible were made and a mean number of quail per covey was calculated. This mean was then applied to coveys where counts were incomplete and to coveys that were not actually seen but which, in the observer's judgement, were present by virtue of sign in the form of tracks, roosts, droopings, etc. Using this method, complete counts were obtained on as many as 18 of 21 coveys and as few as 10 of 31 coveys in various years. Coveys that were not actually seen but were added to the counts ranged from none in some years to 18 in one case. Counts were generally conducted with the aid of one or more bird dogs. Data for the South Area from 1949-56 generally were developed from farmer estimates in the fall and direct counts in spring. In 1949 and 1950, South Area fall estimates were based upon a ratio of North to South Area populations observed in the spring of 1949 when the entire DWQRA was direct counted. CWRU activity on the DWQRA ended in 1956.

The Iowa Conservation Commission reinstituted counts of bobwhites and other upland wildlife on the DWQRA in the fall of 1964 and carried on those activities annually through fall 1980. Direct counts were conducted on the North Area in the same manner as the 1949-56 period, but no census work or recording of farmer estimates was done on the South Area. Counts were suspended on the area after the fall of 1980. Use of sign to account for unseen coveys was still employed in recent years, but to a lesser degree than in the period 1949-56.

Statistical comparisons among DWQRA data, and regression of DWQRA data with regional and statewide quail information and local weather data were accomplished by standard correlation and regression techniques and one-way analysis of variance (Zar 1974). In addition, aerial photographs of the DWQRA from 1941 and 1977 were utilized to analyze changes in land use patterns.

RESULTS AND DISCUSSION

Population Data - 1935-48:

Considerable variation in quail populations on the DWQRA is indicated by data from the period 1935-1944 (Tables 1 and 2). Following the initial direct counts by Green and Beed (1936), Sanders (1940) asked farmers to estimate quail numbers in fall 1936. Sanders checked those estimates by direct census, and calculated a percentage by which farmers had overestimated actual populations. He then used this percentage from spring 1937 through spring 1939 to reduce farmer estimates and calculate what he felt to be the actual number of quail on the 7,713 acre area.

Census data were also compiled for the DWQRA in conjunction with a nesting study conducted by Moorman (1942) from fall 1939 through fall 1941. Again, farmer estimates provided the major basis for figures. These figures indicate questionable expansion of the bobwhite population in terms of both spring and fall numbers (Tables 1 and 2). Careful reading of theses (Sanders 1940, Moorman 1942) and Quarterly Reports of the Iowa CWRU indicate that little or no direct census work was done to verify numbers and the procedures used to arrive at some estimates are suspect. A passage from Moorman (1941) is illustrative:

> "In comparing the writer's figure of 34 coveys seen, plus 1 single bird seen several times in April, or a possible 35 coveys and 322 quail with the farmers' figure of 41 coveys and 534 quail there is an apparent loss of 14.7 percent of the coveys and 39.7 percent of the quail. In the interval between the farmers' estimate in February and the writer's figures in May a loss of 5 percent of the 534 quail or about 27 birds might be expected, thereby reducing the farmers' estimate to 507 birds.
>
> Because the winter cover, both protective and feeding cover, is better on the area than on the neighboring land, there is evidence that about 5 coveys move on the area early in winter and apparently leave early in the spring. Deducting a possible egress of 50 birds from 507 leaves 457 as left in mid-May from the farmers' estimates of 534 in February. As the writer's count of 322 is a minimum and patently low, for it is not likely that all of the quail on an area as large as 7,713 acres were found, let us subtract 322 from 457 and add one-half the difference to 322, and state that 389 was the breeding stock as of May, 1940 on the 7,713 acres in the area. Further, this seems a reasonable procedure because the covey counts after May 1 averaged but 4.6 quail to a covey whereas before that date the average was 10.1 quail to a covey, and because the writer has cautiously eliminated all possible duplications of covey counts.
>
> ... If we take 389 quail, or about 194 pairs, as the breeding stock of the summer, and assume that 60 percent of these reared an average of 10 young to a pair of adults, the fall population could reasonably be estimated as (116 x 10) plus 389 or 1,589 bobwhite quail as of November, 1940, on 7,713 acres or about 1 bobwhite to 4.4 acres. The estimate as of November 15, 1939, the previous year, was 2,268 quail on the area or 1 quail to about 3.4 acres. It was generally agreed by farmers that the shooting population was less in 1940 than in 1939."

Table 1. Bobwhite quail fall population estimates for the 7,713 acre DWQRA in the 1935-48 period.

Year	Fall Census	Census Method	Reference	Comments
1935	508	?	Mangold 1950	Sanders (1940) cites Green and Beed (1936) who show a census figure of 395 quail on 6,000 acres (508 is the expansion to 7,713 acres).
1936	736	FE & DC	Sanders 1940	Sanders checked covey locations and bird numbers of farmer estimates and adjusted for duplication. The same percentage deduction was also used in 1937 and 1938.
1937	501	FE	Sanders 1940	
1938	1334	FE	Sanders 1940	
1939	2316	FE	Sanders 1940	Sanders cites a Moorman census figure 2,268 (origin & methods unknown) and a farmer estimate of 2,316.
1940	1549	EST	Moorman 1942	Estimate based on contrived spring number - no actual census.
1941	1690	FE & EST	Moorman 1942	Estimate apparently contrived.
1942	2462	FE	CWRU Rpt.	Based on partial census of 1,920 acres and expansion to total area. Includes an estimate of hunting loss.
1943	2974	PC & EST	CWRU Rpt.	Based on partial census of 1,920 acres & expansion to total area.
1944	2500	PC & EST	CWRU Rpt.	Based on partial census of 480 acres and expansion to total area.

Legend: FE (Farmers estimates)

PC (Partial Census)

EST (Estimation based on contrived figures or extrapolation)

NC (No count)

DC (Direct Census)

Table 2. Bobwhite quail spring population estimates for the 7,713 acre DWQRA in the 1935-48 period.

Year	Spring Census	Census Method	Reference	Comments
1935	NC			
1936	228	?	Sanders 1940	Sanders cites 177 as the spring population estimate from Green & Beed (1936) for 6,000 acres (228 is the expansion to 7,713 acres).
1937	90	FE	Sanders 1940	Based on a percentage reduction of fall estimates. Percentage reduction based on losses to certain observed coveys
1938	471	FE	Sanders 1940	Based on percentage reduction of farmer estimate as in 1936 fall census (Table 1).
1939	1254	?	Sanders 1940	The origin of this number is unclear.
1940	389	FE	CWRU Rpt.	Moorman (CWRU Rpt.) contrives the figure of 389 based on a late spring count & manipulation of figures. He states that a farmer estimate of 534 was obtained in late February. Sanders (1940) gives the 534 figure as direct count.
1941	673	FE	Moorman 1942	
1942	780	FE	CWRU Rpt.	
1943	1136	PC & EST	CWRU Rpt.	Based on partial census of 1,920 acres and expansion to total area.
1944	1102	PC & EST	CWRU Rpt.	Based on partial census of 960 acres and expansion to total area.

Legend: FE (Farmers estimates)

PC (Partial census)

EST (Estimation based on contrived figures or extrapolation)

NC (No count)

DC (Direct Census)

Similar speculation and manipulation of figures by Moorman (1942) resulted in population estimates of 673 and 1,690 for spring 1941 and fall 1941, respectively. Quail census figures from 1942 through 1944 were developed from partial counts conducted on the DWQRA and from farmer estimates (Tables 1 and 2). Areas censused by CWRU personnel ranged from 480 to 1,920 acres and data from these counts were reduced to a quail per acre basis and expanded to embrace the entire 7,713 acre area. No counts were conducted on the area from 1945-1948.

It is interesting to note the rather rapid progression of quail populations from those of the 1935-37 period to those apparently present in the years 1938-44. Direct census data from 1935 and 1936 indicate quail populations which are roughly equivalent with those of the 1949-56 and 1964-80 periods (Tables 1, 2, 3 and 4). A gross comparison of nesting and row crop acreage on the North Area revealed some apparent changes from 1937 through 1941 (Table 5). Rowcrop acreage increased by about one half. Acreage of fallow ground (idled and not used for any purpose) increased from 10 acres in 1937 to 67 acres in 1939, and an additional 140 acres were planted to lespedeza and sweet clover by 1949, but few other land use changes took place (Sanders 1940:55, 100). Mild winters and an increased food source in 1937-38 and 1938-39 may have resulted in greater breeding numbers than average on the area. Sanders (1940) also suggested that grazing pressure was light during the 1937-40 period. Given these conditions, it is possible that exceptional winter survival and superabundance of nesting and brood cover may have led to higher quail populations.

Though there is no data to refute the population estimates obtained during this period, the extent of the population increase is questionable. It seems likely that the inadequate methods of population estimation and reliance on suspect farmer estimates may have led to an overestimation of quail abundance. The worth of farmer estimates is discussed by Kozicky (1949) who states that "farmers were not generally aware of quail located more than 400 yards from their domicle." The high quail numbers of the 1938-44 period are further suspect when changes in land use patterns between 1941 and 1977 are analyzed (Table 6). A diversity index for both years was developed by measurement of the amount of linear edge of various habitat types on aerial photographs in the manner described by Patton (1975). Areas in various habitat types were also planimetered to determine the amount of acreage in each habitat type. Little change in the acreage of different cover types or the diversity of the area were evident between 1941 and 1977 (Table 6). However, Patton's index is not qualitative in nature. From the data available, there is no method to determine whether nesting or brushy cover was of the same value for quail in 1977 as as in 1941. Also, and probably most importantly, the index provides no measure of quantity of linear edge in relation to different adjacent habitat types.

In summary, while it is not possible to preclude the existance of the extremely high quail populations suggested in the estimates by Moorman (1941, 1942) and others, there exists reasonable doubt of their authenticity due to the methods of estimation used. Therefore population data from this period (with the exception of fall 1935 and spring 1936) is not directly comparable to later periods.

Table 3. Bobwhite quail fall population estimates from the 4,739 acre North Area of DWQRA. All North Area data are derived from direct census.

Year	Fall Census	Reference	Comments
1949	305	Mangold 1950	0 of 21 coveys by sign (188, EST)[a]
1950	326	Mangold 1950	0 of 24 coveys by sign (201, EST)[a]
1951	440	CWRU	0 of 32 coveys by sign (301, FE)[a]
1952	474	CWRU	0 of 20 coveys by sign (337, FE)[a]
1953	278	CWRU	18 of 31 coveys by sign (218, FE)[a]
1954	314	CWRU	5 of 24 coveys by sign (210, FE)[a]
1955	483	CWRU	6 of 31 coveys by sign (218, FE)[a]
1956	303	Herke 1957	3 of 28 coveys by sign (South Area, NC)[a]
1957-1963	No Counts Taken		
1964	138	ICC Files	Data in files at Chariton Research Station
1965	221	ICC Files	7 of 32 coveys by sign
1966	422	ICC Files	1 of 25 coveys by sign
1967	280	ICC Files	3 of 25 coveys by sign
1968	308	ICC Files	2 of 36 coveys by sign
1969	518	ICC Files	4 of 33 coveys by sign
1970	479	ICC Files	2 of 27 coveys by sign
1971	311	ICC Files	1 of 32 coveys by sign
1972	470	ICC Files	0 of 41 coveys by sign
1973	593	ICC Files	1 of 16 coveys by sign
1974	199	ICC Files	0 of 28 coveys by sign
1975	375	ICC Files	0 of 28 coveys by sign
1976	403	ICC Files	0 of 26 coveys by sign
1977	451	ICC Files	2 of 36 coveys by sign
1978	397	ICC Files	2 of 28 coveys by sign
1979	184	ICC Files	0 of 13 coveys by sign
1980	458	ICC Files	0 of 35 coveys by sign

[a]Figures and symbols enclosed by parentheses represents population estimates for the 2,914 acre South Area and the method of estimation if known. Symbols are as in Tables 1 & 2.

Table 4. Bobwhite quail spring population estimates from the 4,739 acre North Area of DWQRA. All North Area data are derived from direct census.

