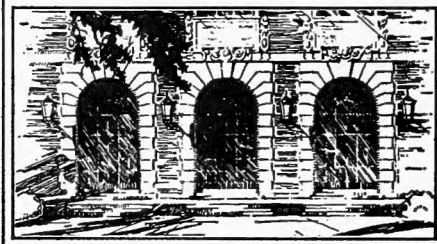




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ILLINOIS NATURAL
HISTORY SURVEY



ILLINOIS PHEASANTS: POPULATION, ECOLOGY, DISTRIBUTION, AND ABUNDANCE, 1900-1978

Richard E. Warner

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State of Illinois
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Illinois Pheasants: Population, Ecology, Distribution, and Abundance, 1900-1978

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The history of the ring-necked pheasant (*Phasianus colchicus*) spans nearly a century in the Prairie State. Because this native of China is intimately associated with agriculture, trends in the bird's abundance have reflected patterns of land use and the general status of wildlife habitat in Illinois.

The pheasant is important for aesthetic, economic, and recreational reasons—particularly since the Illinois legislature established a season for hunting cock pheasants in 1915. In recent years this sport has created annually over one million recreational trips afield; revenue generated in Illinois by pheasant hunters, exclusive of license fees, has approached \$20 million per year (Labisky 1975:3).

This publication reviews the establishment of pheasants in Illinois, subsequent patterns of distribution and abundance, and the effects of farming practices on pheasant populations; it considers pheasant numbers and distribution as monitored by annual estimates of cock harvests and by Rural Mail Carriers' Censuses (RMCC), which have been conducted every 5 years since 1958 (Labisky 1975); and it presents data from the Sibley Study Area (SSA) on trends in hunter success, numbers of pheasants, and land use. The SSA in east-central Illinois has been an important source of data on pheasants since the late 1940's.

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POPULATION ECOLOGY

Natality and Mortality

Hen pheasants reproduce one brood of chicks per year. The average nest of 8-10 eggs typically hatches in mid-June (Robertson 1958:76, Labisky 1968:75). During a normal life span of about 2 years (Wagner et al. 1965:69, Etter 1966:2-3) pheasants are exposed to factors that regulate survival and reproduction. Some of the factors that limit the distribution and abundance of ring-neck populations in Illinois follow.

Habitat

Unlike many avian species, the pheasant is nonmigratory; annual movements of ring-necks tracked by radio telemetry in east-central Illinois (Warner 1979) have typically encompassed a radius of less than 1 or 2 miles.

Certain features of habitat—the amount, growth forms, juxtaposition, and frequency of disturbance of vegetation—are particularly critical to pheasants for reproduction. In Illinois, fields of tame hay, hay pasture, and uncultivated areas with grassy and weedy forbs constitute prime nest cover (Robertson 1958:57, Labisky 1968:295, Joselyn et al. 1968:217). Oat fields planted as a nurse crop for legumes (alfalfa and red clover) and clipped in midsummer provide areas for broods to forage for insects (Warner 1975). The amount of safe nest and brood rearing cover may be a principal factor that limits numbers of pheasants in most parts of Illinois (Joselyn et al. 1968, Warner 1979).

Pheasants find protection from winter elements primarily in residual, herbaceous, and woody vegetation. In some sectors of the state, as in the east-central cash grain belt, protective cover in winter is nearly absent (Robertson 1958:19, Warner & David 1978). However, severe blizzards—precipitation accompanied by driving winds and below-zero (-10° - 20° F) temperatures—are less frequent in Illinois than in more northern Midwestern and Plains States (Labisky et al. 1964:12-13). In Illinois, pheasant mortality from winter storms has rarely been extensive (Robertson 1958:20, Warner & David 1978).

Waste grains scattered by harvest machinery is the mainstay of the adult pheasant diet in Illinois (Robertson 1958:18). Pheasants normally find waste grains even in

plowed fields and deep snow (Leedy & Hicks 1945:57, Warner & David 1978:118).

Predators

Pheasants are particularly vulnerable to predation during nesting; the destruction of eggs by ground squirrels (*Citellus tridactylus*), skunks (*Melephitis memphitis*), raccoons (*Procyon lotor*), farm pets, farm machinery, and avian predators is relatively common (Labisky 1968:278, Joselyn et al. 1968:227). However, by initial or re-nesting attempts, up to 50-75 percent of the hens may be successful in hatching a nest (Robertson 1958:79, Labisky 1968:41) if nest cover is available. Juvenile pheasants are vulnerable to predation, particularly in the early weeks of life (Errington 1945:197).

Although some pheasants fall prey to foxes, hawks, owls, and other predators, there is no evidence that predation is a primary limiting factor to pheasant populations (Errington & Hamerstrom 1937, Allen 1954:250) when suitable nest cover exists.

Pheasant Distribution

Odum (1971:113) observed, "quite different factors may limit abundance in the center of ranges and distribution at the margins . . ." Although numerous pen-reared pheasants were planted in far western and southern counties of Illinois in the early 1900's (discussed later in this manuscript), self-reproducing populations have not become established (Labisky et al. 1964); yet habitat suitable for reproduction by pheasants appears relatively abundant in most unoccupied areas (Illinois Cooperative Crop Reporting Service 1978).

Several more recent attempts have been made to establish pheasants south of 39° north latitude in Illinois (Klimstra & Hankla 1953, Ellis & Anderson 1963, Anderson 1964, 1968). Robertson (1958:7) noted, "Recent observations of an experimental release in southern Illinois . . . re-emphasize the futility of stocking pheasants of the regular game farm strain . . ." Yeatter (1953) postulated that higher temperatures during incubation limited the southward spread of self-maintaining populations.

Experimental releases in western counties have generally failed, although establishment of localized populations (from relocated wild pheasants) may have succeeded (Brady 1974, Vinzant 1978).

The fertility and composition of biogenic salts vary among soil types and land formations in Illinois (Fehrenbacher et al. 1967, Jones et al. 1968). Allen (1954:20) noted, "Good soils yield the best crops, both in quantity and quality of practically everything that lives upon them."

Anderson & Stewart (1969:269) concluded:

"If inorganic ions are limiting the distribution and abundance of pheasants in the Midwest, combinations of two or more elements . . . are possibly—if not probably—involved, and ions comprising such combinations possibly differ from one region to another."

A combination of stresses, such as unfavorable climate and the ingestion of biogenic salts, no doubt lowers the resistance of pheasants to extrinsic factors in marginal and unoccupied areas (Selye 1949:837; Labisky et al. 1964:13).

Pheasant Stocking

Early releases of pheasants in Illinois led to the establishment of wild (self-reproducing) populations. However, present-day stocking of pheasants to increase densities has been largely futile (Besadny & Wagner 1963). Errington (1945:202), with reference to stocking, remarked, "It may be fruitless if done indiscriminately and may have further disadvantages of being expensive, giving a false impression of accomplishment, and diverting attention from basic problems."

Pheasant numbers are regulated by certain factors of habitat. The release of pheasants in a given area where self-maintaining populations of pheasants exist can only result in compensatory increases in mortality. Hence, released pen-reared stock experience very low survival (high mortality) and typically negligible reproduction (Besadny & Wagner 1963).

Hunting

The male pheasant is a polygamous breeder, often associated with harems of 6-12 hens over the reproductive season (Labisky 1961). Harem formation results in the establishment of territories and maintenance of high fertility of females (Robertson 1958:47-48).

With polygamous breeding, the harvest of a high proportion of the available roosters by hunters does not inhibit successful reproduction by hens (Labisky 1961:13-14). Even in situations where more than 80 percent of the cocks are shot, egg fertility remains high (Allen 1947). In recent years (under existing constraints of seasons, bag limit, and low populations), less than one-half of the roosters have been bagged by hunters in east-central Illinois (Warner 1978:6). Greater proportions of cocks are typically harvested by hunters in years when pheasant numbers are relatively high than when numbers are low.

Thus, long-term trends in pheasant abundance are determined by environmental factors—principally climate, weather, soils, and land use—rather than the number of cocks taken in the hunter's bag.

METHODS

The early establishment and expansion of range occupied by pheasants in Illinois is reviewed in this manuscript from previous publications (Robertson 1958), unpublished records, and personal interviews. The findings of previous RMCC's were obtained from Greeley et al. (1962), Labisky & Anderson (1965), and Labisky (1975).

Sibley Study Area (SSA)

The relative abundance of pheasants and land use data for the SSA, located in Ford and McLean counties (Fig. 1), are presented in this manuscript. This area is

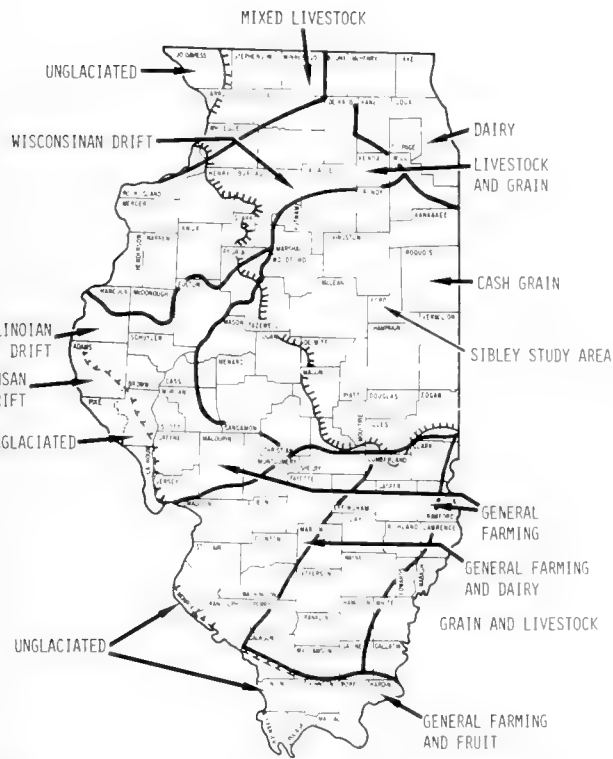


Fig. 1.—Major farm types by region in Illinois (after Preno & Labisky 1971, Ross & Case 1956), and location of Sibley Study Area.

intensively farmed for cash grains (Fig. 2); dominant topes are about 0.4 percent and do not exceed 10 percent (Fehrenbacher et al. 1967). Depending upon drainage, subsoils range from loam till to silty clay and clay till or drift. The dark-colored, highly fertile prairie soils were developed on this loess over glacial drift of the last substage of the Wisconsin glacial period (Fehrenbacher et al. 1967).

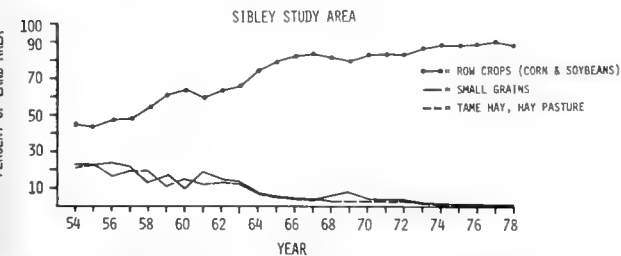


Fig. 2.—Land use by cover type on the Sibley Study Area, 1954-1978.

