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Results of the August Roadside Survey for Upland Wildlife in Iowa: 1963-1988.

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Results of the August roadside survey collected from 1963 through 1988 were examined to determine if trends could be detected in the counts of ring-necked pheasants (*Phasianus colchicus*), northern bobwhite (*Colinus virginianus*), gray partridge (*Perdix perdix*), cottontail rabbits (*Sylvilagus floridanus*), and white-tailed jackrabbits (*Lepus townsendii*). The counts also were compared to harvest estimates to determine if correlations exist. Statistically significant linear trends were detected statewide for pheasants, gray partridge and jackrabbits during the 1963 to 1988 period. Trends were downward for all species except gray partridge. During the last 12 years (1977 through 1988), the only significant trend detected was for gray partridge, where counts increased. The survey results also were examined for trends on a regional basis where possible. Significant correlations were found between the mean counts and harvest for all species. For cottontails, however, this relationship appears to have changed as the correlation of the counts with harvest since 1977 is near zero. INDEX DESCRIPTIONS: Iowa, *Phasianus colchicus, Colinus virginianus, Perdix perdix, Sylvilagus floridanus, Lepus townsendii,* population trends, roadside survey.

A reliable source of information on the abundance of wildlife species is a cornerstone of a sound wildlife management program. In Iowa, many survey and census techniques have been used to monitor upland wildlife populations. These include a late summer/fall roadside survey, spring crow counts, a spring roadside survey, and rural mail carrier counts for ring-necked pheasants (Bennett and Hendrickson 1938a; Kozicky 1952; Nomsen 1953); fall covey searches and July whistling cock counts for bobwhite quail (Bennett and Hendrickson 1938b; Kozicky et al. 1956; Stempel 1962) and July roadside counts for cottontail rabbits and white-tailed jackrabbits (Hendrickson 1939; Voris 1956).

The timing of the fall roadside survey was changed to August, because of the findings of Kozicky et al. (1952) and Klonglan (1955). The August roadside survey was standardized in 1963 (Klonglan 1962). Numbers of bobwhite quail, cottontails, jackrabbits and gray partridge were recorded as well as the number of cock, hen and chick ring-necked pheasants, the number and age of pheasant broods and the number of hens with broods.

Several studies have compared and evaluated the results of these surveys (Kline 1965; Schwartz 1973, 1974, 1975; Wooley et al. 1978). The August roadside survey has emerged as the primary technique used to monitor statewide upland wildlife populations in Iowa. Since it is now the sole source of information for these populations, it is important that the results be examined and re-evaluated to ensure that the survey is still a valid index to these populations. The objectives of this study were to (1) summarize the August roadside survey results collected since 1963, and (2) determine if the results of the August roadside survey still appears to be correlated with the following fall's harvest.

METHODS

We used linear regression analysis (Steel and Torrie 1980) to determine if statistically significant linear trends ($p<0.05$) were evident for each species. For the remainder of this paper, "a significant trend" will be used to refer to such counts. Results were examined for the period from 1963 through 1988 as well as for the period since the last study (1977-1988). The later analysis was to determine if trends have changed in the last 12 years. Results were examined for the entire state and for the 5 land-use regions (Fig. 1) described by Schwartz (1973) to delineate regional shifts possibly confounded in the statewide trends.

Because comparative population information is unavailable, past studies have used the degree of correlation between the mean number of individuals sighted per 30-mile (48 km) route and the following fall's harvest as an indication of the survey's validity (Schwartz 1974, 1975, Wooley et al. 1978). Significant positive correlations were detected for all 5 species in the most recent study (Wooley et al. 1978). We used linear correlation analysis to test the hypothesis that this relationship still exists.

RESULTS AND DISCUSSION

Significant trends were detected for counts of pheasants, gray partridge and white-tailed jackrabbits at the statewide level for 1963 to 1988 (Table 1). A significant increase was detected for gray partridge statewide from 1977-1988 (Table 2). Correlations between the mean counts on the August roadside survey and the subsequent fall's harvest were significant for all species (Table 3).

Ring-necked Pheasant

A significant decline in the mean number of pheasants seen on the August roadside survey statewide was detected for 1963-1988 (Fig. 2). Although downward trends were noticed in all regions except the Northeast Dairy, a significant downward trend was detected in what was formerly considered the prime pheasant range (Farris et al. 1977). This area includes the Cash Grain, Eastern Livestock and Western Livestock regions. This decline is probably due to a reduction in the quality of habitat. Studies in other states (Taylor et al. 1978; Warner and Etter 1986) have reported similar declines.

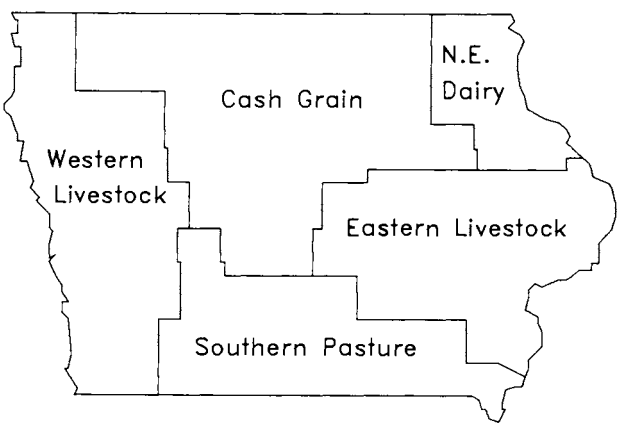


Fig. 1. Land-use regions for the August roadside survey (Schwartz 1973).

Table 1. Results of linear regression analyses of August roadside survey results for the period from 1963 through 1988.