Year	Spring Census	Reference	Comments
1949	172	Mangold 1950	(130, DC)[a]
1950	202	Mangold 1950	(129, EST)[a]
1951	244	CWRU Rpt.	(176, DC)[a]
1952	288	CWRU Rpt.	(137, DC)[a]
1953	189	Boehnke 1954	(62, DC)[a]
1954	124	Boehnke 1954	(41, DC)[a]
1955	165	CWRU Rpt.	16 of 25 coveys by sign (163, DC)[a]
1956	258	CWRU Rpt.	? of 26 coveys by sign (South Area, NC)[a]
1957-1964	No Counts Taken		
1965	121	ICC Files	
1966	100	ICC Files	4 of 11 coveys by sign
1967	154	ICC Files	1 of 14 coveys by sign
1968	154	ICC Files	1 of 14 coveys by sign
1969	208	ICC Files	3 of 20 coveys by sign
1970	230	ICC Files	0 of 18 coveys by sign
1971	205	ICC Files	7 of 22 coveys by sign
1972	125	ICC Files	?
1973	199	ICC Files	0 of 17 coveys by sign
1974	156	ICC Files	0 of 14 coveys by sign
1975	62	ICC Files	0 of 9 coveys by sign
1976	121	ICC Files	0 of 11 coveys by sign
1977	140	ICC Files	1 of 11 coveys by sign
1978	204	ICC Files	0 of 19 coveys by sign
1979	58	ICC Files	0 of 6 coveys by sign
1980	181	ICC Files	0 of 13 coveys by sign

[a]Figures and symbols enclosed by parentheses represents population estimates for the 2,914 acre South Area and the method of estimation if known. Symbols are as in Tables 1 & 2.

Table 5. Gross changes in land use for row crop and nesting cover on 4,739 acre North Area of DWQRA. Nesting cover includes idle land, pasture, timber, and hay with no evaluation of cover quality.

Year	Row Crop Acres	Percent of Total	Nesting Cover Acres	Percent of Total
1937[a]	1,232	29	3,077	71
1938[a]	1,414	31	3,205	69
1939[a]	1,299	28	3,320	72
1941[b]	1,943	40	2,749	60
1949[c]	1,611	34	3,197	66
1977[b]	1,753	38	2,891	62

[a]Data from Sanders (1940).

[b]Data from Table 6, present study analysis of aerial photos.

[c]Data from Mangold (1950).

Table 6. Comparison of diversity of cover types and land use on the north portion (4,739 acres) of the DWQRA in 1941 and 1977.

Cover Type	Acreage in Cover Type		Feet of Linear Edge		% Area in Cover Type	
	1941	1977	1941	1977	1941	1977
Timber	663.5	758.2	181,137	227,962	14	16
Brush	995.2	1,279.5	288,279	246,105	21	27
Row Crop	1,943.0	1,753.4	557,680	411,241	41	37
Nesting Cover[1]	1,090.0	853.0	152,159	175,705	23	18
Water	≃ 31.1	47.4	33,920	50,936	≃ 1	1
Farmstead	47.4	47.4	31,385	32,578	1	1

[1]Includes pasture, hay, and idle areas not invaded by brush.

Population Data - 1949-80:

Estimates of quail numbers on the DWQRA resumed in fall 1949, with separate counts made for North and South Areas through 1956 (Tables 3 and 4). Fall estimates for the South Area were generally some form of farmer estimate, while spring data consisted mainly of direct counts. All data for the North Area were derived from direct censuses. No counts were conducted from 1957-63, but activities were resumed by ICC personnel in fall 1964 and continued through 1980. During this period, only North Area direct counts were conducted. Since methods used to collect North Area data from 1949-56 and 1964-80 were comparable, these data have been combined where possible to examine population relationships (Table 7).

While there have been wide variations in both spring and fall populations, surprisingly little variation in mean numbers has occurred over the period (Figure 2, Table 7). Spring populations have ranged from 58 to 288 birds and fall numbers have varied between 138 and 593 quail. Mortality from fall to spring ranged from 2 to 85 percent and averaged 49.6 percent on the North Area during the 23 years from which data is available. Overwinter losses in the 1964-80 period averaged approximately 10 percent greater than in the earlier period but were not significantly different ($F_{1,21} = 1.02$, $P = 0.32$). This was reflected in differences in mean spring numbers between 1949-56 and 1964-80. Significantly lower ($F_{1,22} = 5.64$, $P = 0.03$) spring populations in the latter period averaged only about 75% of those observed in the earlier period. However, this difference was offset by a greater mean overall rate of increase (nonsignificant, $F_{1,22} = 2.88$, $P = 0.10$) in population from spring to fall in the 1964-80 period (Table 7). Mean fall quail numbers on the North Area did not differ significantly ($F_{1,23} = 0.00$, $P = 0.34$) between periods.

Simple correlations of fall populations with spring quail numbers on the DWQRA were positive and significant (Table 8) indicating that relatively greater fall numbers were achieved when spring populations were high. The correlation was stronger when only 1965-80 data were examined. Fall numbers recorded in the previous year (F_{x-1}) did appear to positively influence following spring numbers (S_x) on the area. However, the rate of increase from spring to fall was not significantly related to the rate of mortality over the preceding fall-spring period (Table 8).

Statewide and regional relationships also existed with DWQRA data. Mean quail per route recorded on August roadside counts statewide were significantly related to both DWQRA spring and fall quail counts for the period 1964-80 (Table 8). Similarly, mean quail per route observed in August in the Southern Pasture region were significantly related to both spring and fall counts on DWQRA, but the relationship was much stronger for fall quail counts (Table 8). Both DWQRA spring and fall counts were predictive of estimated statewide quail harvest (Table 8), but fall numbers were more strongly correlated.

Table 7. Quail population data from the North Area (4,739 acres) of the DWQRA, 1949-1980.

Year	Spring Population	Mortality Rate from Previous Fall	Fall Population	Percent Increase Spring-Fall
1949	172	-	305	77
1950	202	34	326	61
1951	244	25	440	80
1952	288	35	474	65
1953	189	60	278	147
1954	124	55	314	153
1955	165	47	483	193
1956	238	47	303	21
1957-1963	No Census Conducted			
1964		-	138	-
1965	121	12	221	83
1966	100	55	422	322
1967	154	64	280	82
1968	154	45	308	100
1969	208	32	518	149
1970	230	56	479	108
1971	205	57	311	52
1972	125	40	470	296
1973	199	58	593	198
1974	156	74	199	28
1975	62	69	375	505
1976	121	68	403	233
1977	140	65	451	222
1978	204	55	397	95
1979	58	85	184	217
1980	181	2	458	153
$\overline{X}$, 1949-1956	208.6	43.3	366.6	99.6
$\overline{X}$, 1964-1980	151.1	52.4	365.1	176.4
$\overline{X}$, All Years	170.3	49.6	365.6	150.8

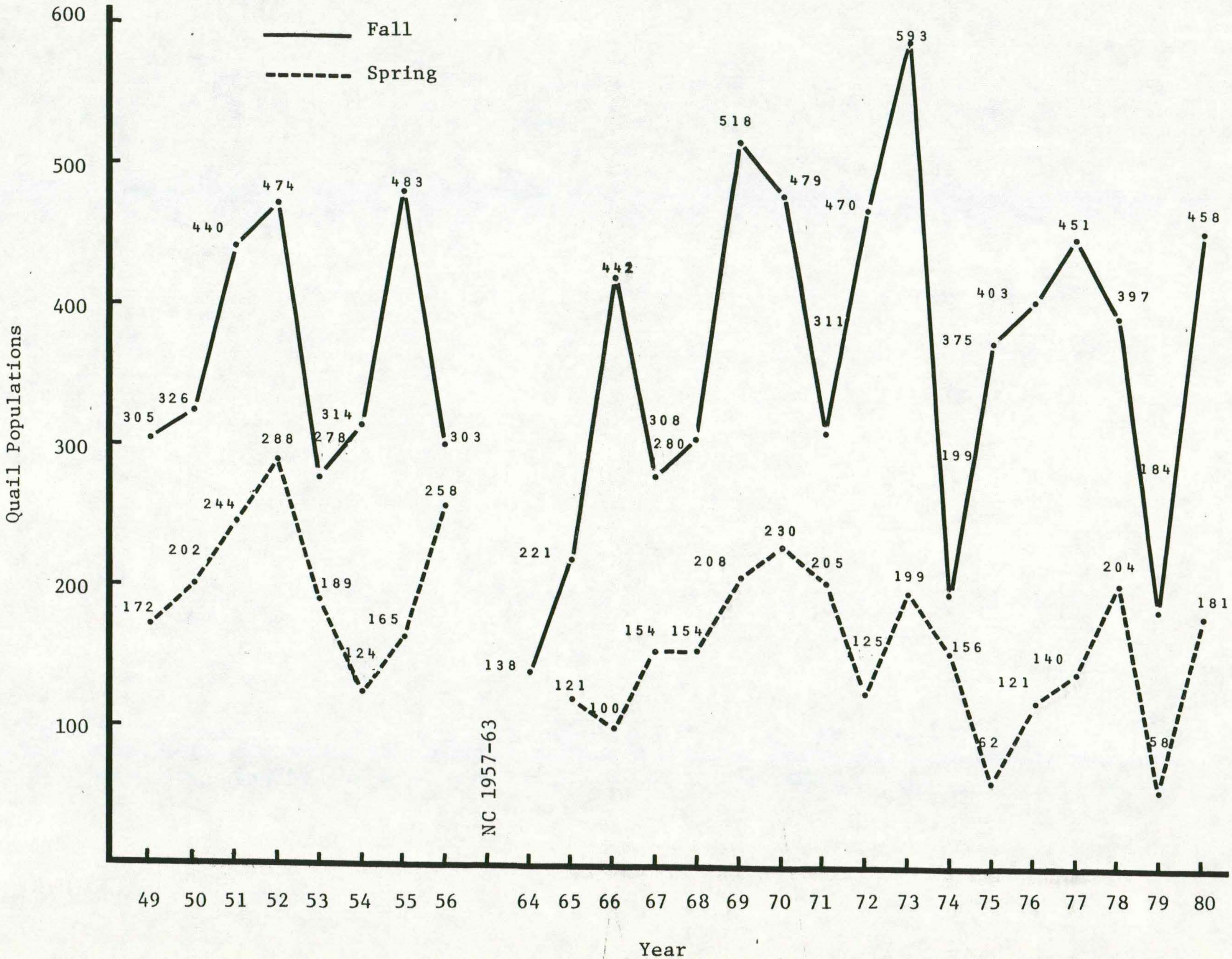

Figure 2. Bobwhite quail populations on the Decatur-Wayne Quail Research Area, 1949-80. No counts were conducted from 1957-63

Table 8. Relationships between bobwhite quail population data from DWQRA, statewide and regional August survey information, and estimated statewide quail harvest.

Variable X		Variable Y	Years	n	r	P
DWQRA Spring	vs	DWQRA Fall	1949-56 + 1965-80	24	0.34	0.05
DWQRA Spring	vs	DWQRA Fall	1965-80	16	0.45	0.05
DWQRA (Fall (X-1)	vs	DWQRA Spring (X)	1964-80	16	0.48	0.05
% Fall-Spring Mortality	vs	% Spring-Fall Increase	1950-56 + 1965-80	23	0.28	> 0.05
% Fall-Spring Mortality	vs	% Spring-Fall Increase	1965-80	16	0.20	> 0.05
DWQRA Spring	vs	$\bar{X}$ Statewide August Quail	1965-80	16	0.66	0.005
DWQRA Fall	vs	$\bar{X}$ Statewide August Quail	1964-80	17	0.59	0.01
DWQRA Spring	vs	$\bar{X}$ Southern Pasture August Quail	1965-80	16	0.48	0.05
DWQRA Fall	vs	$\bar{X}$ Southern Pasture August Quail	1964-80	17	0.65	0.0025
DWQRA Spring	vs	EST Statewide Quail Harvest	1965-80	16	0.52	0.025
DWQRA Fall	vs	EST Statewide Quail Harvest	1964-80	17	0.59	0.01

Quail Populations and Weather:

Correlation analysis of various weather parameters with over-winter mortality rates, spring quail numbers, percent spring to fall increase and fall quail numbers revealed few substantive relationships between weather and population variables in the 1964-80 period (Tables 9 and 10). Numerical count data from fall and spring were not significantly correlated ($P > 0.10$) with weather parameters. However, percent over-winter mortality was positively correlated ($P < 0.10$) with the number of days with greater than 1 inch of snow on the ground in winter. January appeared to be the month contributing most to the relationship (Table 9). Similarly, the number of days below 0° F in January was also correlated with over-winter rates of loss. Cooling degree days in March was negatively correlated with over-winter mortality rate. No obvious explanation for this relationship is apparent, but it may be that cooler weather contributes to a more complete census in March through reducing covey breakup. Degree day data for earlier single months and combinations were not correlated with percent mortality.

Table 9. Correlations of spring DWQRA population data and weather variables. Correlations followed by the symbol ** were considered significant.