Land use on the SSA was determined annually by marking field types and boundaries on 8-inch aerial photographs and using an overlay grid to measure habitat acreage.

The abundance of pheasants on the SSA was monitored annually by several methods: spring breeding counts in May were made by recording all pheasants observed while driving transect routes, brood counts in July and August were made by recording all pheasants seen on roads and roadsides, hunter harvests were surveyed the opening weekend of upland game hunting

season, and sex ratio and aerial counts (weather permitting) were made in late winter. Indices from the various counts were combined to calculate densities of pheasants per square mile (Fig. 3).

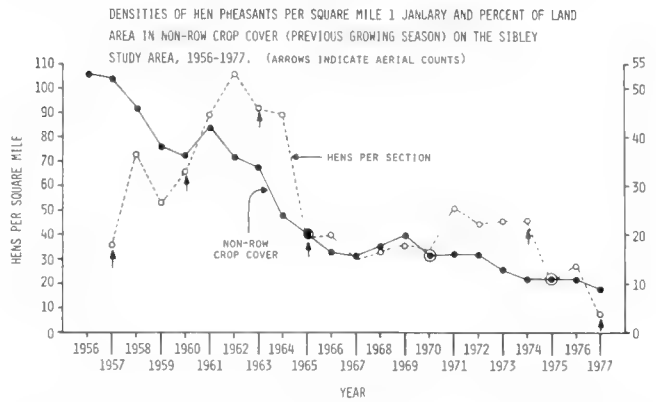


Fig. 3.—Densities of hen pheasants per square mile (January) and percent of land in nonrow crop farmland (previous growing season), on the Sibley Study Area, 1956-1977. (ARROWS INDICATE AERIAL COUNTS)

Rural Mail Carriers' Census (RMCC)

The 74 northernmost counties of Illinois, which encompass the known range of wild pheasants, were censused with the volunteer assistance of rural letter carriers during 24-28 April 1978.

Census cards with instruction packets were mailed to 623 post offices—1,178 rural letter carriers. As in previous RMCC's conducted at 5-year intervals (Labisky 1975), letter carriers drove their routes between 0700 and 1200 hours (CST) over the 5-day period and recorded on a census card for each route: name, post office, rural route number, length of route in miles, counties and political townships transected by the route, and cocks and hens observed. Even if no pheasants were observed, rural letter carriers were asked to return the census card. Follow-up mailings were not made to post offices if census cards were not returned.

Census data were encoded on IBM cards for computer manipulation. Programs were developed to perform calculations using the University of Illinois' "CYBER" interactive computer system. Indices of abundance were computed for townships, counties, and the entire range by dividing the number of pheasants observed by miles driven; multiplication of the dividend by 100 yielded an index of pheasants observed per 100 miles. An Illinois Geological Survey computer program ("Illioplot") was modified to print maps by plotting numerical and symbolic indices of abundance in each township.

If a given rural letter delivery route transected two or more townships (or counties), the pheasants observed and miles driven were divided equally and assigned to townships reported on the census card.

FINDINGS

Nineteenth-Century Agriculture

When the first releases of pheasants were made in Illinois (during the late 1800's), the landscape into which the exotic ring-neck was introduced had been radically

altered by post-Civil War agricultural development (Vestal 1931, Schlebecker 1975). By 1880 nearly all prairie sod in Illinois had been plowed for cultivation (Yeatter 1957).

With the elimination of diverse prairie flora, habitat available to native fauna was modified and reduced. Prairie grouse (*Tympanuchus cupido*) occupied an ecological niche in the prairie community similar to the ground-nesting pheasant. Following a peak in numbers in the mid-1800's (Yeatter 1957), the greater prairie chicken was extirpated from much of its range in Illinois by intensified agriculture (Yeatter 1943:379). During this era of receding populations of prairie chickens, the ring-necked pheasant became established in the Prairie State.

A historical sketch of a farm on the SSA illustrates the dynamics of this transition in Illinois: In 1880, Curtis Henry Stein, a tenant farmer on the SSA aided by neighbors, hitched a team of oxen to a cable winch and V-plow, and drained and plowed the prairie marsh located on his "south 40."

In 1926, Walter O. Stein, grandson of Curtis, rented his first farm in the area. A knoll on his farm served as a spring booming ground for prairie chickens. However, before Walter Stein completed a 4-year rotation of oats-clover-pasture-corn on his farm, the prairie chickens were gone. Mr. Stein recollected, "We started seeing pheasants on our farm at about the time we saw no more prairie chickens."¹

Early Pheasant Releases

Pheasants were first successfully released in the United States in Oregon, New England, and the North Atlantic States after 1880 (Walcott 1945:3; Bennett 1945:11). The initial known release in Illinois was shortly thereafter; numerous individuals attempted releases in Illinois around the turn of the century (Robertson 1958:3). In 1906 the State Game Department received 5,500 pheasant eggs (Phillips 1928:44) to be hatched and distributed to sportsmen's clubs and farmers. State-proffered releases flourished from 1906 to 1918 and then were discontinued until 1928 (Osborne 1943:12, Robertson 1958:3), when the newly formed Department of Conservation again made stock for releasing available to the public. Robertson (1958:4) estimated that all releases, state and private, made in Illinois up to 1928 totalled around 10,000 pheasants. Leopold (1931:106) indicated that most known releases of pheasants through the mid-1920's were in northeastern, central, and western counties, and in Mississippi lowlands along the southern two-thirds of the state.

Genetic Ancestry

Based on the wide color variation of wild pheasants, Yeatter (1953:5-6) hypothesized that the ring-neck populations in Illinois have a diverse ancestry. Robertson (1958:3) noted that some stock was shipped from the Pacific Northwest; other populations were progeny of

captive breeding birds in Europe. The diversity of introduced stock indicates that wild pheasants in this state have genetic ancestry from at least four types of pheasants (Labisky 1968:3): *P. colchichus colchicus* (Caucasus pheasant of black-necked group); *P. c. torquatus* (Chinese ring-necked pheasant of grey-rumped group); *P. c. mongolicus* (Kirghiz pheasant of kirghiz group); and *P. versicolor* (Japanese green pheasant).

Range Expansion 1900-1930

From 1906 to 1909 Stephen A. Forbes directed a survey of land birds in Illinois (Forbes & Gross 1923:438-447); pheasants were not recorded on the list of species observed. However, shortly after 1910, small numbers of pheasants appeared in parts of their present range (Robertson 1958:7). By the 1920's systematic releases had been attempted in every county (McAtee 1929:5, Fig. 4) and patterns of establishment were becoming apparent. Leopold's game survey in 1928-1929 (Leopold 1931:106) indicated that wild populations were established in the northeastern counties—McHenry, Lake, Kane, Cook, Du Page, Will, and Kankakee—with peripheral populations in the adjacent counties of Boone and DeKalb. Scattered populations in the adjacent counties of Boone and DeKalb. Scattered populations also were noted in east-central counties (Leopold 1931:106). In an unpublished manuscript, Leopold mentioned the existence of scattered flocks along the Illinois River bottom west as far as Scott County, and along creeks and bottoms in Sangamon, Macoupin, and Greene Counties (Robertson 1958:10).

Pheasants were apparently increasing in numbers in east-central counties by the late 1920's. Walter O. Stein first observed pheasants around Sibley (Ford County) about 1927. Robertson (1958:10) in reviewing Christmas bird censuses from 1908 to 1929 near Rantoul (Champaign County) and Paxton (Ford County) noted that pheasants were sighted once in 21 counts; four were seen December 24, 1925 (Ekblaw & Ekblaw 1926:44).

Through the 1920's pheasants were absent from most northwestern, western, and southern counties. Dr. N. J. Huff, president of the Southern Illinois Sportsmen's Association, told Leopold (1931:109): "Pheasants do not thrive south of the 39th parallel. They have been planted in southern Illinois . . . for 15 years but are not established anywhere that I know of."

In the early 1930's the DOC typically released approximately 8,000 pheasants each year, and distributed an equal number of eggs to farmers and sportsmen (Robertson 1958:4). Distribution of eggs was curtailed after 1932, but in 1937 the Cooperative Chick Program was formed by the DOC to make day-old chicks available to sportsmen's clubs (Schwartz 1950:2, Robertson 1958:45). This program continues and resulted in the distribution of over 32,000 chicks in 1978 (R. V. Bauer, DOC, personal communication December 1978). Beginning in the 1930's state-proffered stock was distributed mainly to areas where pheasants were known to be established (Robertson 1958:7).

¹ Information regarding the Stein farm was acquired from a personal interview with Walter O. Stein on November 8, 1978.

Distribution and Relative Abundance, 1930-1940

In the late 1920's and early 1930's the wild pheasant range expanded in the northern counties and throughout the east-central sector. Scattered populations were found in west/southwest and east/southeast counties, adjacent to the established range.

This range expansion can be seen by comparing the distribution and abundance of pheasants as mapped in 1929 by Leopold (Fig. 4) and in 1937 by Mohr (Fig. 5). By the late 1930's a center of abundance was clearly defined, encompassing the northeastern counties—Boone, De Kalb, Du Page, Kane, Kendall, Lake, and McHenry (Fig. 5). Densities of pheasants in east-central Illinois (Ford and Livingston counties) may have approached the numbers in the northeastern sector. Yeatter believed that pheasants were relatively well established in Champaign and surrounding counties in the 1930's (Robertson 1958:10).

In this era, wild pheasants were most abundant in Illinois' dairy region, with moderate numbers in the highly fertile east-central grain farming region (Ross & Case 1956, Fig. 1).

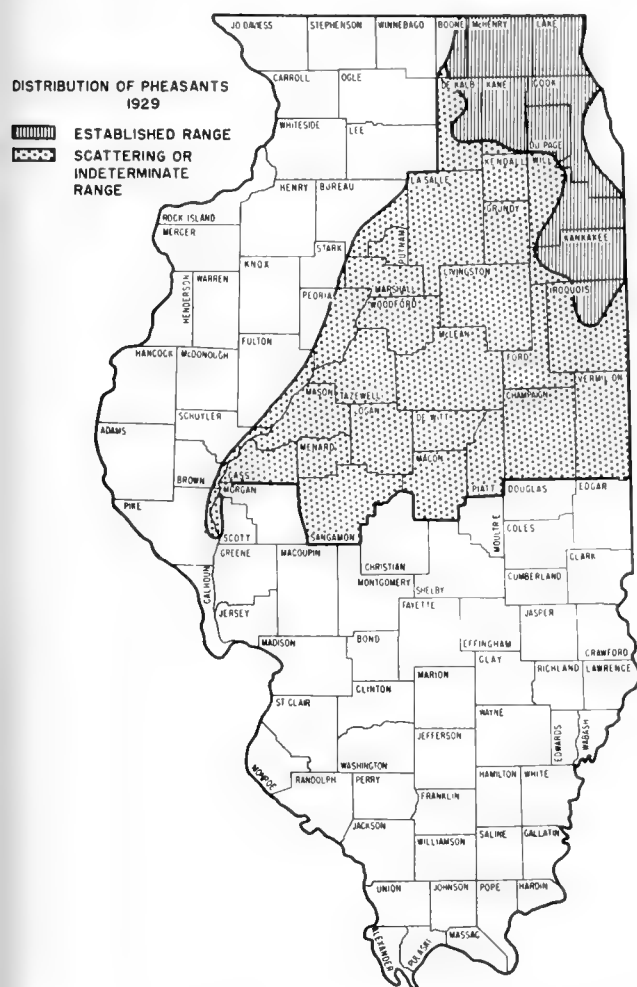


Fig. 4.—Distribution and abundance of pheasants in Illinois, 1929 (modified from Leopold 1931:106, Greeley et al. 1962:13).