Survey variable	Region	Correlation coefficient	Slope of regression line	p-value for test of Ho: Slope = 0
Pheasant broods	Statewide	0.368	−0.095	0.0647
Pheasant chicks per brood	Statewide	0.610	−0.036	0.0009
Pheasant chicks	Statewide	0.527	−0.786	0.0057
Ring-necked pheasants	Statewide	0.641	−1.269	0.0004
Ring-necked pheasants	Western livestock	0.503	−1.329	0.0088
Ring-necked pheasants	Southern pasture	0.290	−0.353	0.1506
Ring-necked pheasants	Cash grain	0.643	−1.908	0.0004
Ring-necked pheasants	Northeast dairy	0.131	0.266	0.5219
Ring-necked pheasants	Eastern livestock	0.521	−1.229	0.0064
Northern bobwhite	Statewide	0.230	−0.020	0.2591
Northern bobwhite	Western livestock	0.174	−0.033	0.3952
Northern bobwhite	Southern pasture	0.258	0.072	0.2028
Northern bobwhite	Eastern livestock	0.703	−0.113	0.0001
Gray partridge	Statewide	0.802	−0.496	0.0001
Gray partridge	Western livestock	0.820	−0.548	0.0001
Gray partridge	Cash grain	0.794	−0.999	0.0001
Cottontail rabbit	Statewide	0.282	−0.070	0.1663
Cottontail rabbit	Western livestock	0.756	−0.250	0.0001
Cottontail rabbit	Southern pasture	0.090	−0.070	0.6606
Cottontail rabbit	Cash grain	0.146	−0.018	0.4755
Cottontail rabbit	Northeast dairy	0.117	−0.029	0.5701
Cottontail rabbit	Eastern livestock	0.571	−0.122	0.0023
White-tailed jackrabbit	Statewide	0.746	−0.014	0.0001

Table 2. Results of linear regression analyses of August roadside survey results for the period from 1977 through 1988.

Survey variable	Region	Correlation coefficient	Slope of regression line	p-value for test of Ho: Slope = 0
Pheasant broods	Statewide	0.432	−0.291	0.1612
Pheasant chicks per brood	Statewide	0.546	0.033	0.0663
Pheasant chicks	Statewide	0.384	−1.267	0.2194
Ring-necked pheasants	Statewide	0.443	−1.797	0.1493
Ring-necked pheasants	Western livestock	0.363	−1.920	0.2468
Ring-necked pheasants	Southern pasture	0.024	−0.061	0.9416
Ring-necked pheasants	Cash grain	0.460	−2.345	0.1322
Ring-necked pheasants	Northeast dairy	0.306	−1.787	0.3342
Ring-necked pheasants	Eastern livestock	0.569	−2.249	0.0537
Northern bobwhite	Statewide	0.057	−0.012	0.8613
Northern bobwhite	Western livestock	0.081	−0.020	0.8018
Northern bobwhite	Southern pasture	0.368	0.295	0.2395
Northern bobwhite	Eastern livestock	0.744	−0.120	0.0055
Gray partridge	Statewide	0.710	0.970	0.0097
Gray partridge	Western livestock	0.595	0.781	0.0413
Gray partridge	Cash grain	0.709	2.018	0.0098
Gray partridge	Northeast dairy	0.711	0.576	0.0095
Gray partridge	Eastern livestock	0.819	0.235	0.0011
Cottontail rabbit	Statewide	0.467	0.211	0.1257
Cottontail rabbit	Western livestock	0.087	0.024	0.7885
Cottontail rabbit	Southern pasture	0.638	1.029	0.0255
Cottontail rabbit	Cash grain	0.218	0.046	0.4957
Cottontail rabbit	Northeast dairy	0.528	−0.346	0.0777
Cottontail rabbit	Eastern livestock	0.145	0.055	0.6534
White-tailed jackrabbit	Statewide	0.159	−0.003	0.6224