Weather Variable	Spring Population r	Spring Population P	Over-winter Mortality r	Over-winter Mortality P
Days with > 1" Snow				
December	0.37	0.15	0.18	0.48
January	-0.01	0.99	0.54	0.02**
February	-0.27	0.30	0.15	0.56
March	-0.23	0.37	-0.24	0.35
December-January	0.18	0.49	0.51	0.04**
December-February	0.01	0.99	0.47	0.06
December-March	-0.08	0.75	0.29	0.27
January-March	-0.21	0.42	0.25	0.33
Days Below 0° F				
January	-0.06	0.82	0.51	0.04**
February	-0.10	0.70	-0.01	0.95
Average Temperature °F				
January	0.05	0.85	-0.40	0.11
February	0.19	0.46	-0.01	0.96
March	0.01	0.95	0.39	0.13
January-February	0.14	0.58	-0.24	0.35
February-March	0.12	0.64	0.23	0.38
January-March	0.09	0.73	0.13	0.61
Degree Days				
January	-0.03	0.90	0.33	0.21
February	-0.12	0.65	-0.13	0.62
March	0.02	0.92	-0.51	0.03**
January-February	-0.09	0.73	0.13	0.61
February-March	-0.04	0.86	-0.41	0.11
January-March	-0.05	0.84	-0.17	0.51

Few significant correlations were found between fall DWQRA data and weather parameters (Table 10) and those which did exist were difficult to explain. April degree days and average April temperature both correlated with the rate of gain from spring to fall and indicated a relationship in which cooler April temperatures were related to greater rates of gain over the summer. Increasing June precipitation was also related to greater spring to fall population increases in the analysis (Table 10). Edwards (1972) stated that low precipitation, high temperatures, or both, in summer were related to low quail populations and harvests in Illinois. Stanford (1972) also identified years of low summer moisture and high temperatures as being low quail production years.

Table 10. Correlations of fall DWQRA population data and weather variables. Correlations followed by the symbol ** were considered significant.

Weather Variable	Fall Population		% Spring to Fall Increase	
	r	P	r	P
Degree Days				
April	0.27	0.28	0.52	0.03**
May	0.05	0.83	-0.18	0.50
June	0.09	0.72	0.02	0.92
May-June	0.07	0.77	-0.15	0.55
Precipitation				
April	-0.21	0.40	-0.27	0.29
May	0.27	0.27	-0.12	0.63
June	-0.32	0.19	0.57	0.01**
May-June	-0.15	0.55	0.36	0.15
Average Temperature °F				
April	-0.02	0.92	-0.52	0.03**
May	-0.02	0.92	0.14	0.58
June	0.15	0.54	-0.17	0.51
May-June	0.06	0.81	0.01	0.94

The most useful information obtained relative to weather and quail populations was gathered following the severe winters of 1975 and 1979 (Table 7, Figure 2). The ability of quail to recover from extremely high over-winter mortality is illustrated in these two years. Quail numbers on the North Area fell to 62 birds in the spring of 1975, but by fall numbers had returned to normal levels, increasing by over 500 percent. This recovery occurred without any shortening of the traditional 90-day quail season. Much the same situation occurred in 1979, but populations on the North Area required 2 years to recover to normal levels. In both cases, favorable winter and spring weather and excellent habitat conditions played a major role in the recovery. Restriction of the normal 90-day quail season by 25 days in 1979-80 probably contributed little, if any, toward population recovery on the area or in the overall quail range across the state.

Supplementary Data:

Other upland wildlife were also counted on the DWQRA from 1964-80 in conjunction with quail population surveys (Table 11). In general, both rabbit and pheasant numbers have fluctuated widely over the period. Rabbit populations do not appear to have changed, but pheasant numbers seem to be increasing. No attempts were made to correlate these counts with weather or land use data.

A quail whistling route was established on the area in 1965 and weekly counts were conducted in June, July and August until 1973. Considerable variation in the date of highest calling frequency is evident (Table 12). Schwartz (1974) found that spring quail numbers on the DWQRA were not significantly correlated ($P > 0.05$) with either the July whistling cock count statewide, or the 10 stop whistling quail count on the DWQRA. In analyzing both statewide quail surveys and DWQRA data, Schwartz (1974) concluded that whistle counts were not predictive of fall quail populations.

Table 11. Numbers of pheasants and rabbits recorded in conjunction with the spring and fall quail census on the Decatur-Wayne Quail Research Area, North Area, 1964-1980.

	Pheasants		Rabbits	
	Spring	Fall	Spring	Fall
1964		3		13
1965	7	23	10	13
1966	20	57	23	33
1967	45	42	33	46
1968	49	28	34	28
1969	31	59	33	34
1970	70	103	23	40
1971	70	63	14	63
1972	40	132	13	94
1973	113	72	40	58
1974	20	58	11	15
1975	28	48	15	41
1976	19	54	11	47
1977	29	73	10	91
1978	159	80	38	38
1979	63	112	10	23
1980	108	169	39	98

Table 12. Results of bobwhite quail whistling counts run on the Decatur-Wayne Quail Research Area 1965-1973. Data indicate dates on which the highest numbers of whistling males were recorded.

	$\overline{X}$ No. of Calling Males Per Stop	Date
1965	1.4	7/29
1966	4.7	6/27
1967	5.3	6/22
1968	5.0	6/17
1969	4.5	8/ 1
1970	5.3	7/21
1971	4.7	6/23
1972	4.4	7/31
1973	3.4	6/14

LITERATURE CITED

Boehnke, R. H. 1954. Winter movements and covey composition of the eastern bobwhite in Decatur County, Iowa, 1952-1954. M.S. Thesis, Iowa State College, Ames. 51pp.

Edwards, W. E. 1972. Quail, land use, and weather in Illinois. Pages 174-184 in Proceedings of the First National Bobwhite Quail Symposium. Oklahoma State Univ. Research Foundation, Stillwater. 390pp.

Elder, J. B. 1956. Analysis of factors effecting production and whistling behavior of the eastern bobwhite in Decatur County, Iowa. Ph.D. Thesis, Iowa State College, Ames. 125pp.

Gooden, S. K. 1952. Winter behavior of the eastern bobwhite on the Decatur County Research Area, 1951-1952. M.S. Thesis, Iowa State College, Ames. 66pp.

Green, W. T. and W. E. Beed. 1936. Iowa quail and pheasants in winter. American Wildlife. 25:83-84, 90-92.

Herke, W. H. 1957. Area-sampling census method and summer cover utilization by the bobwhite in southern Iowa. M.S. Thesis, Iowa State College, Ames. 44pp.

Kozicky, E. 1949. Quail studies. Quarterly Rpt. of the Iowa Coop. Wildl. Res. Unit. Jan-March:4-7. Iowa State University Library, Ames.

Mangold, R. E. 1950. Fall and winter losses of the eastern bobwhite on the Decatur County Quail Research Area. M.S. Thesis, Iowa State College, Ames. 55pp.

Moorman, R. B. 1941. Quail studies. Quarterly Rpt. of the Iowa Coop. Wildl. Res. Unit. Jan-March:4-11. Iowa State Univ. Library, Ames.

__________ 1942. Comparison of production of eastern bobwhite on an experimental game management area in Southern Iowa for 1940 and 1941. M.S. Thesis, Iowa State College, Ames. 34pp.

Patton, D. 1975. A diversity index for quantifying habitat edge. Wildl. Soc. Bull. 3(4):171-173.

Sanders, E. 1940. History and development of an experimental bobwhite management area in southern Iowa. Ph.D. Thesis, Iowa State College, Ames. 159pp.

Schwartz, C. C. 1974. Analysis of bobwhite population surveys. Iowa Wildl. Res. Bull. No. 10. Iowa Cons. Comm., Des Moines. 41pp.

Stanford, J. A. 1972. Bobwhite quail population dynamics: relationships of weather, nesting, production patterns, fall population characteristics, and harvest in Missouri quail. Pages 115-139 in Proceedings of the First National Bobwhite Quail Symposium. Oklahoma State University Research Foundation, Stillwater. 390pp.

Zar, J. E. 1974. Biostatistical analysis. Prentice-Hall, Inc. Englewood Cliffs, N.J. 620pp.

WINNEBAGO AREA

STUDY TITLE: Post-hunting season winter pheasant census on the Winnebago Pheasant Study Area.

OBJECTIVE: Monitor long-term pheasant population fluctuations on the Winnebago (northern Iowa) Study Area.

ABSTRACT: An analysis of ring-necked pheasant (*Phasianus colchicus*) direct winter counts on the Winnebago Research Area in north-central Iowa revealed a long-term decline in pheasant numbers attributed to loss of nesting and winter cover. Direct winter count data from 1950 to 1980 was negatively correlated ($r = -.63$, $P = .0003$) with row crop acreages in Winnebago County. Direct winter count data from 1962 to 1980 was positively correlated with the number of broods ($r = .82$, $P = .0006$) and the total number of pheasants ($r = .84$, $P = .0003$) observed on the Winnebago Research Area August Roadside Census Route. While the ring-necked pheasant breeding population has not been completely extirpated from Winnebago County, population levels have been greatly reduced, and long-term trends on the Winnebago Research Area provide another classic example of the effect of habitat loss on wildlife populations.

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INTRODUCTION

Ring-necked pheasants were successfully introduced into northern Iowa about 1900 and were soon recognized as a potentially important game species. The first pheasant hunting season was held in 13 counties in north-central Iowa in 1925 (Farris et al. 1977:112), but it was recognized that little was known about the management of this new species. Consequently, in 1935 the American Wildlife Institute, cooperating with the United States Bureau of Biological Survey, the Iowa State Conservation Commission, and Iowa State College agreed to establish a pheasant research area on a 4,900 acre tract of private land in Winnebago County in north-central Iowa (Green 1938). Over the years, investigations on the Winnebago Research Area have involved a variety of topics including: 1) nesting and reproduction (Baskett 1947, Klonglan 1955, Kozicky and Hendrickson 1956, Ridley 1957, Fisher 1974); 2) effectiveness of flushing bars (Klonglan 1955, Klonglan et al. 1959); 3) winter behavior and survival (Green 1938, Scott and Baskett 1941, Grondahl 1953); 4) census methods (Klonglan 1955); 5) blood parasites (Fore 1959, Roslien et al. 1962); and 6) experimental management and hunting areas (Green 1948).

Use of direct counts to census pheasant populations on the Winnebago Research Area began in the fall of 1935 (Green 1938). Counts were initially made on foot or on horseback, with the aid of a dog. Later in the season when deep snow made travel by horseback impossible, skis were used and the dog was left home to avoid flushing winter-stressed birds. Pre-hunting season, pre-winter, and post-winter counts by Green (1938) averaged 130, 65, and 32 birds per section, respectively, in the 1935-36 season. During subsequent years, additional direct counts were made on the Winnebago Research Area by Green (1948), Baskett (1947), and other personnel from the Iowa Cooperative Wildlife Research Unit. According to Baskett (1947), pheasant populations on the study area reached an all-time high of 400 birds per section in the fall of 1941. Research activities on the Winnebago Area were suspended during World War II, but winter survey methods were standardized, and direct winter counts were resumed on a 2,480 acre portion of the area in 1950.

While direct survey methods were being developed and improved on the Winnebago Area, rangewide fall roadside surveys (initiated in 1936), spring crowing counts (initiated in 1950), and spring roadside counts (initiated in 1962) were being developed and used as indices to regional and statewide pheasant populations. Rangewide spring and fall (August) survey methods and survey routes were standardized in 1962. One of the census routes used in conducting rangewide pheasant surveys was located on the Winnebago Research Area; this provided a ready comparison of survey methods.

METHODS

Data from pheasant population surveys on the Winnebago Research Area were compiled and analyzed by standard regression and correlation procedures (Zar 1974:198-280). Methodology for these surveys was as follows:

1) Direct Winter Counts (1950-1980) - The pheasant population remaining on the study area after the close of the hunting season in December or early January was censused annually by a direct count of the entire study area. Acres surveyed annually during the 1950-1961 period totaled 2,480; during the 1962-1980 period, 3,840 (Fig. 1).