Distribution and Abundance, 1940-1950

Following range expansion and rapid increase in numbers of pheasants in Illinois in the 1930's, pheasant populations suffered a notable decline, particularly from 1942 to 1945 (Robertson 1958:122). Declines occurred in most Midwestern states during this era (Kimball 1948:291-293, Allen 1953:125-128). In Illinois, the reduction in numbers has been partially attributed to adverse spring weather (Robertson 1958:122-123, Labisky et al. 1964:13).

In 1948, a second survey of hunter success in Illinois (Robertson 1958) (Fig. 5) suggested a state-wide upswing in numbers of pheasants since the early 1940's, particularly in the northeastern and east-central regions (Robertson 1958:120). From 1937 to 1948, both these centers of abundance expanded. Populations in peripheral areas of the range, however (notably along the southwestern and southern edges), appeared lower in the 1940's than in the 1930's.

Yeager (1947:8, 9) described pursuit of the ring-neck by hunters in the prime northeastern range in the late 1940's:

"In metropolitan Chicago, literally under the noses of 4,000,000 hurrying souls, there is some pheasant hunting . . . enough to take, within commuting distance of the Loop, 100,000 sportsmen afield . . . Cover of better quality or interspersed is rare . . . The several types of cover met all ring-neck needs: weed fields, ditch banks, and fencerows for nesting . . . dense thickets and briar patches for escape; and the best in cattail and slough-grass marsh for winter roosting."

During this era, ring-necks were widely hunted, particularly in northern and east-central counties; Livingston and De Kalb counties probably sustained the greatest densities of pheasants in the state (Yeatter & Yeager 1945:6, 36).

Distribution and Abundance 1950's

The surge in Illinois pheasant populations that began in the mid-to-late 1940's continued through the early 1950's. Robertson (1958:120) documented annual increases in numbers of pheasants on study areas in Stephenson, Winnebago, Kendall, De Kalb, Ford, and Livingston counties. A hunter survey in 1950 (Marquardt & Scott 1952, Greeley et al. 1962:14) suggested a moderate increase in numbers state-wide from 1948. The major centers of abundance continued to be north/northeastern and east-central counties. Hunter success in 1950 along the periphery of the established range was clearly improved over 1948 (Marquardt & Scott 1952, Greeley et al. 1962:14).

In 1951, the Illinois pheasant population may have peaked. Robertson (1958:120) estimated spring densities of about 60 pheasants per square mile in the northern range, and nearly 150 birds per square mile in representative portions of the east-central range (Ford and Livingston counties).

Pheasant numbers declined moderately in Illinois during the mid-1950's. A comparison of hunter success in

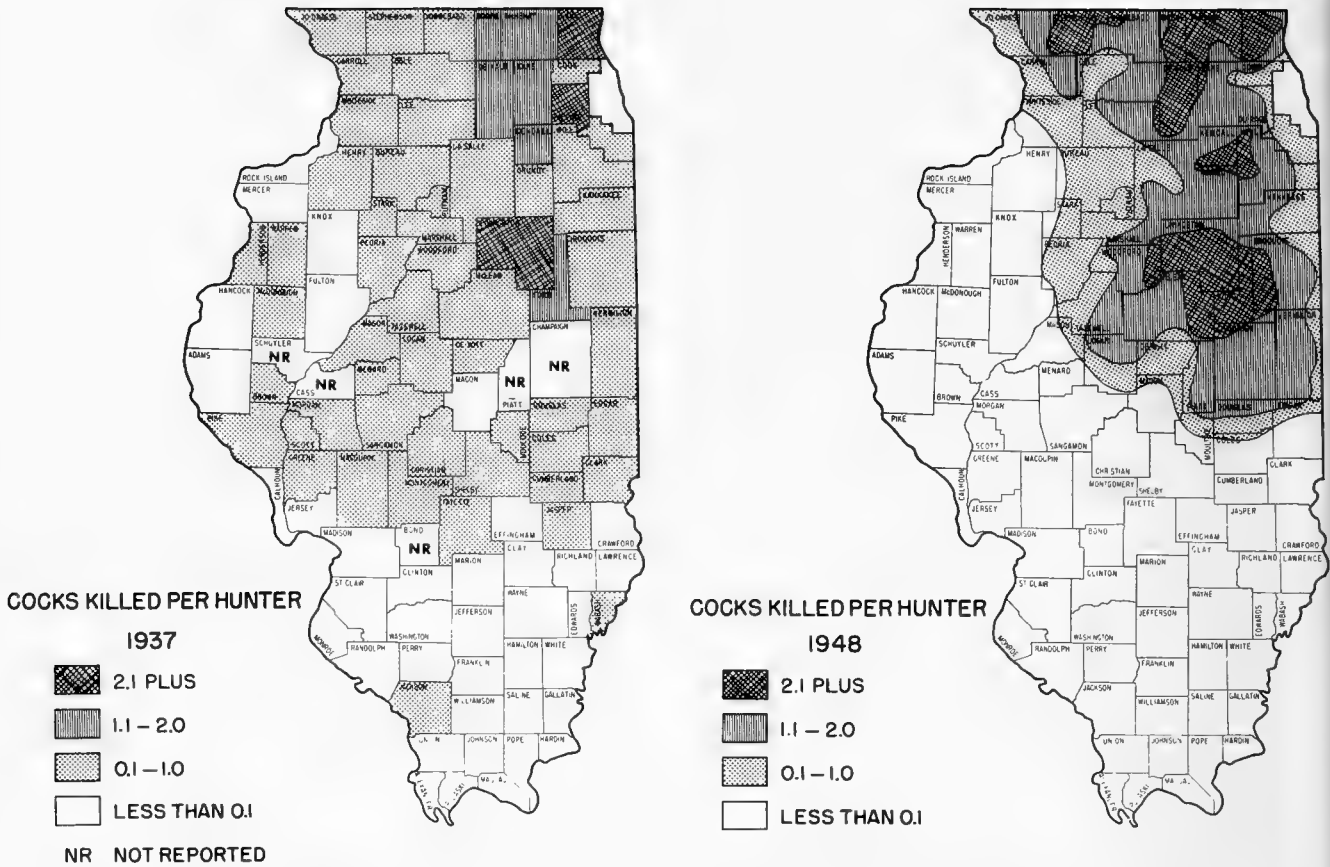


Fig. 5.—Distribution and abundance of pheasants in Illinois from hunting license questionnaires for 1937 (after Carl O. Mohr, unpublished) and 1948 (after Robertson 1958:9).

1950 (Marquardt & Scott 1952, Greeley et al. 1962) and the first RMCC in 1957-1958 (Fig. 6)—although different census methods—suggests notable declines in northern counties. Thus, by the early 1950's the major center of abundance was the east-central region; Livingston, Ford, Iroquois, McLean, and Champaign counties ranked at the top in respective order of abundance (Fig. 6). Trends in pheasant abundance on the SSA (Fig. 3) in Ford and McLean counties were representative of the prime range.

Pheasant Harvest.—The hunter kill of cock pheasants in the early 1950's is not clear. McCabe et al. (1956:298) estimated the pheasant kill for Illinois in 1950 at 150,000 pheasants—a figure that Robertson (1958:5) considered “much too low.” The DOC estimated from license stub kill cards that an average of over 750,000 cocks were bagged annually, 1956-1959 (Table 1). Marquardt & Scott (1952:4) noted that this estimation technique is inherently high.

Land Use.—Changing patterns of land use were evident in Illinois in the 1950's. Acreage planted to hay and small grains (prime habitat for pheasant reproduction) peaked from 1948 to 1953 and declined precipitously thereafter as more acres were planted to corn and soybeans (Fig. 7). These land use changes were particularly evident in the east-central cash grain region (Fig. 7 and 8). Land use trends on the SSA are representative of these changes (Figs. 3, 7). The decline in hay and small grain cover beginning in 1954 was in part

due to policy changes in the Agricultural Conservation Program (ACP), which through 1953 paid relatively large premiums to divert cropland from soil-depleting to soil-conserving crops (Held & Clawson 1965:183).

Labisky et al. (1964:8) characterized the optimal pheasant range in the Prairie State in the era of the late 1950's:

“In summary, the following factors of land use were found to be characteristic . . . where pheasants were most abundant: (i) a high proportion of land area in cultivated crops and a low proportion in woodland, (ii) a high proportion of the farms classified as cash-grain farms and a lower proportion as dairy farms and livestock farms, and (iii) about 50 percent of the cropland in row crops (corn and soybeans), about 5 percent in hay, and about 15 percent in pasture.”

Table 1.—Estimated harvest of cock pheasants during upland game seasons in Illinois averaged for specified periods.

PERIOD	AVERAGE ESTIMATED KILL	SOURCE
1956 - 1959	767,000	Preno and Labisky 1971
1960 - 1964	907,000	Preno and Labisky 1971
1965 - 1969	700,000	Preno and Labisky 1971
1970 - 1974	810,000	J. A. Ellis, personal communication
1975 - 1978	522,000	Ellis 1978, personal communication