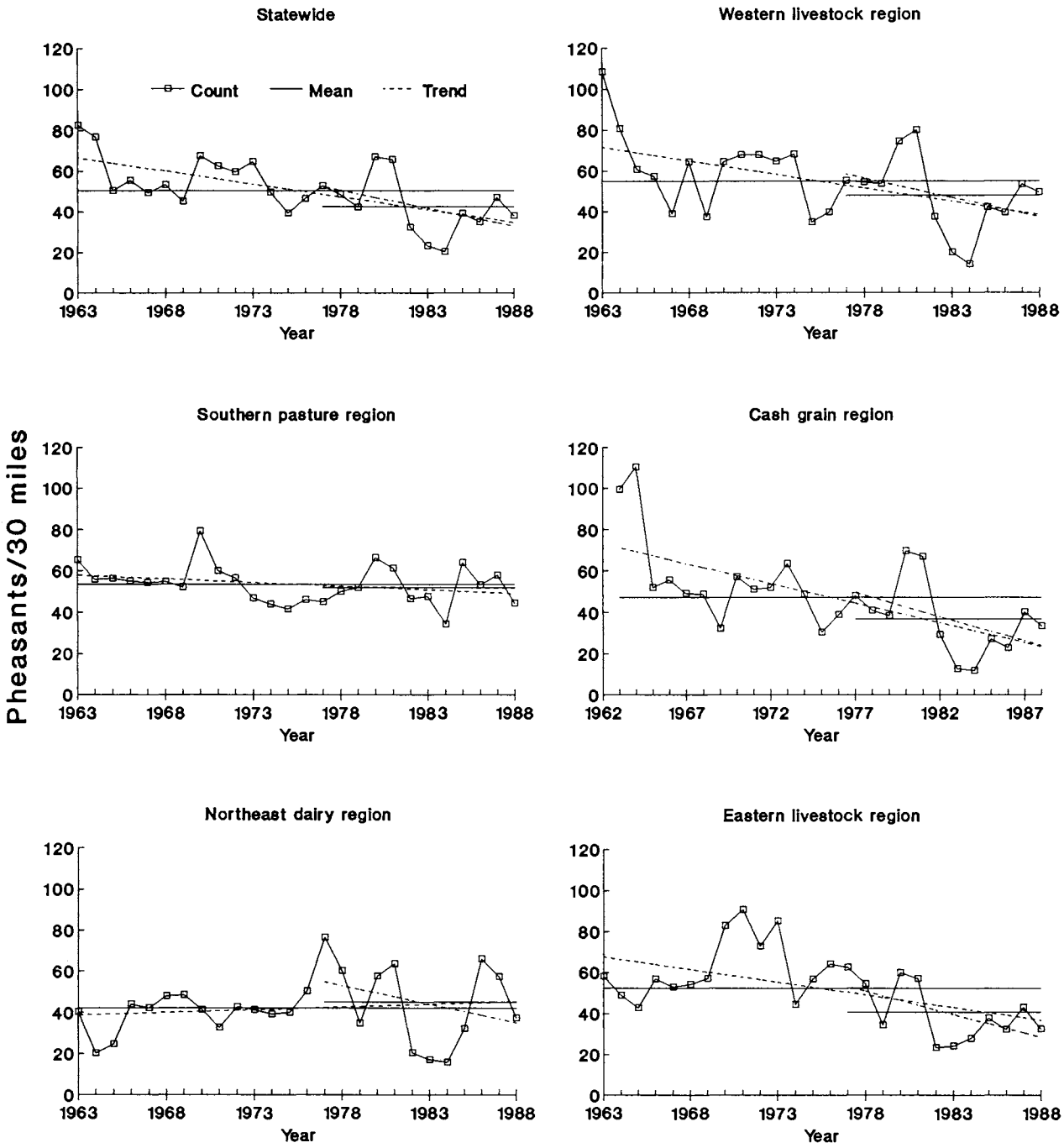
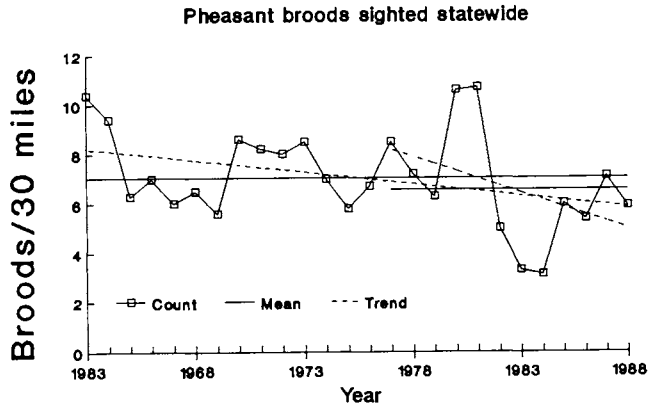
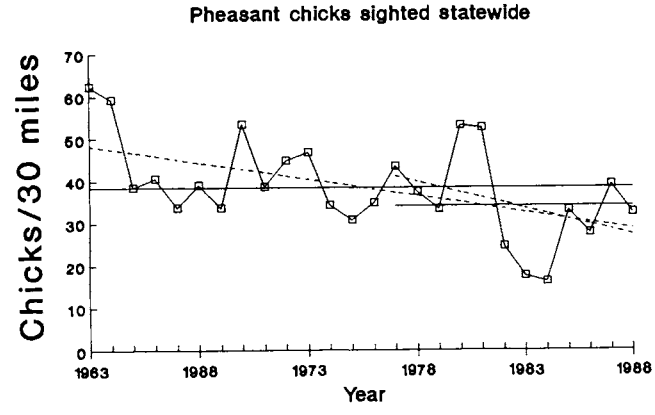


Fig. 2. The mean number of pheasants sighted per 30-mile route on the August roadside survey. The longer solid horizontal lines represent the means for 1963 to 1988, the shorter for 1977 to 1988. The longer dashed lines are the least squares regression lines for 1963 to 1988, the shorter for 1977 to 1988.





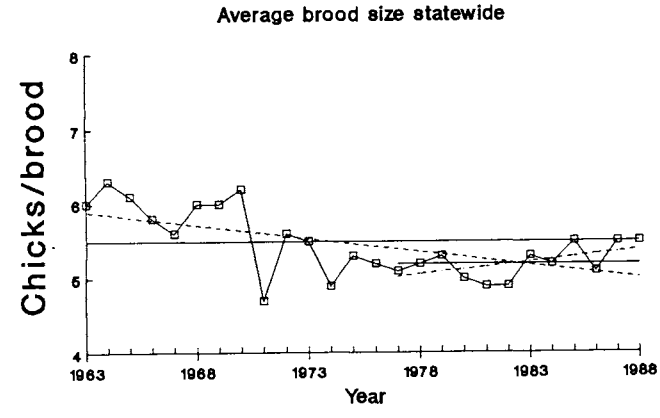
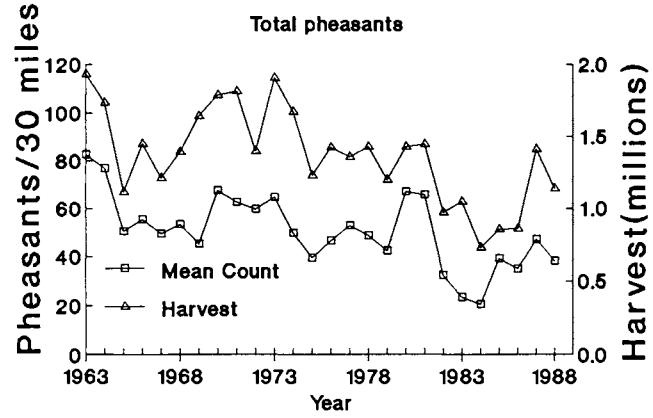
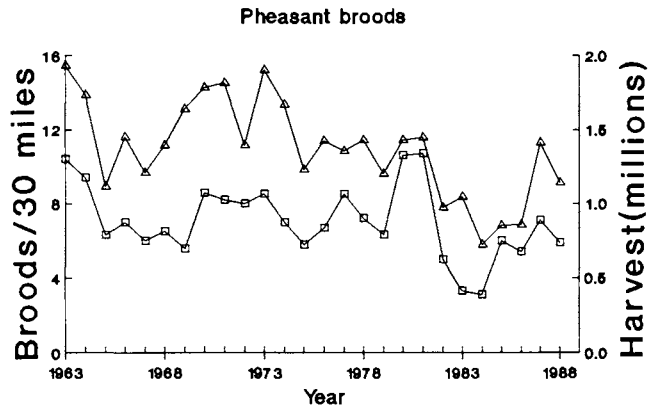