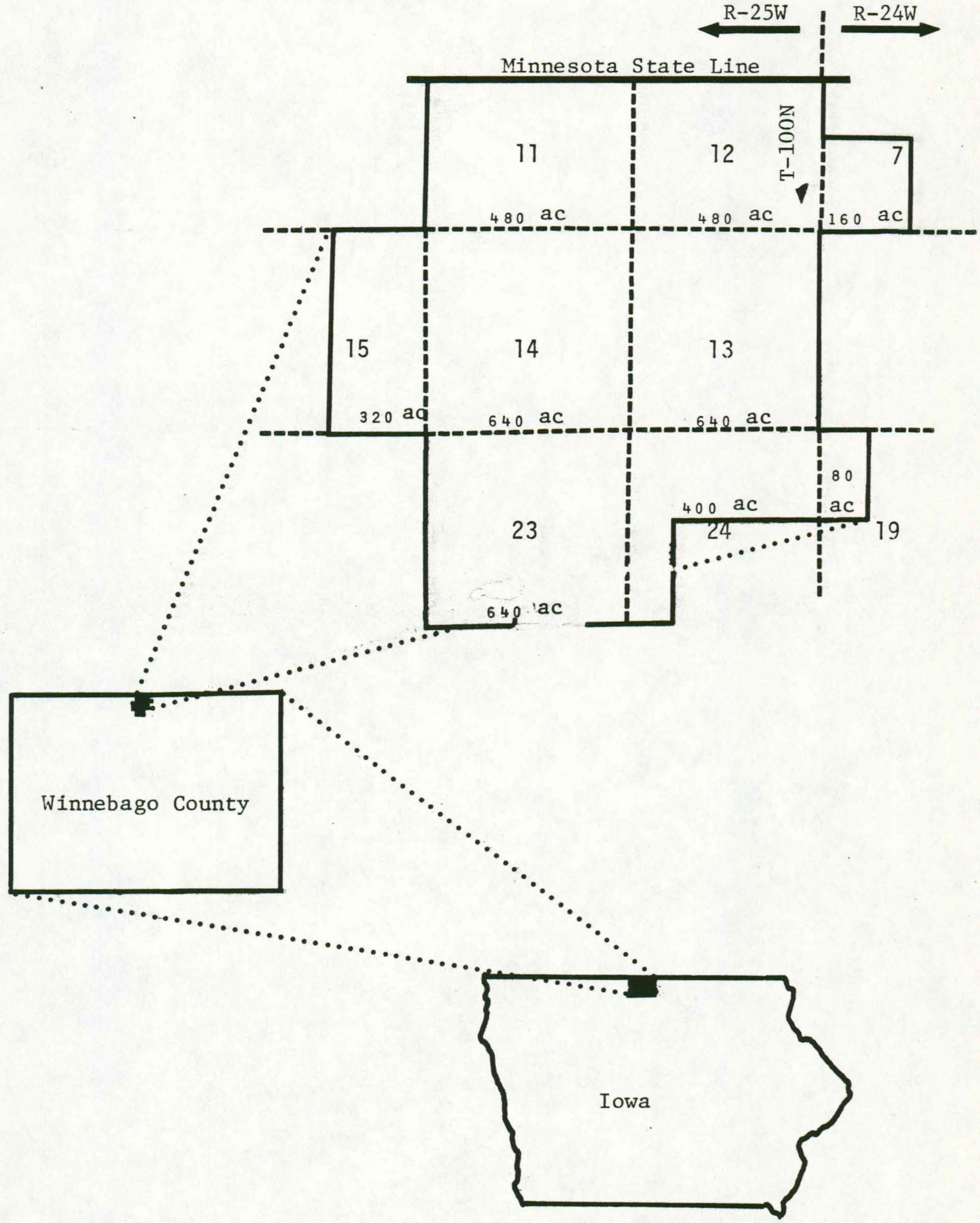

Fig. 1. Location of 3,840 acre Winnebago Winter Pheasant Census Area in Winnebago County, Iowa.

Counts were made under conditions of deep snow (more than 4 inches), low temperatures (below 20° F) and considerable wind (10 mph or more). Under these conditions, pheasants were found only in the heaviest cover, particularly farm groves and brushy waste areas, waterways, wetlands, fencerows and ditches. Since all of the pheasants were concentrated in heavy cover, they were easier to count, and it was not necessary to check large, open wind-swept fields. Iowa Cooperative Wildlife Research Unit personnel were responsible for conducting direct winter counts on the Winnebago Area until 1963. Iowa Conservation Commission personnel assumed this responsibility in 1964.

2) Spring Crowing Cock and Roadside Routes (1962-1977) - These surveys were conducted annually from 25 April to 10 May by Iowa Conservation Commission personnel. Crowing routes consisted of 10 stops, 1 to 1½ miles apart at which an observer recorded all cock calls heard in a 2 minute interval. Counts began 45 minutes before sunrise. Upon completion of the crowing route, the observer conducted a 10-mile return roadside pheasant count and recorded all cocks and hens. Weather had to be calm and clear, with no rain in the previous 24 hours and wind below 8 mph. The Winnebago Research Area spring route (Fig. 2) was one of 87-205 similar routes used statewide as an index to pheasant breeding populations.

3) August Roadside Routes (1962-1980) - This survey was conducted annually from 1-15 August by Iowa Conservation Commission personnel. Observers drove a continuous 30-mile route at approximately 20 mph recording cocks, hens without broods, hens with broods, and the number and age of young as well as other game species. Weather had to be clear and calm, with heavy dewfall. Counts began at sunrise. The Winnebago Research Area August route (Fig. 2) was one of 101-205 routes used statewide to determine hatching chronology, percent successful females, brood size, and other production parameters. The statewide survey also served as an index to potential harvest.

Cover maps and crop acreage data prepared by previous researchers, current aerial photographs and on-site inspections were used to document long-term habitat changes on the Winnebago Research Area. Since row crop acreage data for the Winnebago Research Area was not recorded for all years, row crop acreage data reported for Winnebago County (Iowa Department of Agriculture 1950-80) was used in correlation analysis. May cooling degree days (the sums of the negative departures of average daily temperatures from 65° F) recorded at Forest City, Iowa (NOAA 1963-1980), were also used in correlation analysis.

RESULTS AND DISCUSSION

Direct winter counts on the Winnebago Research Area revealed a mean of approximately 100 pheasants per section during the early to mid-1950's (Fig. 3). During the late 1950's and early 1960's direct counts increased dramatically reaching 235 birds per section in 1960. This was followed by a steady decline ultimately resulting in an almost complete absence of wintering birds during the mid to late 1970's.

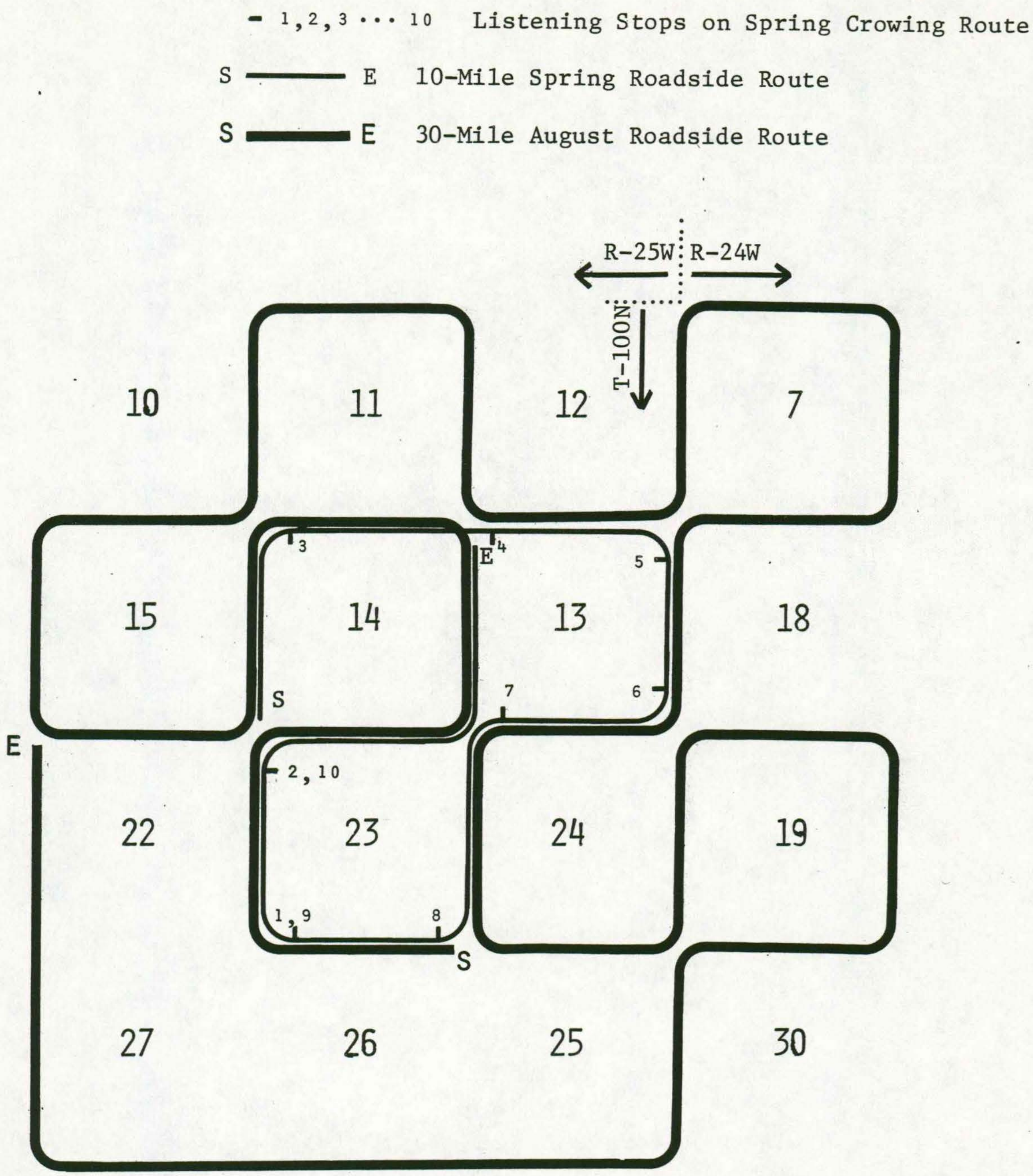

Fig. 2. Location of Winnebago Research Area Spring Crowing Route and Spring and August Roadside Census Routes in Winnebago County, Iowa.

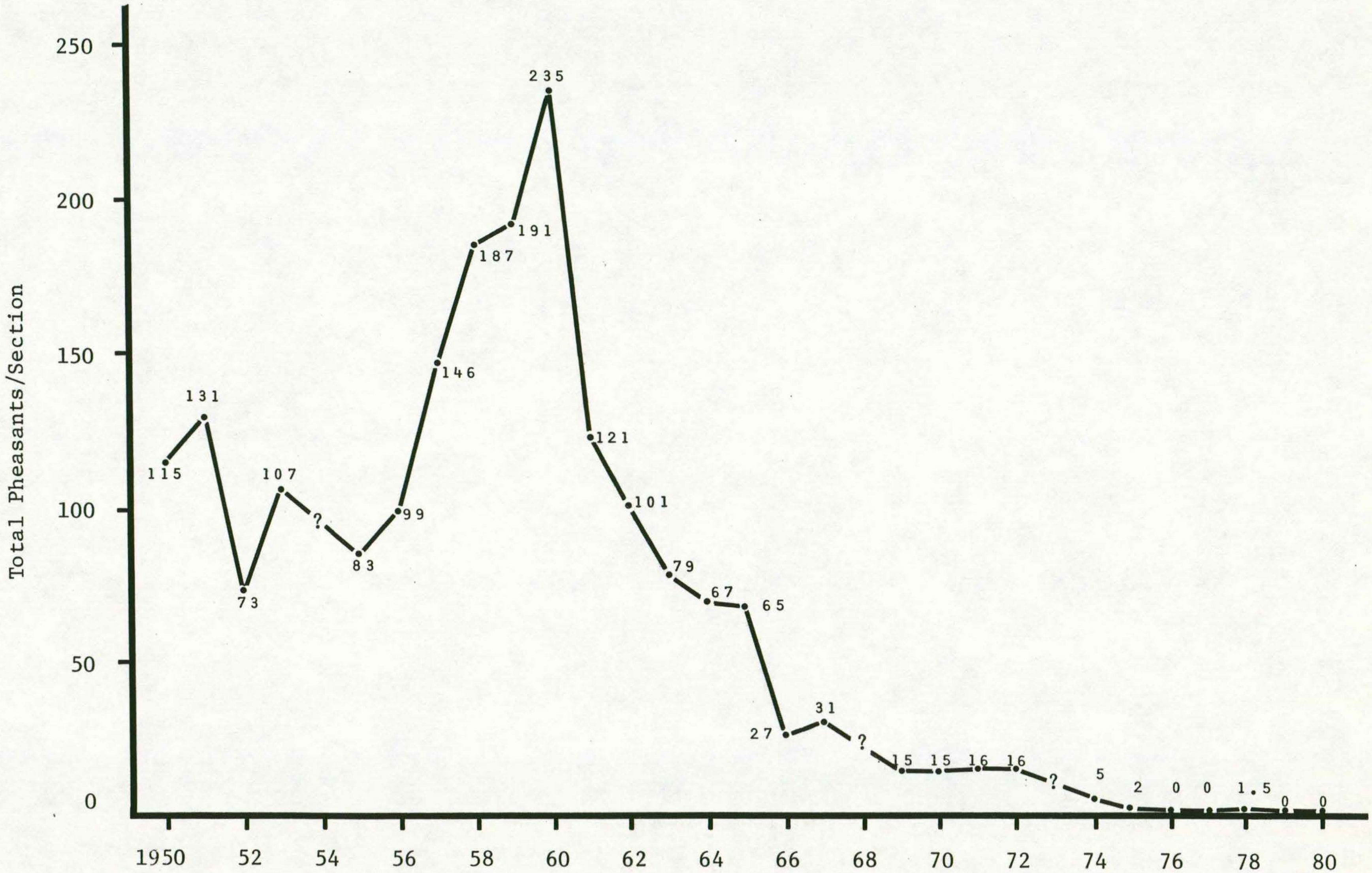

Fig. 3. Total pheasants observed per section during direct winter counts on the Winnebago Research Area 1950-1980.