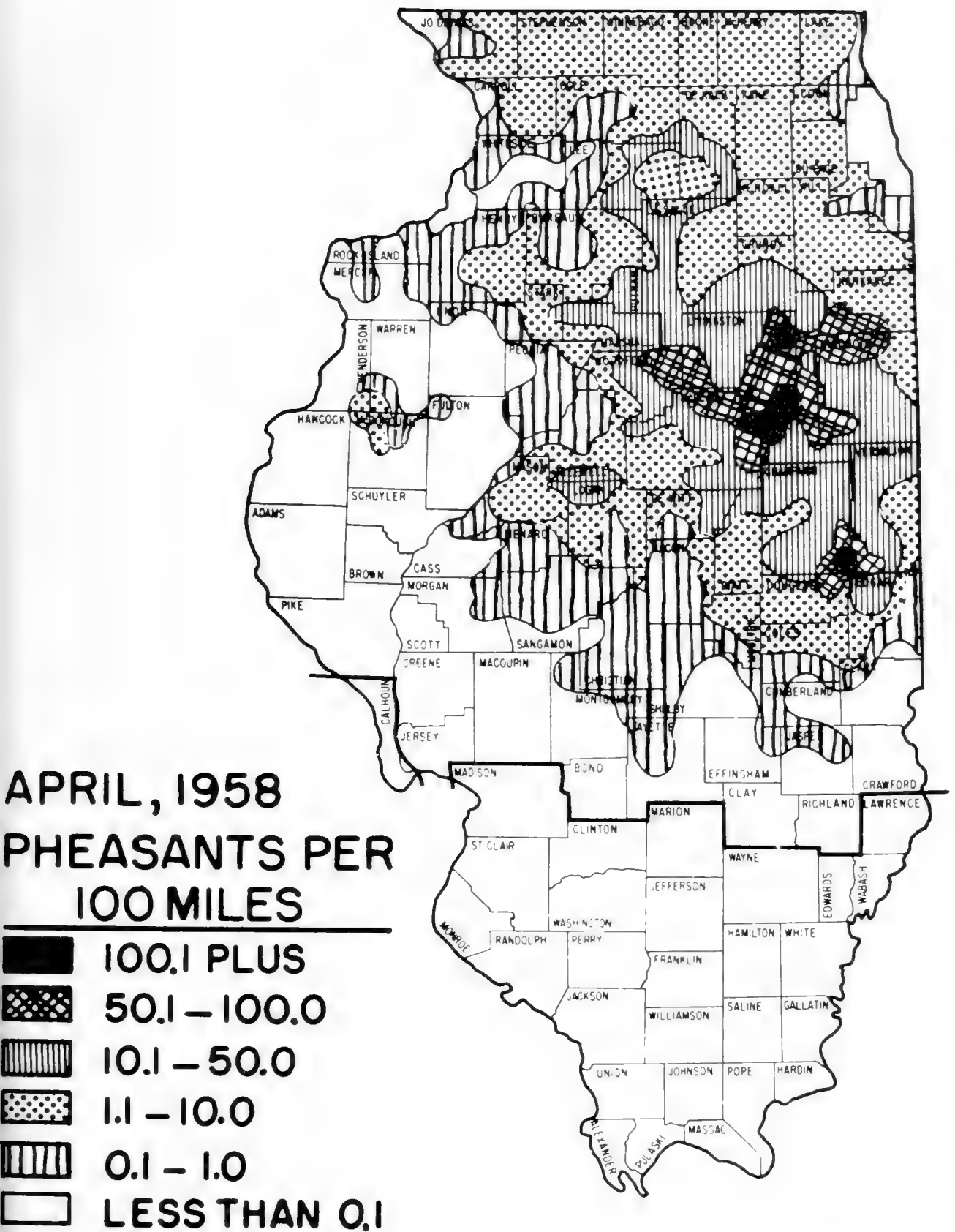


Fig. 6.—Distribution and abundance of pheasants in Illinois obtained by a rural mail carrier census, April 1958 (after Greeley et al. 1962, Labisky & Anderson 1965). Counties below heavy line were not censused.

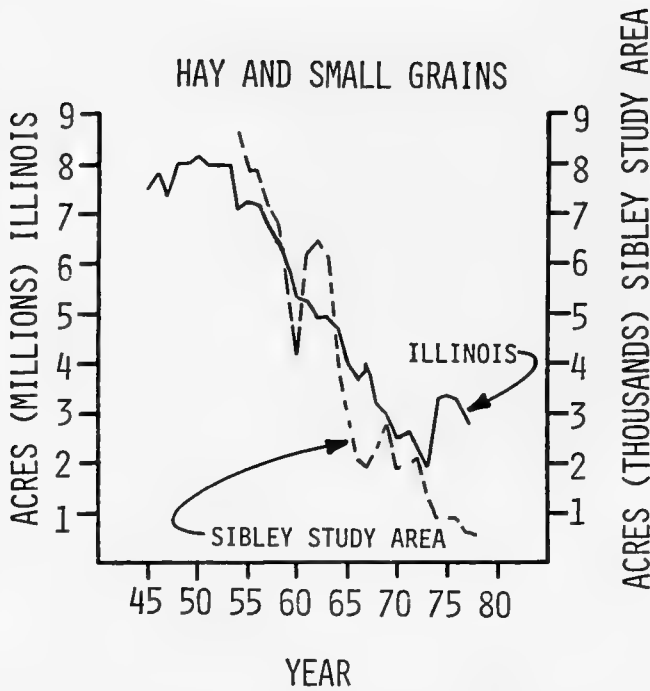


Fig. 7.—Acreages of hay and small grains planted in Illinois (state-wide) and the Sibley Study Area, 1945-1977 (state-wide data from Illinois Cooperative Crop Reporting Service).

Distribution and Abundance 1960-1970

The numbers of pheasants observed per 100 miles declined state-wide from the 1958 RMCC's (Fig. 6, Table 2) to the 1963 RMCC (Fig. 9). In the prime range (east-central counties, Table 3), however, densities of pheasants increased during these 5 years. Numbers of pheasants on the SSA apparently peaked in 1962 (Fig. 3) Declines were most evident in the early center of abundance in northern Illinois (Fig. 9).

The 1968 RMCC (Fig. 10) indicated a 28-percent decline in pheasant numbers from 1958 to 1968 and a 44 percent decline from 1963 to 1968 (Table 2). The most significant change in the late 1960's was the decline in the abundance of ring-necks in the east-central prime range (Fig. 9, 10: Table 3). Pheasant populations increased moderately in northwestern counties—especially Carroll, Ogle, and Whiteside—and in some counties in west/southwest and east/southeast sectors, especially Logan, Moultrie, De Witt, and Piatt (Fig. 10).

The 1968 RMCC also indicated localized increases in pheasant numbers around the joining of Vermilion, Edgar, Douglas, and Champaign counties, and at the junction of Mason and Tazewell counties (highest densities in the state) (Fig. 10).

Pheasant Harvest.—The estimated hunter harvest of cock pheasants in Illinois averaged 907,000 per season from 1960 to 1964 and 700,000 per season from 1965 to 1969 (Table 1). This estimated kill peaked at over 1 million birds in 1962 and 1963 and declined thereafter except for a harvest of over 900,000 in 1969 (Preno & Labisky 1971:20). Hunter surveys on the SSA during opening weekend of the upland game seasons show a marked increase in effort expended per cock bagged during the late 1960's (Fig. 11).

Land Use.—In the early 1960's, farmers were induced by a Federal Feed Grain Program (FFGP) to reduce acreages planted in corn and grain sorghums (Spitze 1972). Implementation of the FFGP arrested the expansion of row cropping for a few years (Fig. 3, 7) and resulted in moderately increased hay and oats acreages (Joselyn & Warnock 1964:549). The effects of the FFGP were most evident in the cash grain belt, represented by the SSA (Fig. 7). Although the FFGP did not result in vast increases in prime reproductive habitat for pheasants state-wide, moderate increases in the fertile cash grain belt were noted in undisturbed cover—predominately an oats-hay complex.

With the termination of the FFGP in the late 1960's (Spitze 1972) farmland devoted to forage legumes and small grains was further reduced and corn and soybean production increased (Fig. 3, 7). The west, west/southwest, and east/southeast counties were least affected by the surge in row crop production; conversion to row crop

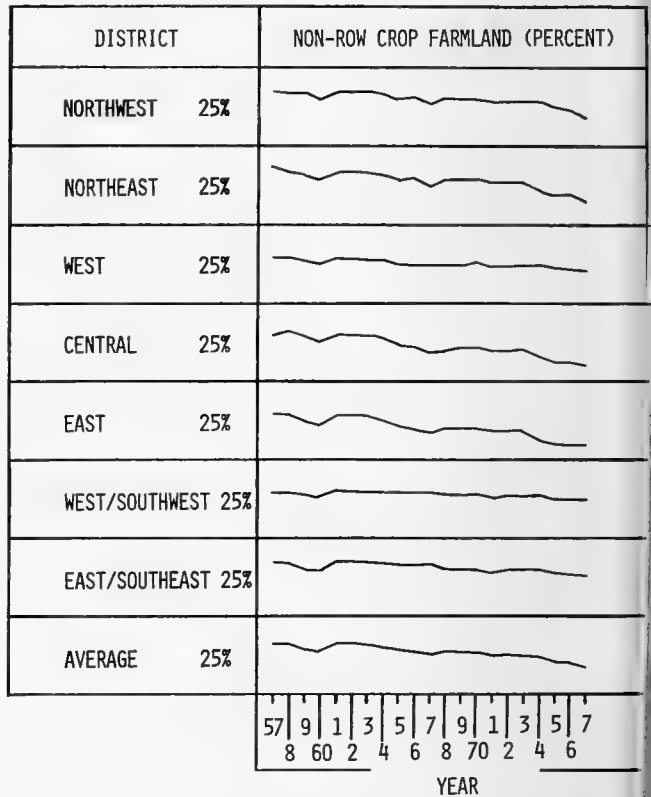


Fig. 8.—Nonrow-crop farmland by region in the Illinois pheasant range, 1957-1977. Regions are: **Northwest:** Bureau, Carroll, Henry, J. Daviess, Lee, Mercer, Ogle, Putnam, Rock Island, Stephenson, Whiteside, and Winnebago counties. **Northeast:** Boone, Coles, De Kalb, Du Page, Grundy, Kane, Kendall, Lake, La Salle, McHenry and Will counties. **West:** Adams, Brown, Fulton, Hancock, Henderson, Knox, McDonough, Schuyler, and Warren counties. **Central:** DeWitt, Logan, McLean, Macon, Marshall, Mason, Menard, Peoria, Star, Tazewell, and Woodford counties. **East:** Champaign, Ford, Iroquois, Kankakee, Livingston, Piatt, and Vermilion counties. **West/Southwest:** Bond, Calhoun, Cass, Christian, Greene, Jersey, Macoupin, Madison, Montgomery, Morgan, Pike, Sangamon, and Scott counties. **East/Southeast:** Clark, Clay, Coles, Crawford, Cumberland, Douglas, Edgar, Effingham, Fayette, Jasper, Lawrence, Marion, Moultrie, Richland, and Shelby counties. (Illinois Cooperative Crop Reporting Service 1978).

Table 2.—Comparative statistics obtained from rural mail carrier censuses of pheasants in the 74 northernmost counties (including 1,257 townships) of Illinois during designated 5-day census periods in April 1958, 1963, 1968, 1973, and 1978 (data from 1958-1973 after Labisky 1975).

CATEGORY	1958	1963	1968	1973	1978
QUESTIONNAIRES					
Number mailed	1,368	1,320	1,256	1,207	1,178
Number returned	1,053 (77)	1,202 (91)	1,143 (91)	1,120 (93)	1,061 (90)
Number usable	...	1,150 (87)	1,105 (88)	1,078 (89)	1,046 (89)
Number of townships reported (of 1,257)	1,221 (97)	1,222 (97)	1,214 (97)	1,199 (95)	1,193 (95)
Total miles driven	250,129	318,605	333,070	351,150	366,348
Miles driven per township reported	205	261	268	281	307
Cocks observed	10,047	17,204	10,706	10,898	1,651
Hens observed	9,044	14,446	7,545	6,454	1,390
TOTAL PHEASANTS OBSERVED	19,091	31,650	18,251	17,352	3,041
Sex ratio: hens per cock	0.9	0.8	0.7	0.6	0.8
Cocks per 100 miles	4.0	5.4	3.2	3.1	0.5
Hens per 100 miles	3.6	4.5	2.3	1.8	0.4
TOTAL PHEASANTS PER 100 MILES	7.6	9.9	5.5	4.9	0.9

Percentages are given in parentheses.

farming was most dramatic in the east and central sectors (Fig. 8).