Fig. 3. The mean number of pheasant broods and pheasant chicks and the average size of pheasant broods sighted per 30-mile route on the August roadside survey. The longer solid horizontal lines represent the means for 1963 to 1988, the shorter for 1977 to 1988. The longer dashed lines are the least squares regression lines for 1963 to 1988, the shorter for 1977 to 1988.





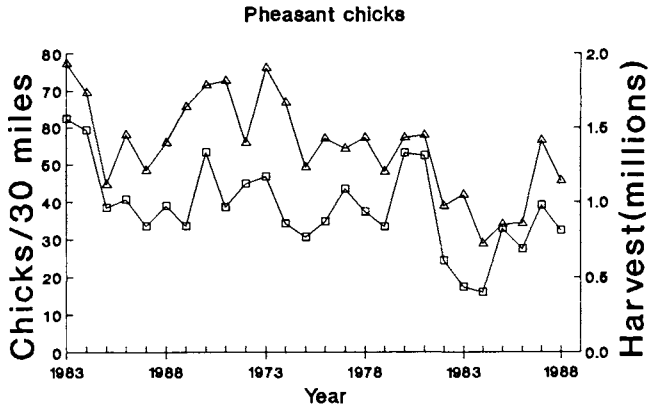


Fig. 4. The mean number of pheasants, the average size of pheasant broods and the mean number of chicks sighted per 30-mile route on the August roadside survey compared to the following fall's harvest.

Table 3. Results of the correlation analyses of the mean counts from the August roadside survey with the fall harvest estimates. The analyses were for the period from 1963 to 1988 unless specified.

Survey variable	Region	Correlation coefficient	p-value for test of Ho: r=0
Pheasant broods	Statewide	0.715	0.0001
Pheasant chicks per brood	Statewide	0.277	0.1794
Pheasant chicks	Statewide	0.748	0.0010
Ring-necked pheasants	Statewide	0.830	0.0001
Northern bobwhite	Statewide	0.758	0.0001
Gray partridge	Statewide	0.723	0.0001
Cottontail rabbit	Statewide	0.424	0.0194
White-tailed jackrabbit	Statewide	0.725	0.0001
Cottontail rabbit (63-76)	Statewide	0.760	0.0016
Cottontail rabbit (77-88)	Statewide	0.130	0.6868

Populations also appear to have become more variable. Weather may affect populations more severely in this poorer habitat.

A downward trend also was found during the last 12 years both regionally and statewide, although only the later was significant. Examination of the residuals from the statewide regression equation indicate that the trend during this later period may not be linear. In general, counts increased through the late 70's and peaked in the early 80's. A sharp, rapid decline occurred in 1982 and lasted through 1984. Since then, counts have increased. This pattern was evident in all 5 regions but was most prominent in the northern and western portions of the state.

A possible explanation for the decline from 1982 through 1984 were losses during severe winter weather, especially where secure winter cover was lacking. The winters of 1982 and 1983 produced some of the coldest and snowiest months on record (Waite 1982, 1983a). Poor production also was noted from 1982 through 1984, with very few broods or chicks being produced (Fig. 3). The 3 year period from 1982 through 1984 was the wettest on record (Waite 1984a). The month of June in both 1983 and 1984 produced record precipitation (Waite 1983b, 1984b). Following mild winters in 1985-86 and 1986-87 (Waite 1986a, 1987), and drier summers in 1985 and 1986 (Waite 1985a, 1986b), counts rebounded.

Additionally, nearly two million acres of land has been enrolled into the conservation reserve program (CRP). Some studies (Joselyn and Warnock 1964; Farris et al. 1977; Edwards 1984) have suggested that previous periods of high pheasant numbers were associated with large amounts of idled land.

The number of chicks, the number of broods and the average brood size declined significantly during 1963-1988. A downward trend also was found during the last twelve years for chicks and broods, but the average brood size increased.