Spring crowing counts and spring and August roadside counts from the Winnebago Research Area also indicated generally high pheasant population indexes in the early 1960's and extremely low numbers by the mid-1970's (Fig. 4-6). Direct winter count data from 1962 to 1980 was positively correlated with the preceding season's August broods (r = .82, P = .0006) and total August pheasants (r = .84, P = .0003). During the late 1970's August roadside survey data (Fig. 6) indicated an upward trend in pheasant numbers on that was not apparent from direct winter count data (Fig. 3).

Farris et al. (1977:77) suggested that the high pheasant numbers observed in parts of Iowa during the late 1950's and early 1960's may have been due to the abundance of nesting habitat provided by the Conservation Reserve Program established by the Soil Bank Act of 1956. Land retirement in Iowa was greatest under this program from 1959 through 1964. By 1965 the acreage retired in this program was less than one tenth of the amount enrolled five years earlier.

While Farris et al. (1977:51) reported a negative relationship between May cooling degree days in Central Iowa and the statewide index of chicks per hen in August (r = -.79, P < .01), we found no relationship (P > .10) between May cooling degree days at Forest City and chicks per hen in August on the Winnebago Research Area. We also found no relationship (P > .10) between May cooling degree days and total August pheasants or August broods.

Fischer (1974:56) attributed the recent decline in pheasant numbers on the Winnebago Area to a combination of winter losses and lack of nesting cover associated with land use and agricultural practice changes. Severe winter weather during the 1961-62, 1965 and 1975 seasons undoubtedly contributed to loss of pheasant brood stock in northern Iowa (Farris et al. 1977:46-48), but loss of critical habitat ultimately had a more detrimental long-term effect. Potential nesting cover was available on 47.6% of the entire Winnebago Area during 1954. However, by 1980 potential nesting cover was available on only 9.7% of the area. At the same time, percentage of the study area in row crops increased from 46.8% in 1954 to 85.6% in 1980 (Table 1). Direct winter count data from 1950 to 1980 was negatively correlated (r = -.63, P = .0003) with row crop acreages in Winnebago County.

In addition to the direct loss of nesting cover there has also been a loss of habitat diversity and edge effect as field sizes increased, oat and hayfield acreages declined, wetlands and pastures completely disappeared, and the land became dominated by large fields of corn and soybeans (Farris et al. 1977:81-83).

The sparse winter habitat remaining on the Winnebago Area appears to be incapable of supporting wintering pheasants as evidenced by recent direct winter count data (Fig. 3). However, recent August roadside survey data (Fig. 6) indicates some pheasants are still produced on the area. It is logical to assume these birds move off the Winnebago Area in the fall in search of better winter habitat (perhaps to 483 acre Harmon Lake Wildlife Area 2.5 miles to the east or other nearby privately-owned wetlands in Iowa or Minnesota) and return to the Winnebago Area in the spring to breed. Kimball (1949) reported pheasants in South Dakota traveled as far as 10 miles between river bottom winter cover and upland summer range so a limited seasonal movement between Harmon Lake and the Winnebago Area does not seem unreasonable.

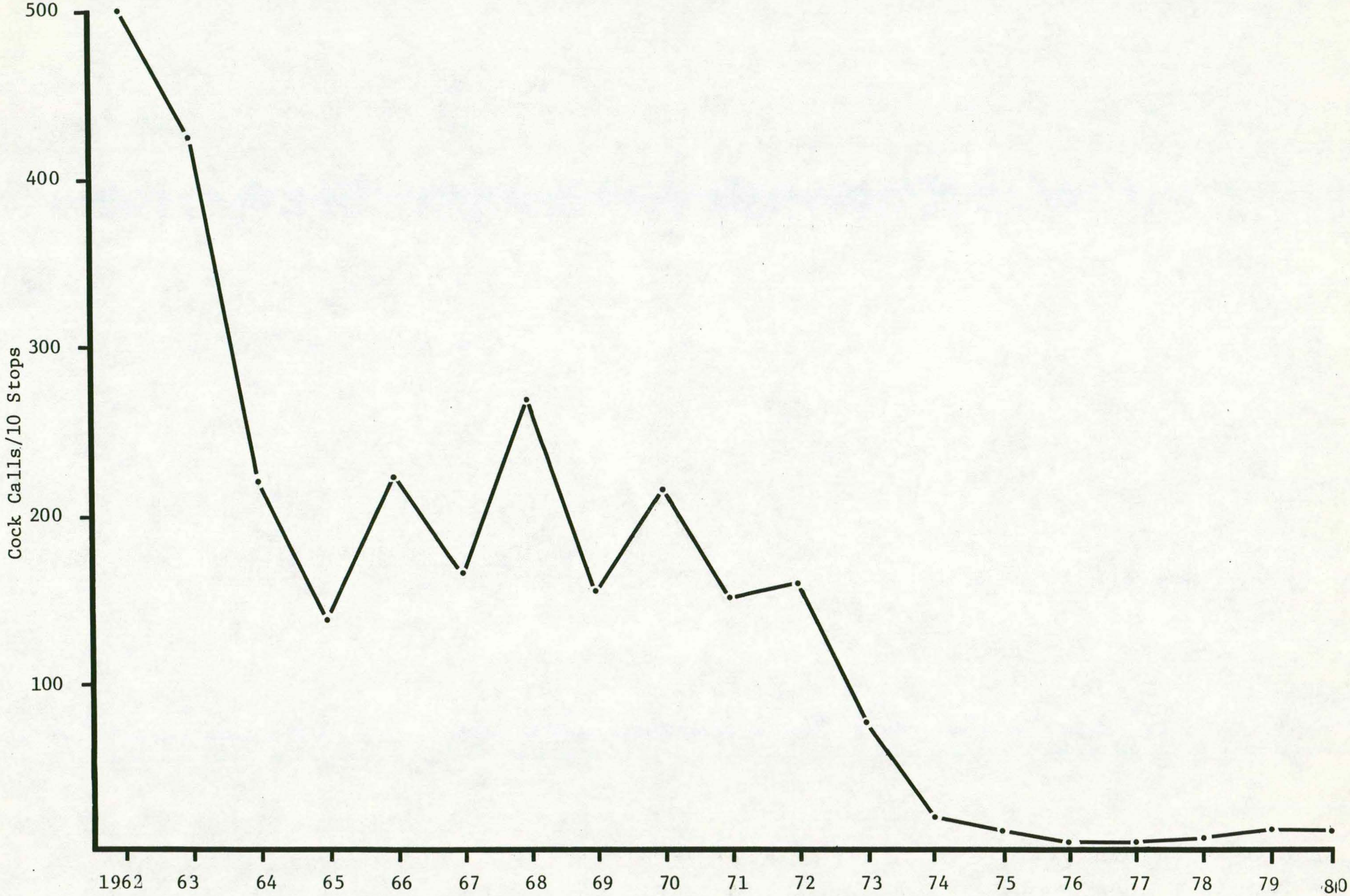

Fig. 4. Total cock calls heard on the 10-stop Winnebago Research Area Spring Crowing Route 1962-1980.

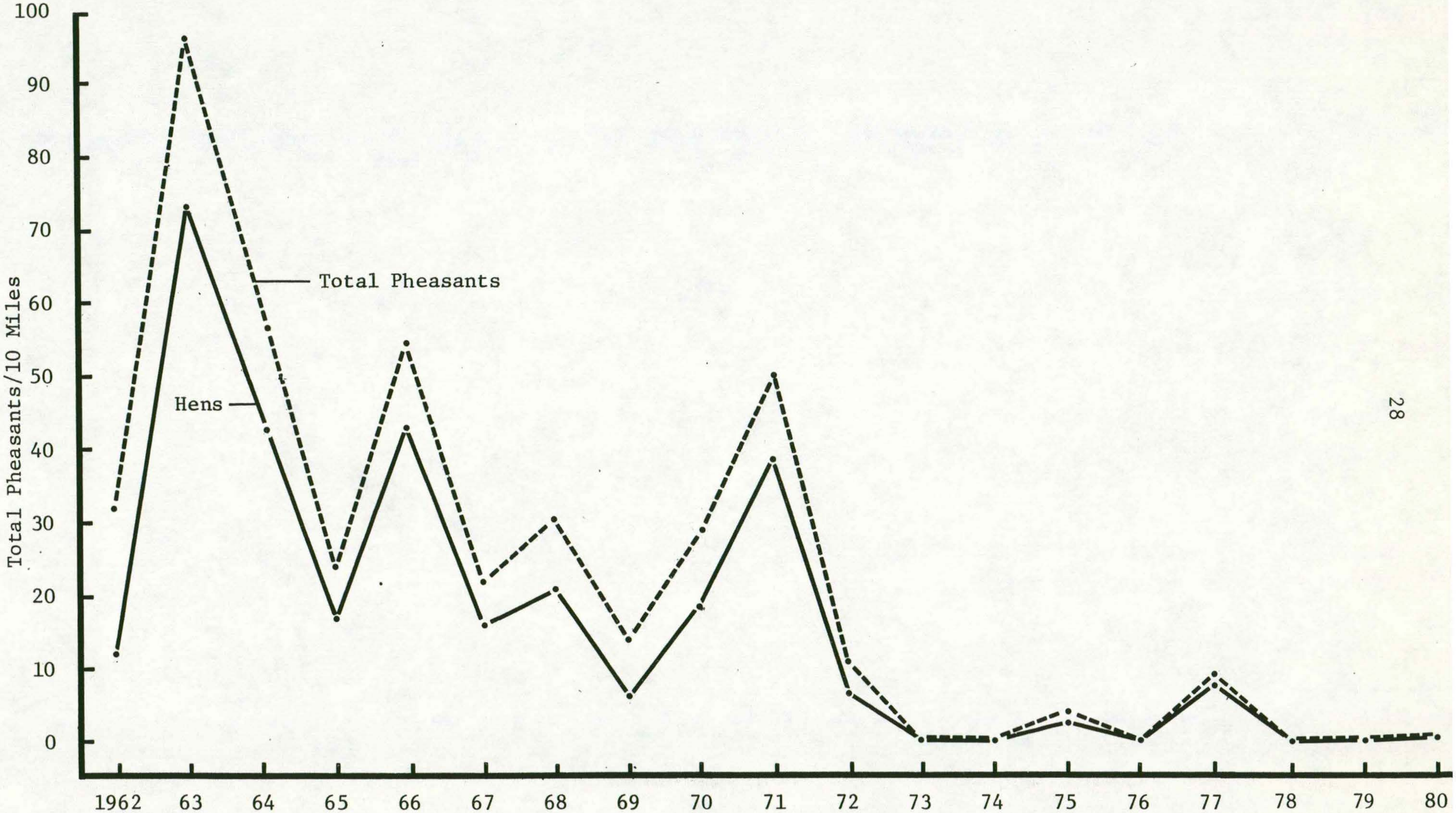

Fig. 5. Total pheasants (cocks and hens) observed per 10 miles on the Winnebago Research Area Spring Roadside Survey Route 1962-1980.