Distribution and Abundance 1970's

By 1973 the relative abundance of ring-neck populations had declined 11 percent from 1968 as indicated by the RMCC's (Table 2). Although continuing to evidence substantial declines, the east-central counties ranked above other regions of the state in pheasants observed per 100 miles. Of these counties, the west/southwest counties (Logan, Moultrie, De Witt, Macon, and Piatt) were among the top 10 in 1973 (Table 3). Several neighboring counties had moderate increases in the early 1970's (Fig. 10, 12).

Trends in pheasant abundance were also changing in northern counties. Labisky (1975:7) observed:

"Thus, despite some declines in pheasant abundance in De Kalb, McHenry, La Salle, Will, and Grundy Counties, northern Illinois posted a notable increase in pheasant abundance between 1968 and 1973, the first real upswing in pheasant numbers in this portion of the state in more than two decades. However, . . . pheasant abundance in northern Illinois was only about one-fifth of that in east-central Illinois."

Labisky (1975:7-8) characterized the western periphery of Illinois' ring-neck range: "small, scattered flocks of pheasants . . . which have never demonstrated strong geographic permanence or numerical persistence, have been maintained, at least partially, by sporadic releases of propagated pheasants." Labisky (1975:7) concluded that there had been no change in range occupied by pheasants in Illinois in over two decades.

The April 1978 RMCC denoted a decline of 84 percent in pheasants observed range-wide from 1973 (Table 2) and a decline of 92 percent from 1963 to 1978.

The magnitude of declines, in respective order, was greatest for the east-central, northern, and west/southwestern counties (Fig. 13). Populations of pheasants in

counties peripheral to the established range tended to be stable from 1973 to 1978 although a slight-to-moderate increase in abundance was registered for Mercer, Cumberland, McDonough, Warren, Fayette, Hancock, Jasper, Jersey, Crawford, Greene, and Bond counties (Table 3). The 1978 census (Fig. 14), compared with previous RMCC's, indicates possible limited range expansion in Knox, Warren, Henderson, Fulton, and Schuyler counties, which may in part explain more frequent sightings in 1978 for these counties.

A precursory glance at the 1978 distribution map (Fig. 14) compared with 1973 (Fig. 12) suggests a moderate southward expansion of range by pheasants in counties along the southern apron. This expansion is particularly evident in the southernmost townships of Effingham and Jasper counties (Fig. 14). Researchers on prairie chicken sanctuaries in southern Jasper County confirm the presence and recent increase in numbers of pheasants in this area (R. L. Westemeier, Illinois Natural History Survey, personal communication). However, fewer pheasants were observed per 100 miles of driving in Jasper and Effingham counties in 1978 than in the late 1950's (Fig. 14). Censuses of 1957 and 1958 (Greeley et al. 1962:12) registered pheasants in all townships of Jasper County and nearly all townships of Effingham County. Pheasants were also observed in northern townships of Clay County (south of Effingham County) during this era.

Long-term population data (1958-1978) from the RMCC's for counties along the southern margin of the pheasant range—Bond, Clark, Clay, Crawford, Cumberland, Effingham, Fayette, Jasper, and Shelby—show that the number of townships in which pheasants were observed has declined in the 1973 and 1978 censuses. Of the townships in these counties, 26 had recordings of pheasants sighted during the first three RMCC's (1958-1968) but none in the 1973 or 1978 RMCC; only eight townships (generally in the north) had pheasants recorded for the first time in 1973 or 1978; and 26

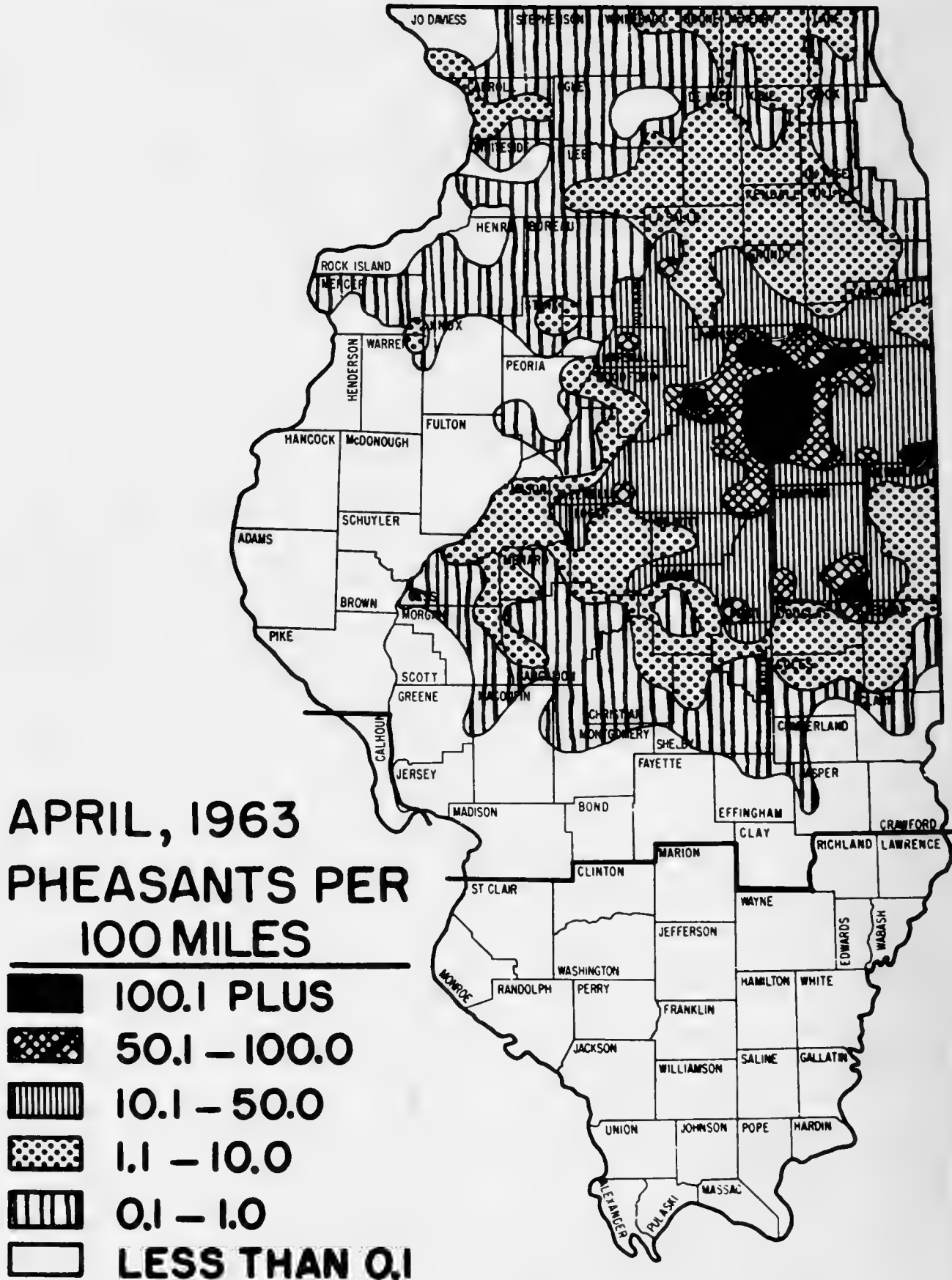


Fig. 9.—Distribution and abundance of pheasants in Illinois obtained by a rural mail carrier census, April 1963 (after Labisky & Anderson 1965). Counties below the heavy line were not censused.

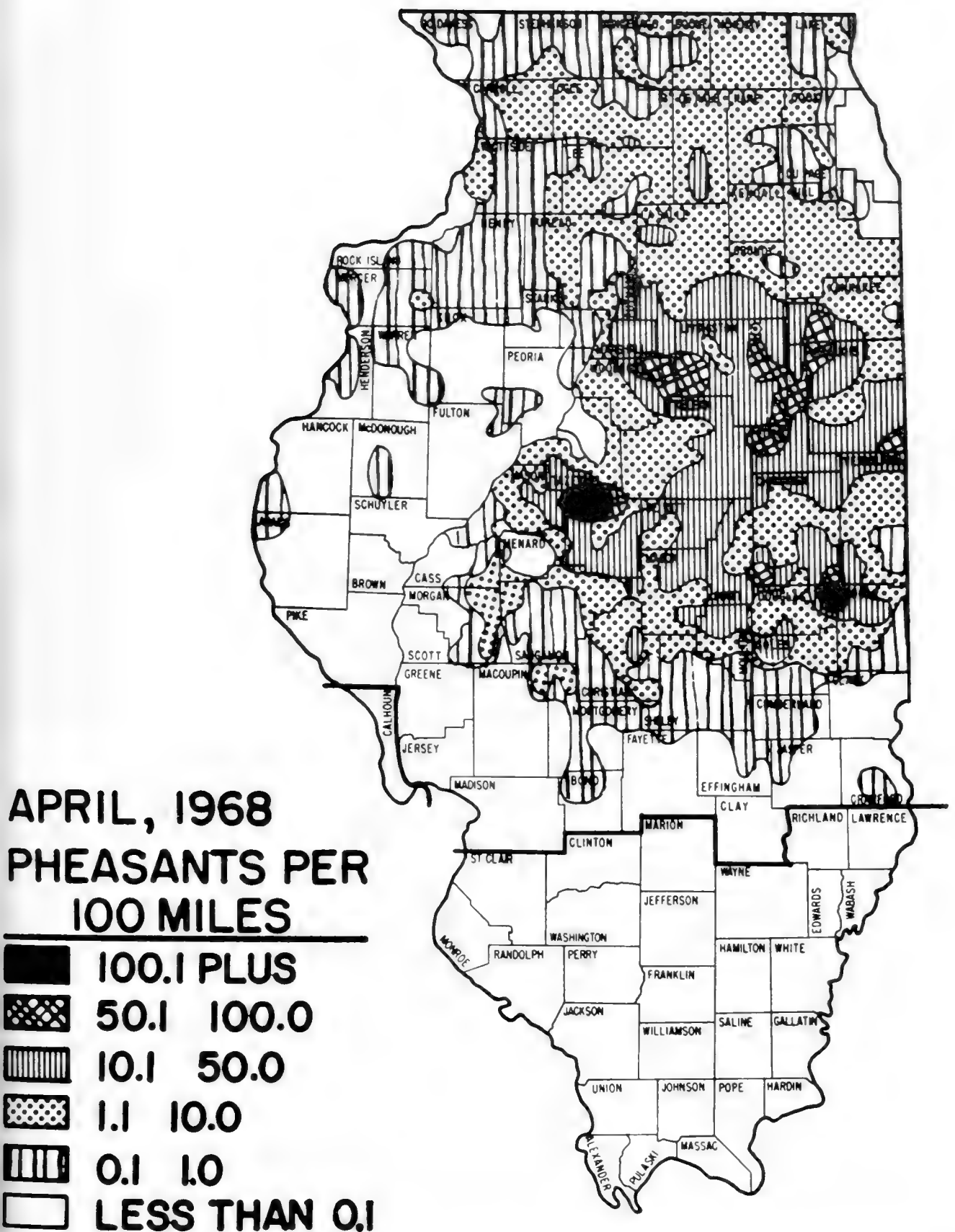


Fig. 10.—Distribution and abundance of pheasants in Illinois obtained by a rural mail carrier census (after Labisky 1969). Counties below heavy line were not censused.