The mean number of broods, the mean number of chicks and the mean number of total pheasants sighted (Fig. 4) were highly correlated with the following fall's harvest ($p<0.001$). The highest

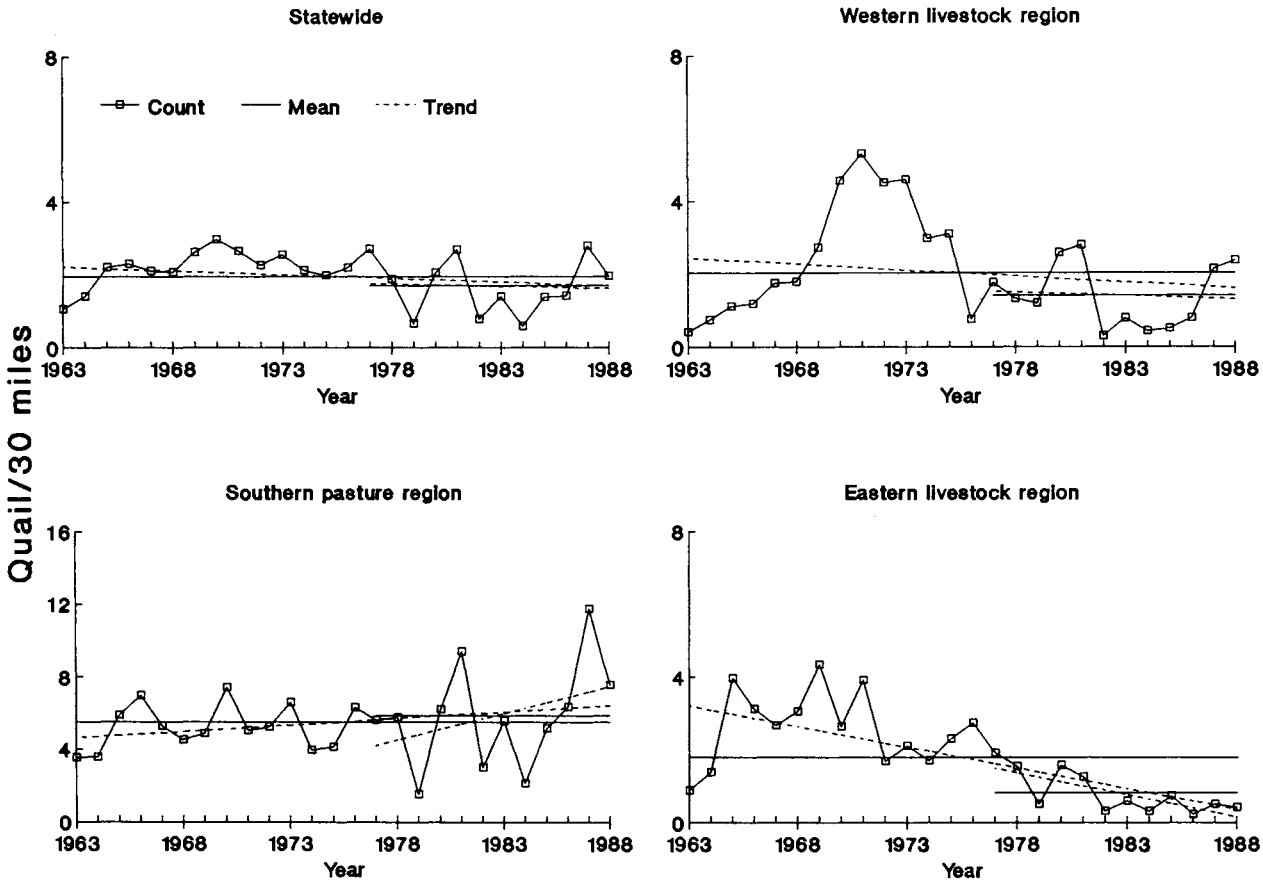


Fig. 5. The mean number of quail sighted per 30-mile route on the August roadside survey. The longer solid horizontal lines represent the means for 1963 to 1988, the shorter for 1977 to 1988. The longer dashed lines are the least squares regression lines for 1963 to 1988, the shorter for 1977 to 1988.

correlation was with the total number of pheasants, followed by the mean number of chicks and the mean number of broods. This is the reverse of what Wooley et al. (1978) found and indicates that currently the mean number of pheasants sighted would be the best predictor of harvest. The mean number of pheasants sighted explained almost 70% of the variation in fall harvest.

Northern Bobwhite

Statewide, the trend for 1963-1988 was downward (Fig. 5). A significant decrease was found in the Eastern Livestock region. Counts also decreased in the Western Livestock region. Sightings in the Northeast Dairy and the Cash Grain region have become so rare that analysis for trends was not attempted. The major quail range, however, is in southern Iowa, and counts in the Southern Pasture region were fairly stable from 1963-1976, with an overall upward trend since then.

The statewide and regional trends during the last 12 years are similar to those for 1963-1988, although the highest mean counts recorded statewide and for the Southern Pasture region occurred in 1987. Counts in the Southern Pasture region have become more variable in the past 12 years. This may reflect a decline in the overall quality of habitat, since highly fluctuating counts appear to be reflective of marginal habitat (Schwartz 1974). Following the severe winters of 1982-83 and 1983-84 counts declined, but rebounded rapidly following the winters of 1985-86 and 1986-87 which were some of the warmest and driest on record (Waite 1986a, 1987). The winter of 1984-85 was near normal (Waite 1985b).

The mean number of quail sighted was correlated ($p<0.001$) with the following fall's harvest (Fig. 6). Roadside counts explained almost 60% of the variation in harvest and continue to be a good predictor of fall harvest.

Gray Partridge

This is the only species for which a significant upward trend was detected statewide (Fig. 7). This upward trend was found in all regions where partridge were regularly sighted, both for 1963 to 1988 and during the last 12 years. This increase was due to both an increase in the number of partridge sighted per route as well as partridge being sighted on more routes. Counts of partridge were recorded regularly in all regions except the Southern Pasture. Partridge have been reported regularly in the Northeast Dairy and Eastern Livestock region since 1978. The highest rate of increase was in the Cash Grain region.

The mean number of partridge sighted was highly correlated ($p<0.001$) with the fall harvest (Fig. 6). Roadside counts explained over 50% of the variation in fall harvest.

Cottontail Rabbits

The trend in the mean number of cottontails sighted statewide for 1963-1988 was downward (Fig. 8). Significant downward trends were found for the Eastern Livestock and Western Livestock regions. A similar trend in counts was observed in the Cash Grain and Northeast Dairy region, but in the Southern Pasture region the trend was upward.