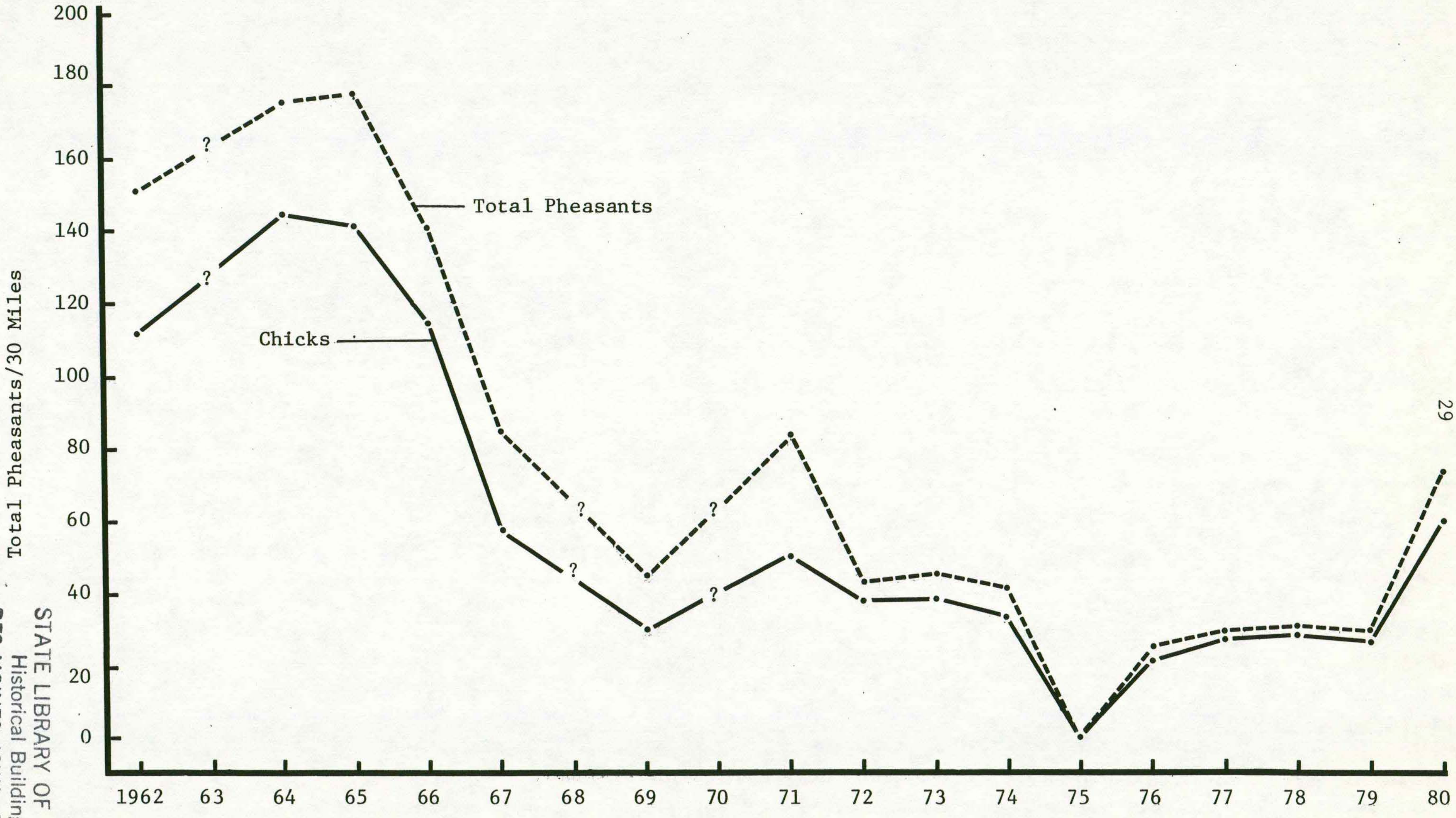

Fig. 6. Total pheasants (adults and chicks) observed per 30 miles on the Winnebago Research Area August Roadside Survey Route 1962-1980.

Table 1. Land use on the Winnebago Pheasant Study Area expressed in percent (update of Farris et al. 1977:80).

	1939-1941	1949-1950	1954	1967	1973	1980
Row Crops[1]	31.2	45.1	46.8	72.8	81.5	85.6
Potential Nesting Cover[2]	58.7	45.6	47.6	22.5	14.3	9.7
Other[3]	10.1	9.3	5.6	4.7	4.2	4.7

[1]Includes corn and soybeans.

[2]Includes hay, oats, pasture, fencerow, roadside, slough, and diverted land.

[3]Includes roads, lanes, farm groves and lots, gardens, cane, flax, barley, and straw stacks.

While the ring-necked pheasant breeding population has not been completely extirpated from Winnebago County, population levels have been greatly reduced, and long-term trends on the Winnebago Research Area provide another classic example of the effect of habitat loss on wildlife populations.

LITERATURE CITED

Baskett, T. S. 1947. Nesting and production of the ring-necked pheasant in north-central Iowa. Ecol. Mono. 17:1-3.

Farris, A. L., E. D. Klonglan and R. C. Nomsen. 1977. The ring-necked pheasant in Iowa. Iowa Cons. Comm., Des Moines. 147pp.

Fischer, W. A. 1974. Nesting and production of the ring-necked pheasant on the Winnebago Research Area, Iowa. M.S. Thesis. Iowa State Univ., Ames. 63pp.

Fore, P. L. 1959. Blood parasites in relation to Iowa pheasants. M.S. Thesis. Iowa State Univ., Ames. 67pp.

Green, W. E. 1938. The food and cover relationship in the winter survival of the ring-necked pheasant, Phasianus colchicus torquatus Gemlin, in northern Iowa. Iowa State College. J. Sci. 12:285-314.

__________ 1948. The development of experimental areas for the ring-necked pheasant, Phasianus colchicus torquatus Gemlin, in northern Iowa. Ph.D. Thesis. Iowa State Univ., Ames. 168pp.

Grondahl, C. R. 1953. Winter behavior of the ring-necked pheasant, Phasianus colchicus, as related to winter cover in Winnebago County, Iowa. Iowa State College. J. Sci. 27:447-465.

Iowa Department of Agriculture. 1950-72. Annual farm census. Iowa Dept. Ag., Des Moines.

__________ 1975-1980. Iowa agricultural statistics. Iowa Dept. Ag., Des Moines.

Kimball, J. W. 1949. The crowing count pheasant census. J. Wildl. Manage. 13:101-120.

Klonglan, E. D. 1955. Factors influencing the fall roadside pheasant census. J. Wildl. Manage. 19:254-262.

__________ 1955. Effectiveness of two pheasant flushing bars under Iowa conditions. Iowa State College. J. Sci. 30:287-294.

__________ 1955. Pheasant nesting and production in Winnebago County, Iowa, 1954. Proc. Iowa Acad. Sci. 62:626-637.

__________, R. L. Robbins and B. L. Ridley. 1959. Evaluation of effectiveness of pheasant flushing bars in Iowa hayfields. Iowa Acad. Sci. 66:534-552.

Kozicky, E. L. and G. O. Hendrickson. 1956. Pheasant nesting and production in Winnebago County, Iowa, 1940 Versus 1954. Iowa Acad. Sci. 63:669-680.

NOAA. 1963-1980. Climatological data. National Climatic Center, Asheville, N.C. 74(5)-91(5).

Ridley, B. L. 1957. Nesting behavior of the ring-necked pheasant. Ph.D. Thesis. Iowa State College, Ames. 95pp.

Roslien, D. J., P. L. Fore and A. O. Haugen. 1962. Blood parasites in relation to pheasants and quail in Iowa. Iowa Acad. Sci. 69:239-244.

Scott, T. G. and T. S. Baskett. 1941. Some effects of the 1940 Armistice Day storm on Iowa's wildlife. Iowa Bird Life. 11:22-29.

Zar, J. H. 1979. Biostatistical analysis. Prentice-Hall Inc., Englewood Cliffs, New Jersey. 620pp.

UNION-ADAIR AREA

STUDY TITLE: Post-hunting season winter pheasant census on the Union-Adair Pheasant Study Area

OBJECTIVE: Monitor long-term pheasant population fluctuations on the Union-Adair (southern Iowa) Study Area.

ABSTRACT: An analysis of ring-necked pheasant (*Phasianus colchicus*) direct winter counts on the Union-Adair Research Area in southwestern Iowa revealed generally high pheasant indices during the 1960's and lower indices during the 1970's. Direct winter count data from 1957 to 1980 was negatively correlated ($r = .70$, $P = .0015$) with average row crop acreages in Union and Adair Counties. Direct winter count data was positively correlated with the number of broods ($r = .62$, $P = .03$) and the total number of pheasants ($r = .68$, $P = .015$) observed on the Union-Adair Research Area August Roadside Census Route. A positive correlation ($r = .38$, $P = .03$) was observed between average May temperatures and chicks per hen in August. While pheasant habitat conditions on the Union-Adair Area have deteriorated substantially during the past 2 decades, 56.9% of the Union-Adair Area still provided potential pheasant nesting habitat in 1980.

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INTRODUCTION

Ring-necked pheasants were successfully introduced into northern Iowa about 1900, but massive stocking efforts throughout the state over the next 5 decades failed to establish appreciable numbers in southern Iowa (Farris et al. 1977:10-14). Failure to successfully establish pheasants in southern Iowa was variously attributed to high temperatures during the nesting season, low calcium levels in the soil, unsuitable cover conditions, or poorly-adapted broodstock.

In 1953, fall roadside pheasant census data revealed a rather dramatic, and unexpected, increase in pheasant numbers in an isolated area in Union and Adair Counties in southwestern Iowa. A 5-year experimental pheasant trapping and transplanting project was began in 1955 to see if stock from this area could be used to establish new populations elsewhere in southern Iowa (Farris et al. 1977:14). While these stocking efforts ultimately proved successful, a satisfactory explanation for the high pheasant numbers in Union and Adair Counties was still unknown. Therefore in 1957, a 3-year study was initiated to investigate this phenomenon. Eugene Klonglan, an Iowa State University student, was selected to conduct the study.

Klonglan (1962:1-2) selected a 2,480 acre tract of rolling, privately-owned farmland in Union and Adair Counties for his study area. Klonglan reported pheasants on the Union Adair Pheasant Research Area were as numerous as in northern Iowa, exceeding 400 birds per square mile in early fall. He found most aspects of pheasant production were quite similar in both northern and southern Iowa. He noted the increase in pheasants in southwestern Iowa followed 5 years of heavy agricultural lime application in an area historically deficient in calcium. He concluded the sudden increase in the formerly low population in the isolated southwestern Iowa area likely resulted from a simultaneous favorable combination of several environmental conditions.

Crowing cock counts, spring and summer roadside routes, and direct winter counts initiated by Klonglan on the Union-Adair Research Area during the 1950's were continued by Iowa Conservation Commission field personnel during the 1960's and 70's. Data from spring and August surveys on the Union-Adair Research Area was combined with data from other survey routes to provide an index to regional and statewide pheasant population trends (George and Humburg 1976; Wooley et al. 1978).

Direct winter counts were continued on the Union-Adair Research Area in order to provide a long-term direct count of post-hunting season pheasant numbers that could be related directly to habitat changes, weather variables, and effects of hunting on a specific study area. It was felt that this information would serve to supplement regional and statewide pheasant population trend information obtained from crowing and roadside surveys and perhaps provide a more indepth evaluation of pheasant population dynamics than could be obtained from statewide surveys.

METHODS

Data from pheasant population surveys on the Union-Adair Research Area were compiled and analyzed by standard regression and correlation procedures (Zar 1974:198-280). Methodology for these surveys was as follows:

1) Direct Winter Counts (1957-1980) - The pheasant population remaining on the study area after the close of the hunting season in December or early January was censused annually by a direct count of the entire area. During the 1957-1960 period the census area totaled 2,480 acres; during the 1965-1980 period the census area was redefined as 2,520 acres (Fig. 1). Counts were made under conditions of deep snow (more than 4 inches), low temperatures (below 20° F) and considerable wind (10 mph or more). Under these conditions, pheasants were found only in the heaviest cover, particularly farm groves and brushy waste areas, waterways, fencerows and ditches. Since all of the pheasants were concentrated in heavy cover, they were easier to count, and it was not necessary to check large, open wind-swept fields.

2) Spring Crowing Cock and Roadside Routes (1962-1977) - These surveys were conducted annually from 15 April to 1 May by Iowa Conservation Commission personnel. Crowing routes consisted of 10 stops, 1 to 1½ miles apart at which an observer recorded all cock calls heard in a 2 minute interval. Counts began 45 minutes before sunrise. Upon completion of the crowing route, the observer conducted a 10-mile return roadside pheasant count and recorded all cocks and hens. Weather had to be calm and clear, with no rain in the previous 24 hours and wind below 8 mph. The Union-Adair Research Area Spring Route (Fig. 2) was one of 87-205 similar routes used statewide as an index to pheasant breeding populations.

3) August Roadside Routes (1965-1980) - This survey was conducted annually from 1-15 August by Iowa Conservation Commission personnel. Observers drove a continuous 30-mile route at approximately 20 mph recording cocks, hens without broods, hens with broods, and the number and age of young as well as other game species. Weather had to be clear and calm with heavy dewfall. Counts began at sunrise. The Union-Adair Research Area August Roadside Route (Fig. 2) was one of 101-205 routes used statewide to determine hatching chronology, percent successful females, brood size, and other production parameters. The statewide survey also served as an index to potential harvest.

Cover maps and crop acreage data prepared by previous researchers, current aerial photographs and on-site inspections were used to document long-term habitat changes on the Union-Adair Research Area. Since row crop acreage data for the Union-Adair Research Area was not recorded for all years, an average of row crop acreage data for Union and Adair Counties (Iowa Department of Agriculture 1957-1980) was used for correlation analysis. May cooling degree days (the sums of the negative departures of average daily temperatures from 65° F) recorded at Greenfield, Iowa (NOAA 1965-1980) were also used in correlation analysis.