Table 3.—Comparative abundance of pheasants as reported by rural mail carriers in the 74 northernmost counties of Illinois in April 1958, 1963, 1968, 1973, and 1978 (data from 1958-1973 after Labisky 1975).

COUNTY	PHEASANTS PER 100 MILES					COUNTY RANK		PERCENT CHANGE	
	1958	1963	1968	1973	1978	1973	1978	1968 to 1973	1973 to 1978
MASON	2.7	5.4	6.4	10.1	6.3	12	1	+ 58	- 38
WINNEBAGO	1.5	0.6	1.0	3.9	2.4	25	2	+290	- 38
CARROLL	1.9	1.1	2.0	5.4	2.4	20	3	+170	- 55
LEE	6.2	3.1	2.8	4.9	2.2	21	4	+ 75	- 56
STEPHENSON	5.4	0.3	0.9	2.2	2.1	37	5	+144	- 5
KENDALL	7.4	4.8	5.0	7.4	2.1	18	6	+ 48	- 72
WOODFORD	15.6	21.8	21.4	9.2	2.0	13	7	- 57	- 78
DE KALB	10.4	5.2	8.0	4.1	1.9	24	8	- 49	- 54
WILL	4.6	3.0	2.7	2.5	1.9	34	9	- 7	- 25
OGLE	1.5	0.5	2.0	3.0	1.8	28	10	+ 50	- 41
MCHENRY	7.0	3.9	3.4	2.5	1.6	32	11	- 26	- 37
LIVINGSTON	56.4	99.1	33.3	25.2	1.5	2	12	- 24	- 94
BOONE	5.1	1.0	2.3	3.1	1.4	27	13	+ 35	- 55
LOGAN	8.3	9.7	31.1	20.7	1.4	3	14	- 33	- 93
FORD	50.7	75.8	29.2	30.2	1.3	1	15	+ 3	- 96
MACON	0.7	6.6	8.5	12.0	1.3	9	16	+ 41	- 89
WHITESIDE	0.3	0.3	0.8	2.5	1.2	33	17	+213	- 52
KANE	3.6	2.7	1.7	2.8	1.2	31	18	+ 65	- 57
TAZEWELL	6.1	8.5	6.5	4.4	1.2	22	19	- 32	- 73
LA SALLE	12.4	13.8	9.1	7.5	1.2	17	20	- 18	- 84
MCLEAN	27.7	43.1	17.0	12.0	1.1	8	21	- 29	- 91
BUREAU	1.3	0.5	1.0	1.7	1.1	40	22	+ 70	- 35
SHELBY	0.2	0.5	0.7	2.3	1.1	36	23	+229	- 52
CHRISTIAN	0.2	1.2	3.5	5.8	1.1	19	24	+ 66	- 81
IROQUOIS	28.9	43.4	15.7	17.8	1.1	4	25	+ 13	- 94
MENARD	0.6	1.0	2.3	3.0	1.0	29	26	+ 30	- 67
LAKE	2.0	1.2	1.1	1.1	0.9	44	27	0	- 18
GRUNDY	12.5	17.7	9.3	8.3	0.8	16	28	- 11	- 90
MOULTRIE	1.4	11.3	18.1	15.9	0.8	5	29	- 12	- 95
DE WITT	6.5	16.1	12.2	14.9	0.8	6	30	+ 22	- 95
DU PAGE	4.9	4.3	1.2	1.8	0.7	39	31	+ 50	- 61
HENRY	1.8	0.3	0.3	0.7	0.7	46	32	+133	0
KANKAKEE	15.3	19.7	10.1	8.4	0.6	15	33	- 17	- 93
VERMILION	17.3	11.1	9.8	10.9	0.6	11	34	+ 11	- 95
PUTNAM	10.8	19.1	10.6	2.9	0.5	30	35	- 73	- 83
STARK	4.2	0.5	0.2	0.5	0.5	47	36	+150	0
EDGAR	5.0	4.2	5.3	4.1	0.5	23	37	- 23	- 88
MARSHALL	14.6	15.0	8.2	3.3	0.5	26	38	- 60	- 85
CHAMPAIGN	25.7	35.6	16.8	13.3	0.4	7	39	- 21	- 97
MERCER	0.1	0.5	0.4	0.3	0.4	50	40	- 25	+ 33
COOK	2.8	1.6	1.4	2.2	0.4	38	41	+ 57	- 82
PIATT	11.8	34.6	17.7	11.9	0.4	10	42	- 33	- 97
DOUGLAS	8.7	14.3	8.6	8.6	0.4	14	43	0	- 95
SANGAMON	0.3	0.6	1.5	1.3	0.4	42	44	- 13	- 69
COLES	2.0	2.3	3.2	2.5	0.4	35	45	- 22	- 84
JO DAVIESS	1.2	0.3	0.2	1.2	0.4	43	46	+500	- 67
CUMBERLAND	0.3	0.1	0.1	0.0+	0.2	61	47	...	...
CASS	0.2	0.8	1.2	0.8	0.2	45	48	- 33	- 75
MCDONOUGH	0.6	0.0+	0.0+	0.0+	0.2	63	49	0	...
HENDERSON	0.5	0.0	0.0+	0.2	0.2	57	50	0	0
WARREN	0.3	0.1	0.0+	0.1	0.2	54	51	+	+100
MONTGOMERY	0.1	0.1	0.3	0.3	0.2	49	52	0	- 33
ROCK ISLAND	0.1	0.1	0.1	0.2	0.1	51	53	+ 50	- 50
FAYETTE	0.1	0.0	0.0+	0.0	0.1	...	54	...	+
FULTON	0.0+	0.0	0.1	0.0+	0.1	58	55	-	...
MACOUPIN	0.0	0.0+	0.1	0.1	0.1	53	56	0	0
HANCOCK	0.0	0.0	0.0+	0.0+	0.1	59	57	0	...
KNOX	0.0+	0.1	0.1	0.1	0.1	56	58	0	0
EFFINGHAM	0.8	0.1	0.0+	0.1	0.1	55	59	+	0

Table 3.—Continued.

JASPER	1.0	0.1	0.0+	0.0+	0.1	62	60	0	+
CLARK	0.1	0.1	0.0+	0.4	< 0.1	48	61	+	- 90
PEORIA	0.4	0.1	0.1	0.0+	< 0.1	60	62	-	- 90
JERSEY	0.0	0.0+	0.0	0.0	< 0.1	...	63	0	+
CRAWFORD	0.0	0.0	0.0+	0.0	< 0.1	...	64	+	+
GREENE	0.1	0.1	0.0	0.0	< 0.1	...	65	+	+
BOND	0.0	0.0	0.0+	0.0	< 0.1	...	66	-	+
MORGAN	0.1	0.2	0.4	1.6	< 0.1	41	67	+300	- 99
SCHUYLER	0.0	0.0	0.0	0.1	0.0	57	...	+	-
CLAY	0.3	0.0	0.0	0.0	0.0	...	...	0	0
BROWN	0.0	0.0	0.0	0.0	0.0	...	...	0	0
SCOTT	0.0	0.0	0.0	0.0	0.0	...	...	0	0

+ denotes nominal increase

- denotes nominal decrease

0.0 + (prior to 1973) and 0.1 (1973-1978) mean the same thing.

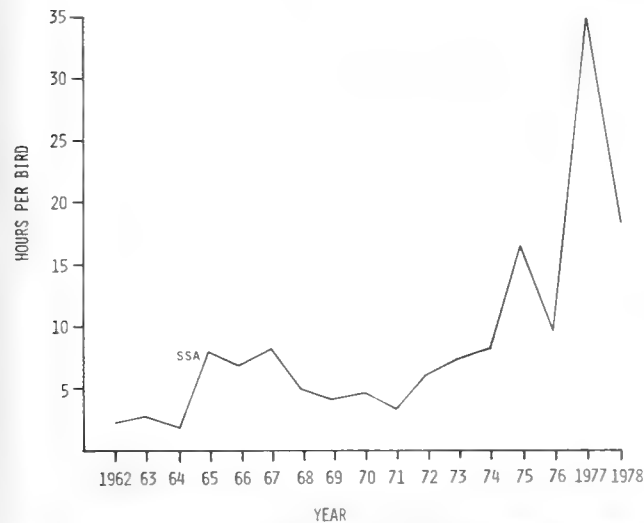


Fig. 11.—Hunter hours expended per cock pheasant bagged during the opening weekend on the Sibley Study Area, 1962-1978.

townships had no recorded sightings during the past five RMCC's.

The east-central counties, Livingston, Ford, McLean, Iroquois, and Champaign, which ranked highest in densities of pheasants for at least 3 decades (Table 3, Labisky 1975), ranked 12, 15, 21, 25, and 39, respectively, in 1978. Population trends on the SSA (Fig. 3) substantiate these dramatic declines. The west/southwestern counties, which evidenced substantial increases in the late 1960's and early 1970's (Labisky 1957:7), generally ranked lower in 1978 (Table 3) except Mason County, which had the greatest abundance of pheasants in the state in 1978 (Table 3, Fig. 14).

Pheasant Harvest.—The estimated hunter kill of cock pheasants averaged 810,000 birds annually, 1970-1974, and 522,000 birds, 1975-1978 (Table 1). This decline is also noted in the recent RMCC.

Land Use.—The amount of farmland planted in nonrow-crop cover continued to decline in the 1970's. Declines were extensive in the east and central regions and minimal in west, west/southwest, and east/southeast

sectors (Fig. 15). Areas of the pheasant range least intensively farmed presently have about 25 percent of farmland in nonrow crops; the most intensively cultivated east-central cash grain regions have 10 percent or less farmland in nonrow crops (Fig. 8).

There was a modest increase in hay and small grain acreages in Illinois from 1974 to 1976 (Fig. 7). Nearly all of this increase reflected expanded production of wheat—a 33-percent increase (Illinois Cooperative Crop Reporting Service 1975, 1977).

Winter Mortality

The vast (84 percent) decline in the abundance of pheasants indicated by the 1973 and 1978 RMCC's (Table 2) reflects more than continued expansion of corn and soybean production and related losses of nest and brood cover. The winters of 1976-1977 and 1977-1978 were of unprecedented severity for ring-neck populations in Illinois. Illinois winters are generally mild, and Robertson (1958:21) concluded, "Pheasants in east-central Illinois . . . thus appeared to be far more tolerant of the near-absence of heavy winter cover than was the case in other Midwestern areas." However, the heavy snowfall, below-zero temperatures, and winds in excess of 69 km per hour over much of the state in January 1977, caused wide spread mortality of pheasants (Warner & David 1978). Biologists reported mortality in 20 counties after the storm; from one-half to two-thirds of the pheasants on five areas of investigation in east-central counties succumbed to exposure (Fig. 16) (Warner & David 1978).

The mortality rate of pheasant populations in the winter storms of 1977-1978 approached, that of the preceding winter in east-central Illinois (Warner 1978:6). The combined effects of two consecutive decimating winters no doubt account for much of the decline noted by the 1978 RMCC (Fig. 13).