The statewide trend during the last 12 years has been upward. A

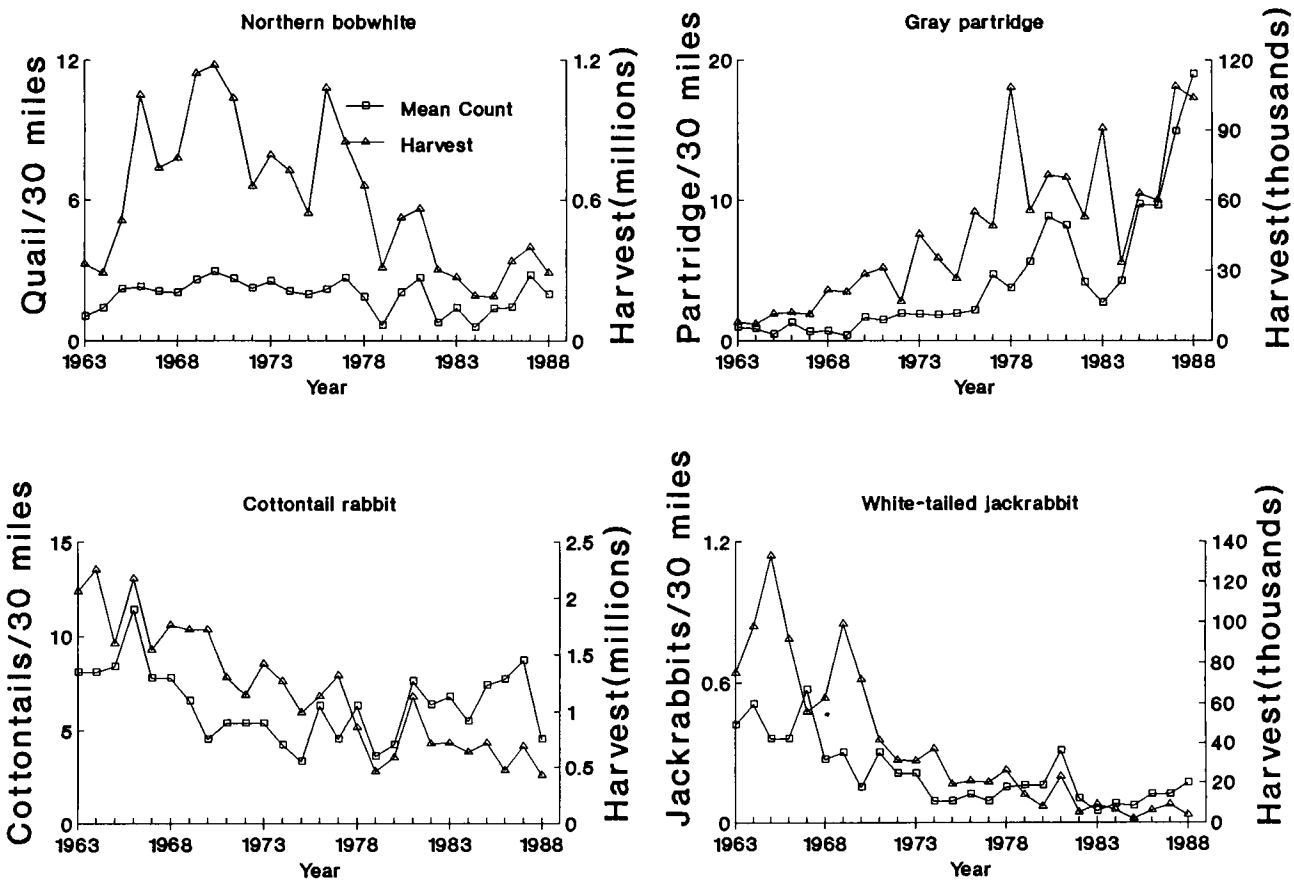


Fig. 6. The mean number of bobwhite quail, gray partridge, cottontail rabbits and white-tailed jackrabbits sighted per 30-mile route on the August roadside survey compared to the following fall's harvest.

significant upward trend was detected in the Southern Pasture region and an upward trend occurred in all regions except the Northeast Dairy.

Mean counts were correlated with harvest ($p<0.05$). However, the counts explain less than 20% of the variation observed in the harvest. The relationship between the counts and the harvest appears to have changed beginning in the mid to late 1970's (Fig. 6). A test of the hypothesis that the correlation for 1963-1976 was the same as that during 1977-1988 period (Steel and Torrie 1980) was rejected ($p=0.018$). The correlation coefficient during the last period was near zero.

This could indicate that the roadside survey no longer reflects fall population numbers, or more likely, it points out a weakness of this approach in validating the survey. This weakness is in the implicit assumption that the harvest reflects the actual abundance of the species during the fall. If this assumption is not correct for cotton-