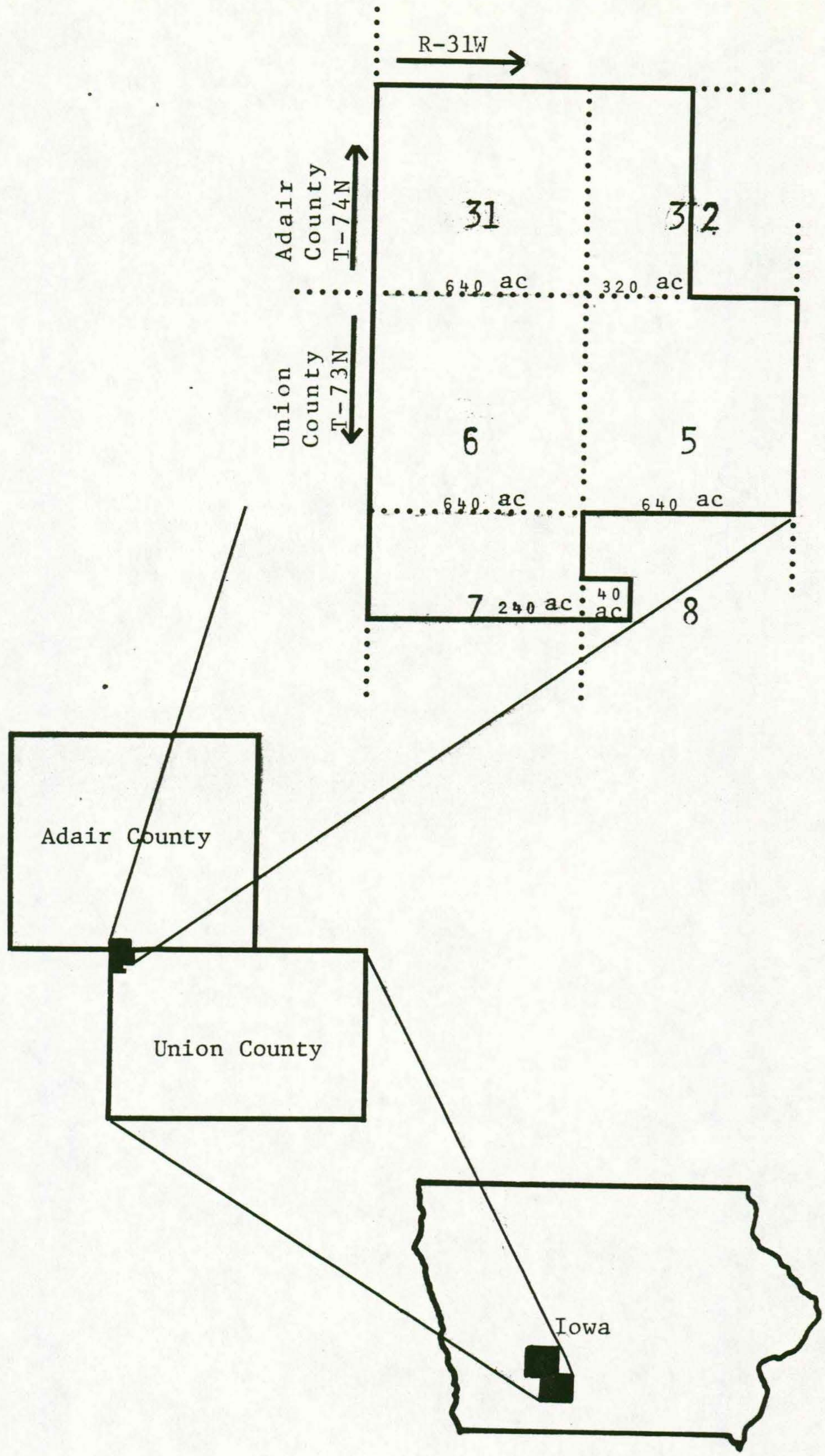

Fig. 1. Location of 2,520 acre Union-Adair Winter Pheasant Census Area in Union and Adair Counties, Iowa.

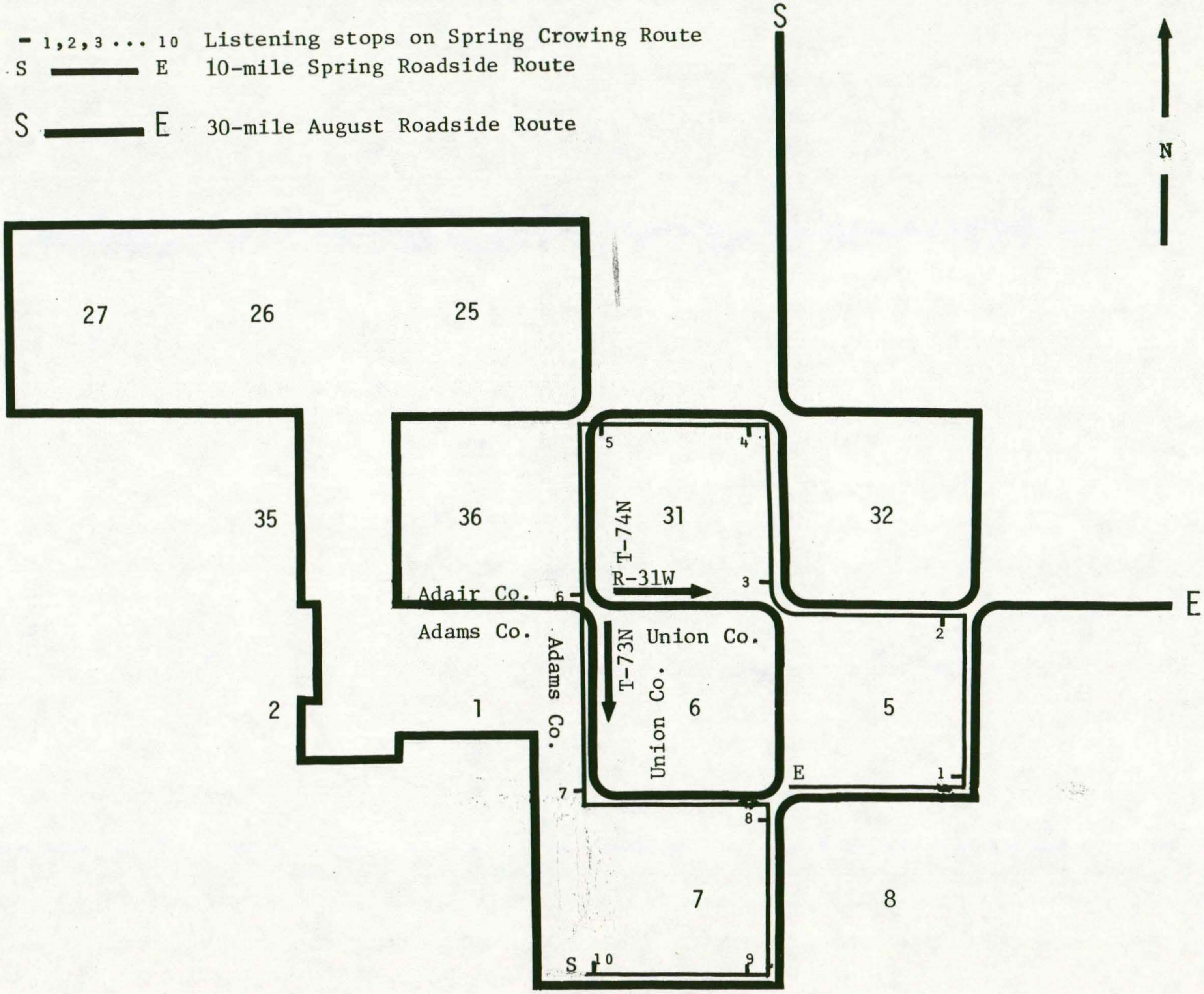

Fig. 2. Location of the Union-Adair Pheasant Research Area Spring Crowing and Spring and August Roadside Census Routes in Union, Adair, and Adams Counties, Iowa.

RESULTS AND DISCUSSION

Direct winter counts on the Union-Adair Research Area revealed an annual mean of 228 pheasants per section during Klonglan's initial 4-year study in the late 1950's (Fig. 3). While winter counts were conducted only sporadically during the 1960's, an all-time high of 325 birds per section was apparently reached in 1968. This was followed by a dramatic decline during the late 1960's and early 1970's ultimately reaching a low of 15 birds per section in 1977. While there was some recovery during the period 1978-1980, winter counts on the Union-Adair Area have averaged only 100 birds per section in recent years, considerably below those levels recorded prior to 1970.

Spring crowing counts and spring roadside counts from the Union-Adair Research Area (Fig. 4, 5) indicate generally low pheasant indices in 1962 and 1963 -- 2 years when there were no direct winter counts or August roadside counts for comparison. Spring roadside counts, August roadside counts, and winter direct counts all indicate generally high pheasant indices during the 1960's and lower indices during the 1970's (Fig. 3, 5, 6). Direct winter count data from 1957 to 1980 was significantly correlated with the preceding season's August broods ($r = .62$, $P = .03$) and total August pheasants ($r = .68$, $P = .015$). Spring crowing count data (Fig. 4) appears to indicate a greater pheasant population recovery during 1978 and 1979 than is shown by the other surveys.

While Farris et al. (1977:51) reported a negative relationship between May cooling degree days in Central Iowa and the statewide index of chicks per hen in August ($r = -.79$, $P < .01$), we found no relationship ($P > .10$) between May cooling degree days at Greenfield and chicks per hen in August on the Union-Adair Research Area. We also found no relationship ($P > .10$) between May cooling degree days and total August pheasants or August broods. A positive correlation ($r = .38$, $P = .03$) was observed between average May temperatures at Greenfield and chicks per hen in August on the Union-Adair Research Area.

Severe winter weather during the 1961-62, 1968-69, and 1975 seasons (Farris et al. 1977:46-48) may have been responsible for some of the pheasant losses reported in those years (Fig. 4-6). However, habitat conditions undoubtedly had a greater long-term effect on pheasant numbers on the Union-Adair Area.

Klonglan (1962:2) stated cover was not a limiting factor for pheasants on the Union-Adair Area. He reported nesting cover was more plentiful and winter cover generally better than in northern Iowa. However, he also indicated recent changes in land use pointed toward a decrease in good pheasant habitat.

The Soil Bank Program that provided excellent pheasant habitat in some parts of Iowa during the late 1950's and early 1960's (Farris et al. 1977:78) apparently had little effect on pheasant numbers on the Union-Adair Area since Klonglan (1962:118) reported only one 5-acre Soil Bank field on the entire 1,520 acre nesting study area in 1957 and 1958.

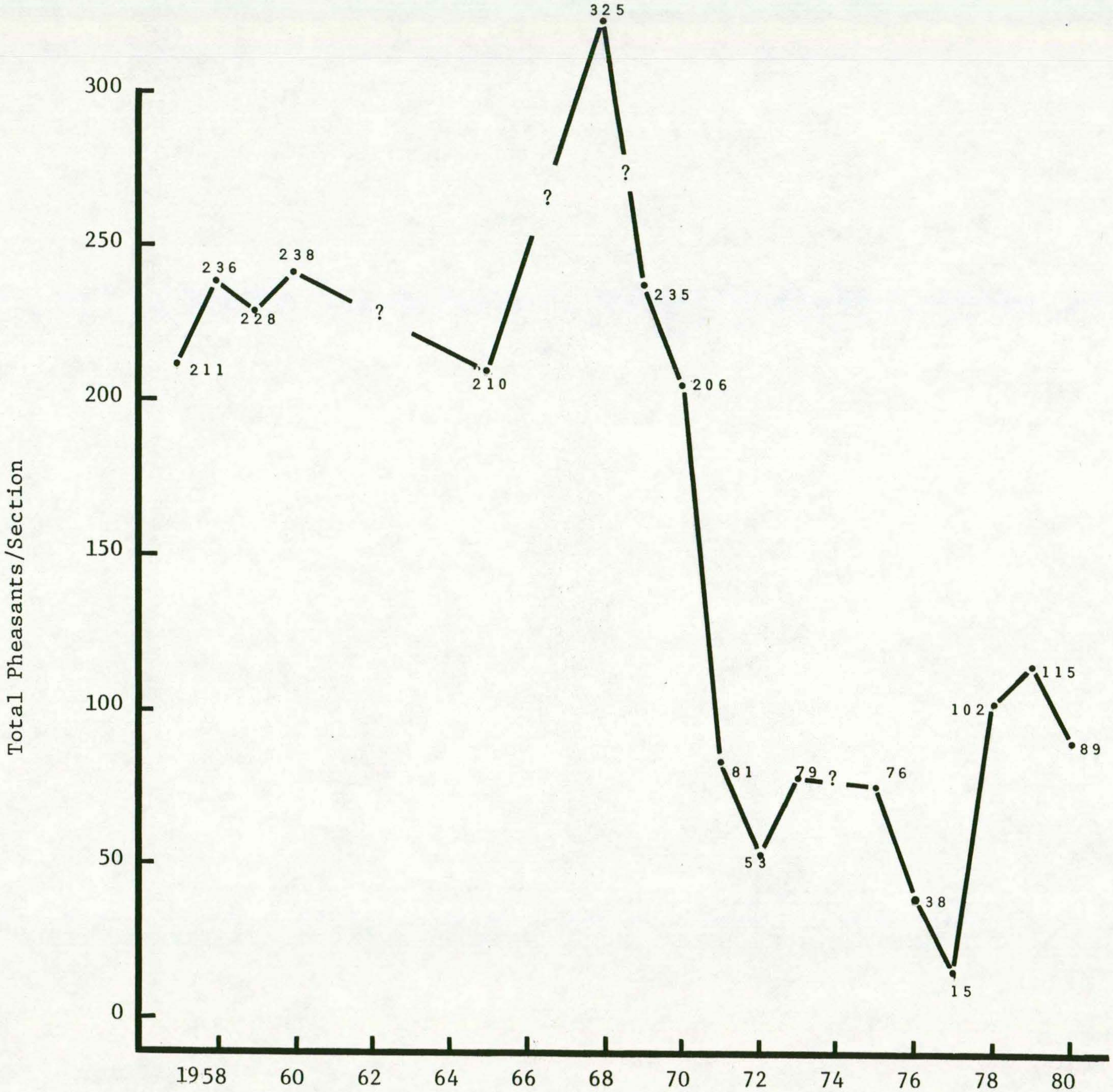

Fig. 3. Total pheasants observed per section during direct winter counts on the Union-Adair Research Area 1957-1980.