Frozen specimens collected in 1977 and 1978 indicated mortality related to exposure; most exposure-killed birds were found with substantial body fat reserves and food in their crops (Warner & David 1978:117). The fact that pheasants typically roost in open fields makes them

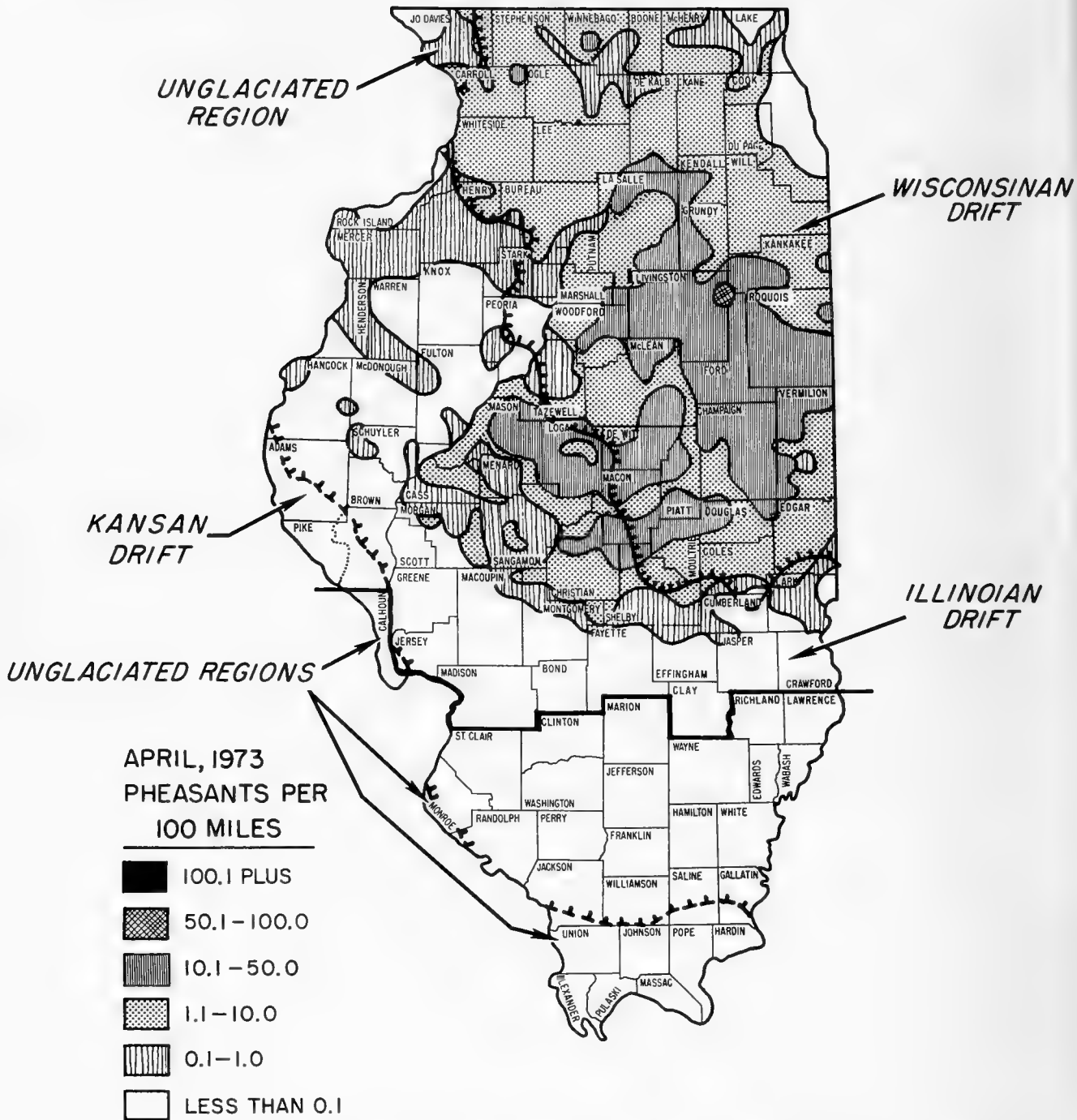


Fig. 12.—Distribution and abundance of pheasants in Illinois obtained by a rural mail carrier census, April 1973 (after Labisky 1975). Counties below the heavy line were not censused.

particularly susceptible to severe storms during the night and early morning hours, such as occurred in 1977 and 1978.

On pheasant study areas in east-central Illinois declines in pheasant populations from 1976 to 1978—the period encompassing severe winter storms—were greatest where densities of pheasants were highest, regardless of differences in the amount of protective woody cover present (R. E. Warner and L. M. David, unpublished data).

This phenomenon may have occurred throughout

most of Illinois' pheasant range. Assuming the 1973 RMCC provides an index of pheasant abundance prior to winter storm-induced mortality, a regression test of pheasants observed per 100 miles in 1973 (by county) on pheasants observed per 100 miles in 1978 (Table 3) indicates that 37 percent of the variation in magnitude of declines by county is explained by population density ($r = 0.607$, $F_{1, 72} = 42.003$; $P < 0.001$). Although winter weather and land use varied from one region to another, mortality was highest where densities of pheasants were greatest.

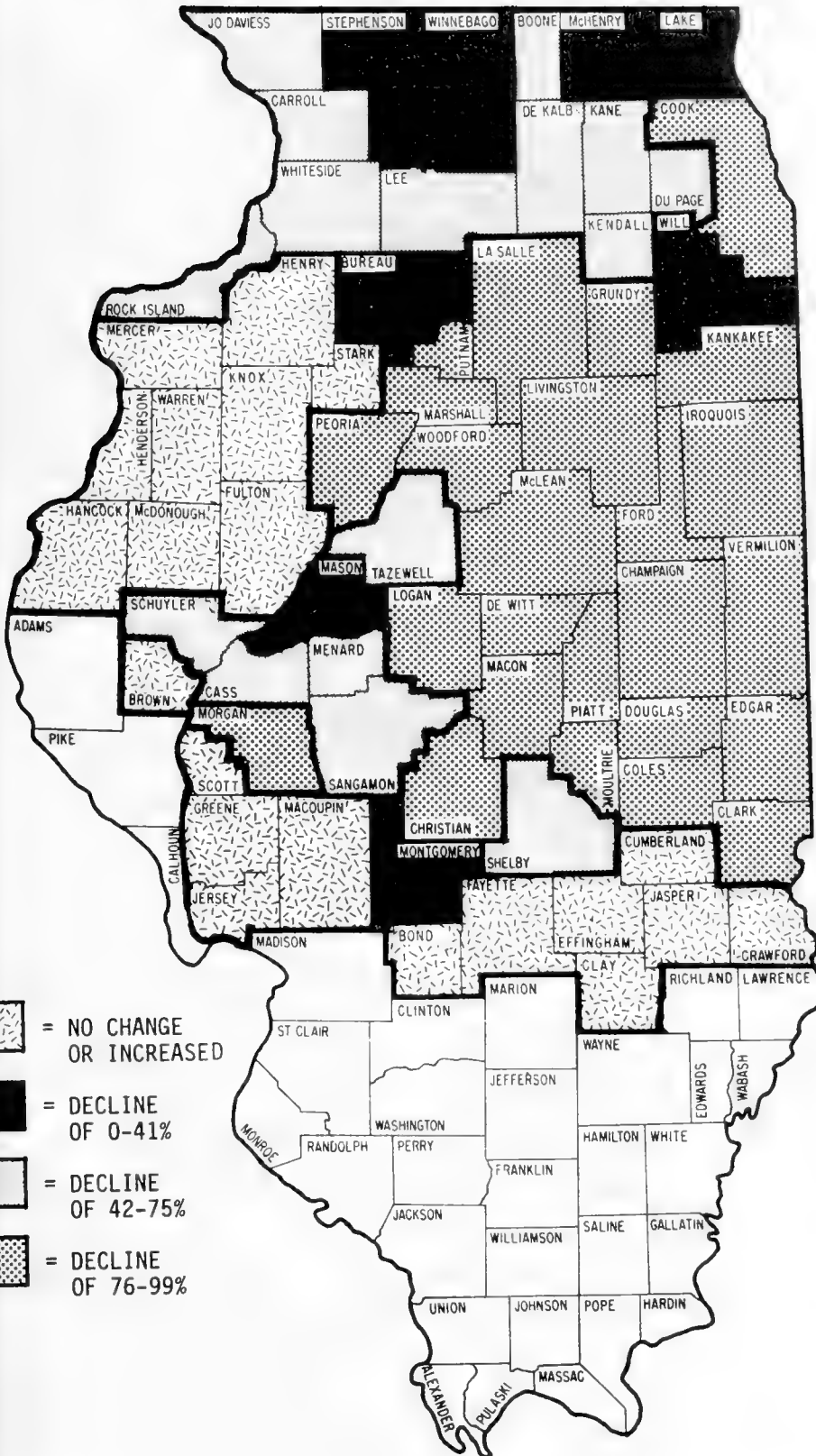


Fig. 13.—Magnitude of change in pheasants observed per 100 miles by driving during rural mail carrier censuses conducted April 1973 and April 1978.

DISCUSSION

Government Programs for Wildlife Habitat
 In recent years, agriculture in Illinois, as in the United

States in general, has been plagued by chronic overproduction leading to insufficient markets and unstable prices for farm commodities (Spitze 1972).