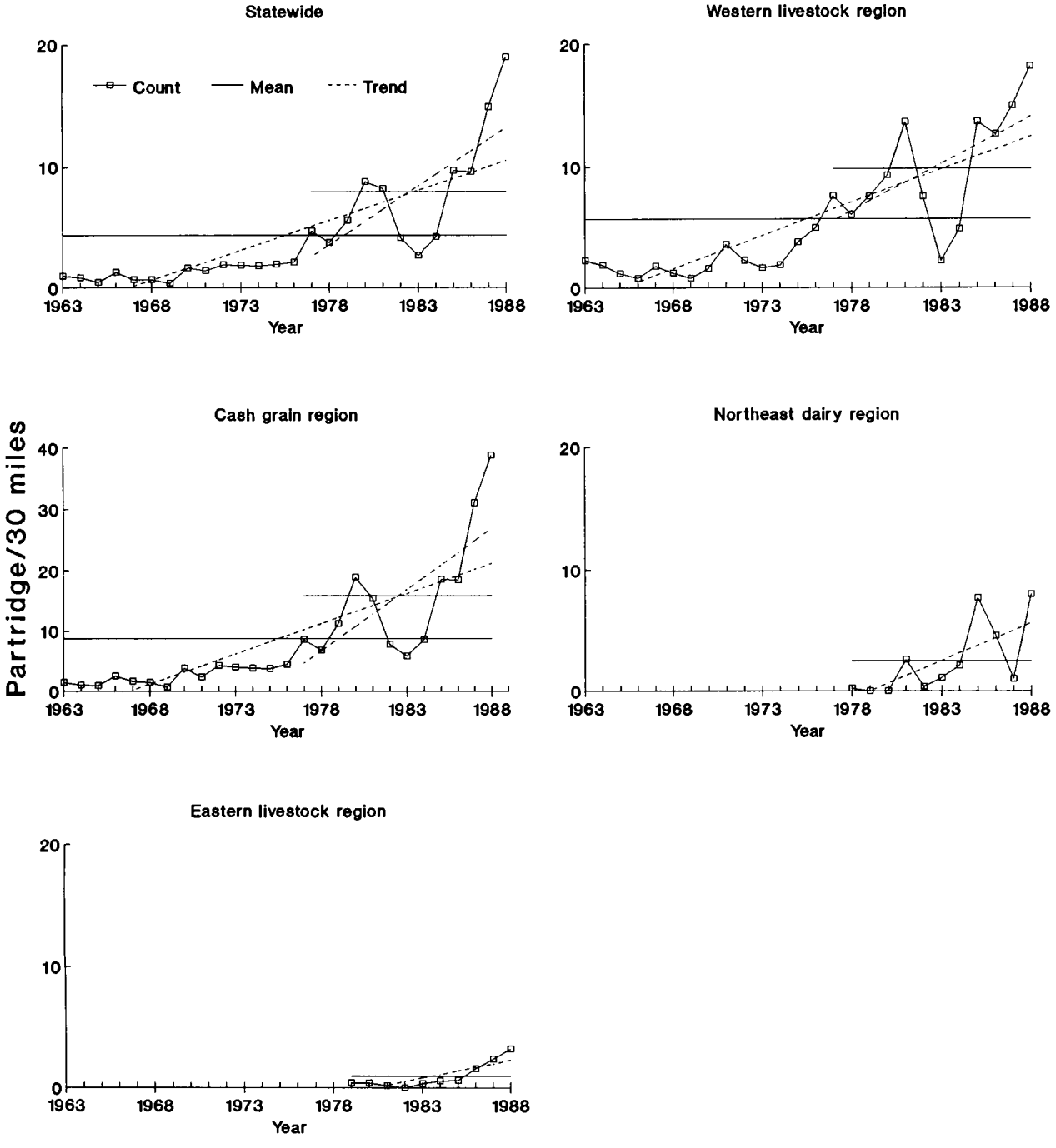


Fig. 7. The mean number of gray partridge sighted per 30-mile route on the August roadside survey. The longer solid horizontal lines represent the means for 1963 to 1988, the shorter for 1977 to 1988. The longer dashed lines are the least squares regression lines for 1963 to 1988, the shorter for 1977 to 1988.

tails, then any correlations would be spurious. For cottontails, the percentage of hunters pursuing rabbits decreased by over 25% from 1977 to 1986 while hunter numbers declined during the same period (Kienzler 1989). Cottontail harvest estimates could reflect the decline in hunter interest rather than an actural change in the population. Thus, even though no correlation with harvest was detected during the last 12 years, the roadside survey results may reflect actual changes in cottontail rabbit populations. Further studies would be needed to determine if this assumption is true. Although this problem potentially exists for the other species, the level of hunter interest for these species has remained fairly consistent (Fig. 9). Thus, harvest for these species is probably more reflective of actual fall populations.

White-tailed Jackrabbit

The trend in the mean number of jackrabbits sighted was significantly downward for 1963-1988 (Fig. 10). The rate of decline has decreased in the last 12 years and was not significant. Counts have