Fig. 4. Total cock calls heard on the 10-stop Union-Adair Research Area Spring Crowing Route 1962-1979.

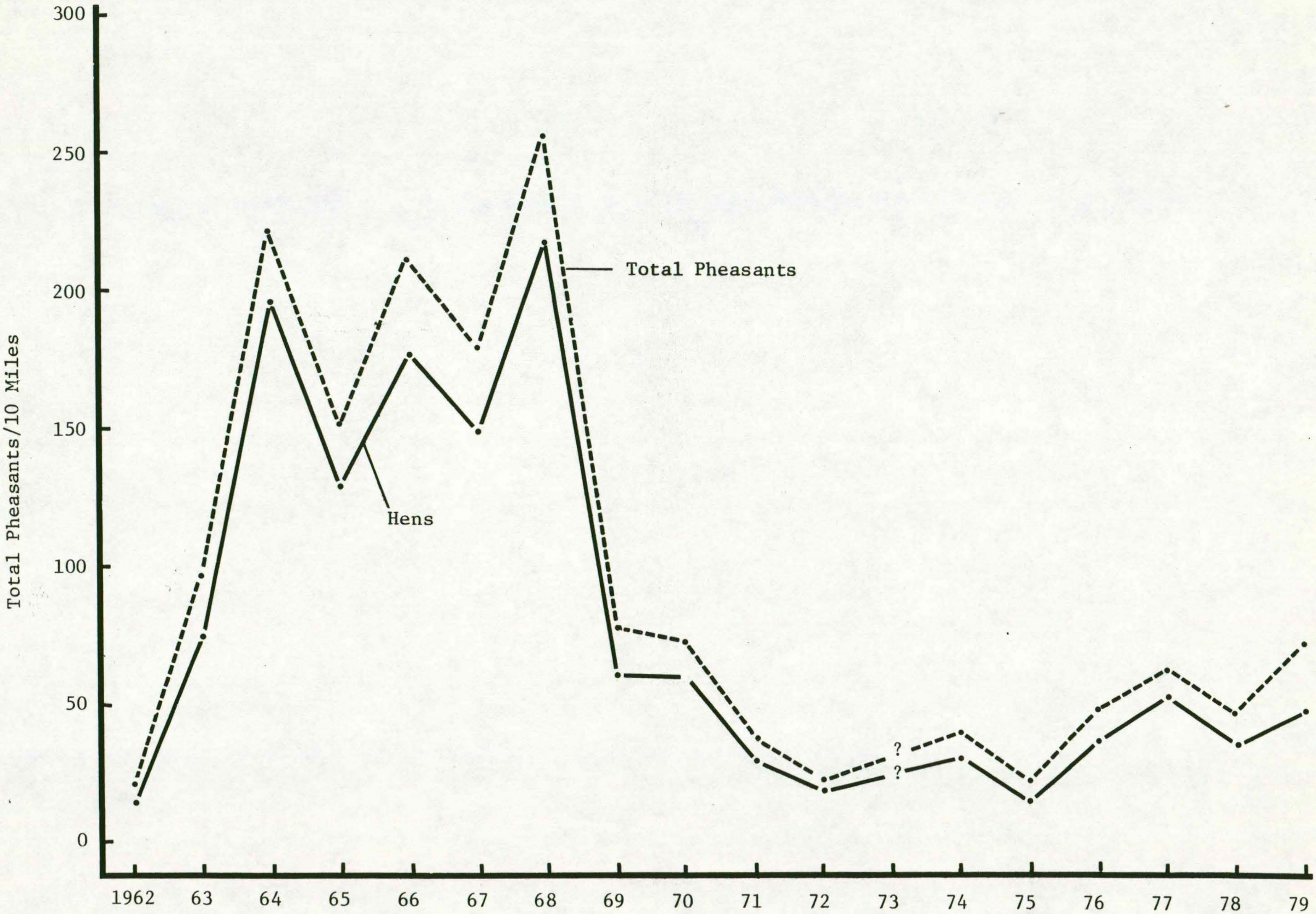

Fig. 5. Total pheasants (cocks and hens) observed per 10 miles on the Union-Adair Research Area Spring Roadside Route 1962-1979.

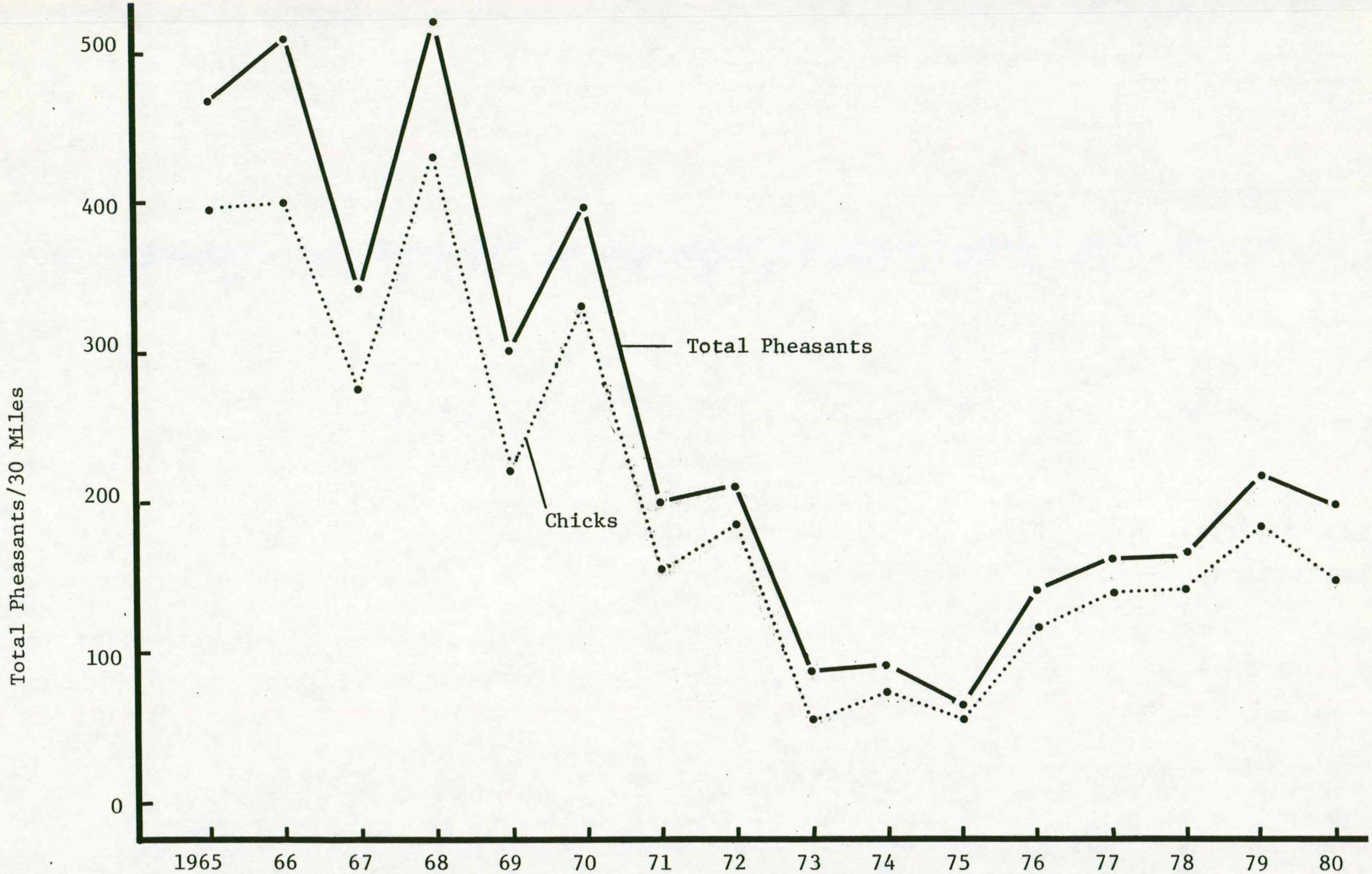

Fig. 6. Total pheasants (adults and chicks) observed per 30 miles on the Union-Adair Research Area August Roadside Route 1965-1980.

Klonglan (1962:104-108) noted the Union-Adair Area possessed one striking advantage over the Winnebago Area in northern Iowa with respect to potential nesting cover. He noted lightly-grazed, bluegrass seed-production pastures comprised nearly 22% of the total area. These pastures were heavily used by pheasants as nesting and brood-rearing habitat. Unfortunately, the market for bluegrass seed declined during the late 1950's and early 1960's and this management practice was discontinued by local farmers. This loss of nesting habitat along with the loss of other cover undoubtedly contributed to the pheasant population decline observed during the late 1960's and early 1970's (Fig. 3, 4, 5, 6).

Potential nesting cover as a whole declined 12.4% on the Union-Adair Area between 1957 and 1980 while row crop acreage increased 31.0% (Table 1). Direct winter count data from 1957 to 1980 was negatively correlated ($r = .70$, $P = .0015$) with average row crop acreages in Union and Adair Counties. While pheasant habitat conditions on the Union-Adair Area have deteriorated substantially during the past 2 decades, it is important to note that in 1980, 56.9% of the Union-Adair Area still provided potential nesting habitat while only 9.7% of the Winnebago Area in northern Iowa could be described as potential nesting habitat.

Table 1. Land use on the Union-Adair Pheasant Study Area.

Cover Type	1957[3] Acres	1957[3] %	1980 Acres	1980 %	% Change
Row Crop	469.0	30.9	614.6	40.4	+31.0
Corn	434.8	28.6	492.8	32.4	+13.3
Soybeans	34.2	2.3	121.8	8.0	+256.1
Potential Nesting Cover	987.2	64.9	864.7	56.9	-12.4
Hayfields	201.3	13.2	181.9	12.0	-9.6
Oats	255.2	16.8	41.6	2.7	-83.7
Pasture	371.3	24.4	524.5	34.5	+41.3
Other[1]	159.4	10.5	116.7	7.7	-26.8
Other[2]	63.8	4.2	40.7	2.7	-36.2
	1,520	100	1,520	100	-

[1]Includes rye, waterways, idle areas, pond watersheds, fencerows, and road ditches.
[2]Includes road bed, field lane, farm groves, lots, and buildings.
[3]1957 data from Klonglan (1962:86)

Long-term studies on the Union-Adair Research Area again show the importance of suitable, undisturbed nesting cover in maintaining high pheasant populations.

LITERATURE CITED

Farris, A. L., E. D. Klonglan and R. C. Nomsen. 1977. The ring-necked pheasant in Iowa. Iowa Cons. Comm., Des Moines. 147pp.

George, R. R. and D. D. Humburg. 1976. Upland wildlife populations in Iowa 1975. Iowa Wildl. Res. Bull. 19. Iowa Cons. Comm., Des Moines. 30pp.

Iowa Department of Agriculture. 1957-1972. Annual farm census. Iowa Dept. Ag., Des Moines.

__________ 1975-1980. Iowa agriculture statistics. Iowa Dept. Ag., Des Moines.

Klonglan, E. D. 1962. Ecology of pheasant production in southwestern Iowa. Ph.D. Thesis, Iowa State Univ., Ames. 343pp.

NOAA. 1963-1980. Climatological data. 74(5)-91(5) National Climatic Center. Asheville, North Carolina.

Wooley, J. B., D. D. Humburg, A. L. Farris, R. R. George and J. M. Kienzler. 1978. Analysis of ring-necked pheasant population surveys. Iowa Wildl. Res. Bull. 24. Iowa Cons. Comm., Des Moines. 22pp.

Zar, J. H. 1979. Biostatistical analysis. Prentice-Hall, Inc., Englewood Cliffs, New Jersey. 620pp.