1978 RURAL MAIL CARRIER'S CENSUS

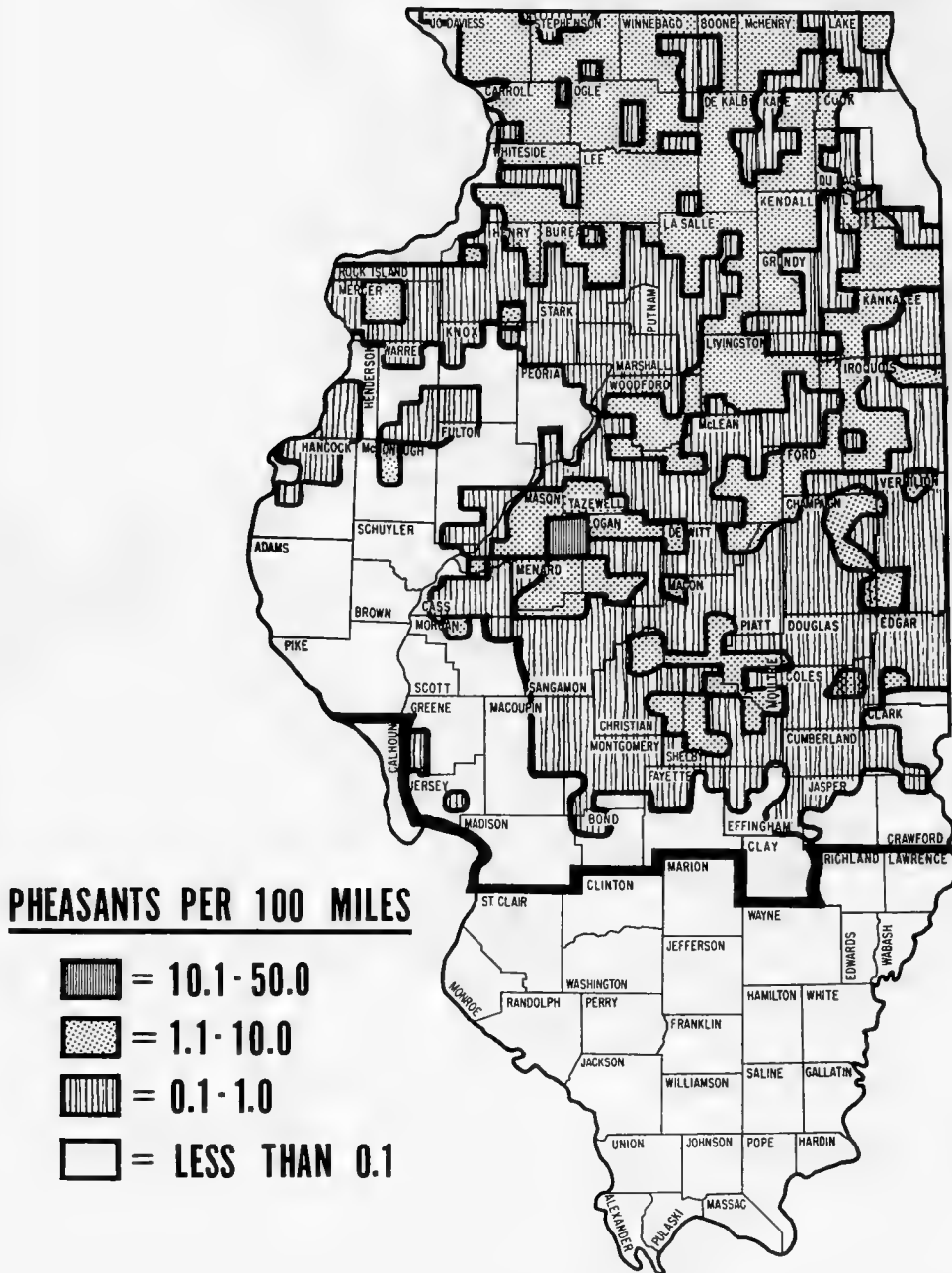


Fig. 14.—Distribution and abundance of pheasants in Illinois obtained by a rural mail carrier's census, April 1978. Counties below the heavy line were not censused.

Expanded corn and soybean production has created extensive soil loss through erosion in some areas (Held & Clawson 1965, Tinus 1976). Moderation of these trends, whether government-invoked or voluntary, could improve pheasant habitat. It is doubtful however, that such moderations will result in long-term benefits to pheasants without interagency cooperation. For example, programs aimed at reducing production of feed grains or at establishing soil-building or soil-protecting vegetation could provide pheasants with undisturbed

cover for nesting. The Set-Aside Acres Program of the early 1960's was one of the few such endeavors that have resulted in substantial benefits to ground nesting birds in the Midwest (Joselyn & Warnock 1964; Harmon & Nelson 1973).

The DOC offers technical and cost-sharing programs through regional offices to assist the landowner in establishing wildlife habitat. "Roadsides for Wildlife," a program initiated in 1972, is designed to establish safe nest habitat along rural road rights-of-way in east-central

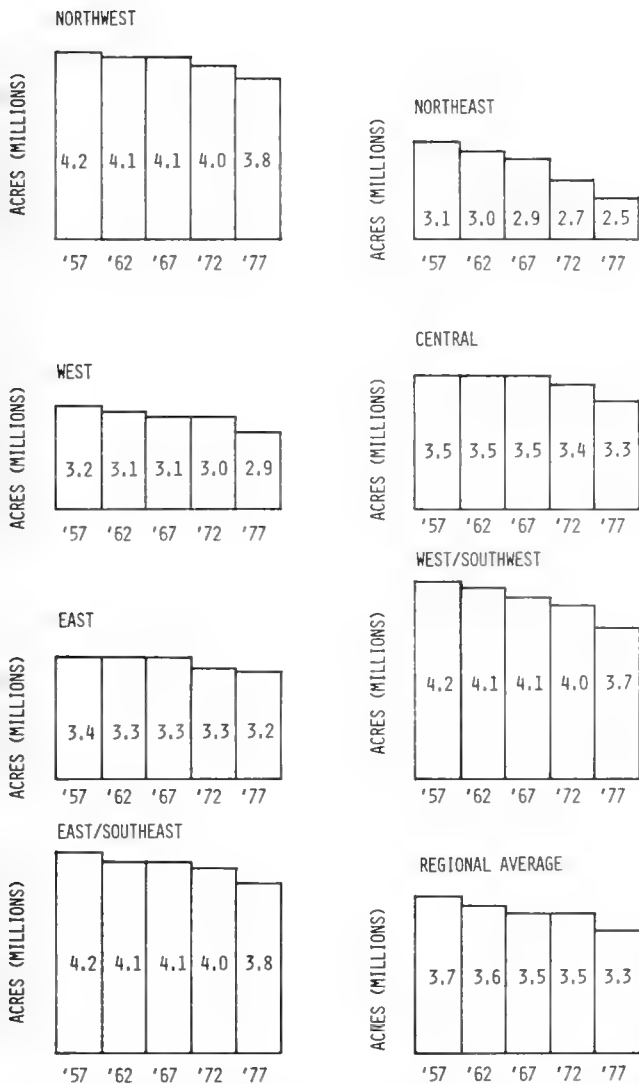


Fig. 15.—Farmland acres by region in the Illinois pheasant range, 1957-1977 (Data from Illinois Cooperative Crop Reporting Service 1968, 1978).

Illinois. In a cooperative agreement, the DOC seeds brome-alfalfa along roadsides, and farm operators annually delay mowing until 1 August. Developed roadside vegetation has been an important supplement to other nest habitat on experimental areas in east-central Illinois (Joselyn et al. 1968, Warner & Joselyn 1978).

Habitat

"The association with agriculture is so intimate that pheasant study in Illinois becomes chiefly a study of the effects of farming practices and crop phenologies upon the life activities of the bird," (Robertson 1958:13). Research has shown that populations of pheasants thrive where fields of hay (prime nest cover) and oats-hay (brood feeding areas) are common (Joselyn et al. 1968, Warner 1979). Range-wide trends in pheasant abundance and land use substantiate these findings. The era of the late 1940's and early 1950's was characterized by peak hay-oats acreages in Illinois (Fig. 7), and perhaps the

greatest numbers of pheasants. Farm policies of the early 1960's halted the expansion of corn production in east-central Illinois (Fig. 2, 7) and encouraged planting of hay and oats—much of which was not harvested or clipped until post-nesting season (Joselyn & Warnock 1964). The prime habitat fostered by this farm policy supported high densities of pheasants in the east-central range that are still remembered.

Evaluations of habitat for reproduction for pheasants in Illinois cannot be simplified to merely the amount of nonrow-crop cover. In South Dakota the actual acreages devoted to nonrow crops have not been as significant to pheasant populations as the quality of grassy cover and lack of disturbance (Dahlgren 1967, Harmon & Nelson 1973).

In the mid-1970's nonrow-crop plantings increased moderately in Illinois (Fig. 7); yet no corresponding increase in numbers of pheasants was detected in the 1973 census (Fig. 17). These expanded acreages of wheat (Illinois Cooperative Reporting Service 1976) failed to provide attractive ground cover during the nest establishment period (Warner 1978:8). Furthermore, the relatively few late-nesting hens in wheat are typically disturbed by mid-summer combining operations.

Farmland Loss

The loss of farmland to urban expansion has been extensive for the northeastern sector of the state—



Fig. 16.—A hen pheasant found frozen in a field in Ford County following the January 1977 storm.

particularly in the decade of the 1970's. The present rate of urban sprawl is alarming in these counties, which once sustained the greatest density of pheasants in the state.

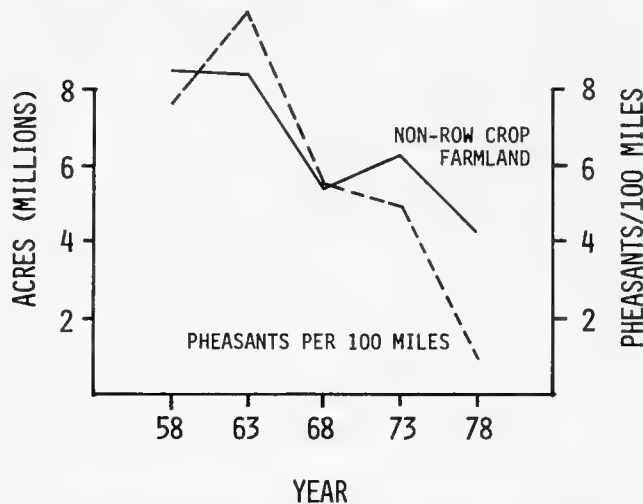


Fig. 17.—Pheasants observed per 100 miles of driving during April rural mail carrier censuses compared with nonrow crop farmland acreages, 1958-1978.

However, in the short run these changes are not entirely detrimental to ring-necks. Fields sited for development in suburban areas sometimes remain undisturbed for several years. Vegetation comprising early old field succession offers prime habitat for pheasants year round. In addition, the purchase of small (1-49 acres) tracts of land by "hobby farmers" has become a significant trend in the last decade in counties adjoining metropolitan areas (J. C. van Es, University of Illinois, Department of Agricultural Economics, personal communication). These landowners are not prone to farm intensively for income.

SUMMARY

With the exception of counties in the peripheral pheasant range, recent declines in populations have been range wide. Northern and west/southwest counties showed smaller declines from 1973 to 1978 than the east-central counties, the former prime range. Greater population densities in northern and west/southwest counties (compared with that of the east-central area) were attributed to: 1) relatively more protective (primarily herbaceous) overwintering cover, and 2) more hay and small grain fields. Most of these counties had exhibited moderate gains in numbers of pheasants in 1968 and 1973 (Table 3). Winter storm-related mortality masked any further relative increases in pheasant densities in these areas. There is also evidence that pheasants in western counties peripheral to the main pheasant range may be gradually increasing in numbers (Table 3) and area of range occupation (Fig. 6 and 15).

The annual harvest of pheasants by hunters in the next several years will probably not exceed 400,000 to 500,000 cocks—similar to the average kill noted for 1975-1978 (Table 1). Sport hunting of pheasants can be enjoyed in the future without reductions in bag limit or season length; pheasant hunting in the Prairie State has not

impinged on the reproductive capabilities of the ring-neck.

Future management of pheasant populations in Illinois should be directed toward establishment of habitat for nesting and brood foraging. Winter roost cover is generally of secondary importance. To substantially increase numbers of pheasants, habitat on agricultural lands would have to be improved.

CONCLUSIONS

The highly fertile east-central cash grain belt has in past years demonstrated the greatest potential for sustaining large numbers of pheasants. The cash grain region and other sectors of the range (especially northern counties) may show increases in numbers of pheasants over the next few years, perhaps approaching pre-winter storm densities of pheasants; however, dramatic increases cannot be anticipated under current land use constraints. Unless extensive corn and soybean production with associated clean farming practices are moderated, "boom" populations of pheasants in Illinois will remain only a memory.

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A familiar scene during pheasant season in Illinois.