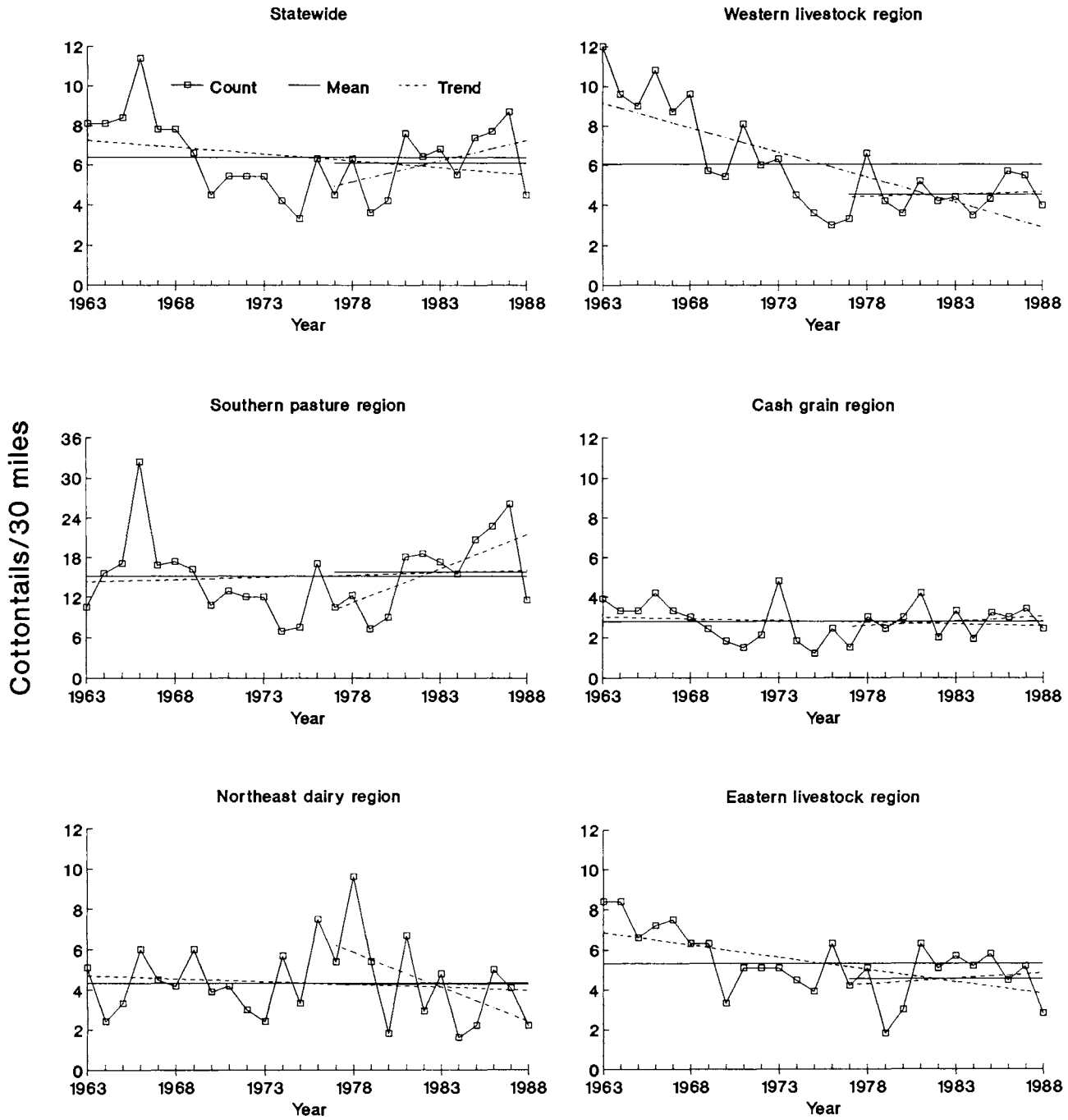


Fig. 8. The mean number of cottontail rabbits sighted per 30-mile route on the August roadside survey. The longer solid horizontal lines represent the means for 1963 to 1988, the shorter for 1977 to 1988. The longer dashed lines are the least squares regression lines for 1963 to 1988, the shorter for 1977 to 1988.

generally increased over the last 6 years. Regionally, counts were too inconsistent to be analyzed. The statewide count was highly correlated ($p<0.001$) with harvest estimates (Fig. 6).

CONCLUSION

Based upon criteria used in past studies (Schwartz 1974, 1975, Wooley et al. 1978), we conclude that the August roadside survey continues to provide an index to the fall population of pheasants, quail, gray partridge and jackrabbits in Iowa. For these species, the survey explains more than 50% of the variation in the following fall's harvest. The survey may also reflect changes in cottontail rabbit numbers but further studies are needed to confirm this assumption.

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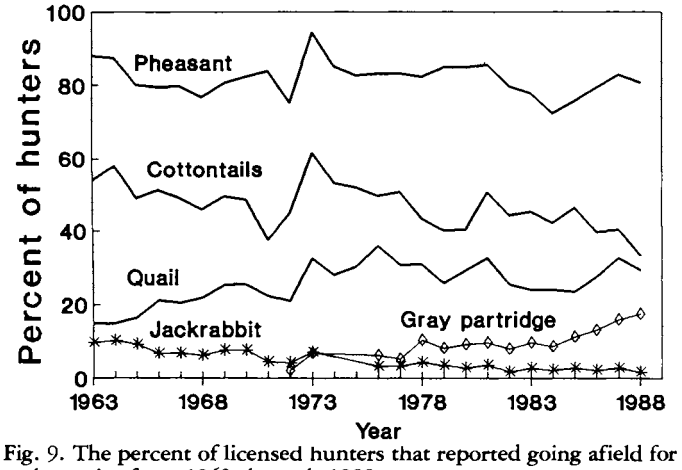

Fig. 9. The percent of licensed hunters that reported going afield for each species from 1963 through 1988.

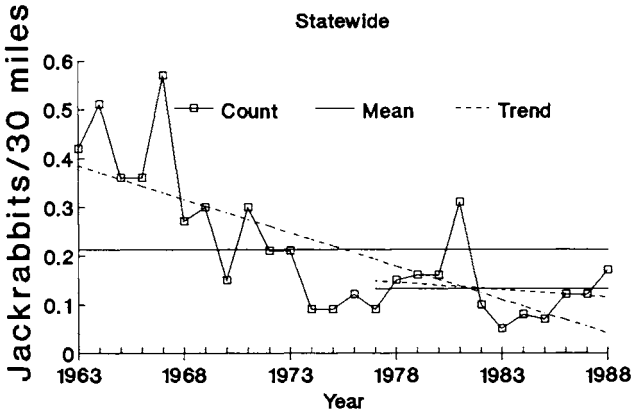

Fig. 10. The mean number of white-tailed jackrabbits sighted per 30-mile route on the August roadside survey, statewide. The longer solid horizontal lines represent the means for 1963 to 1988, the shorter for 1977 to 1988. The longer dashed lines are the least squares regression lines for 1963 to 1988, the shorter for 1977 to 1988.

REFERENCES

BENNETT, L.J. and G.O. HENDRICKSON. 1938a. Censusing the ringneck pheasant in Iowa. Trans. N. Amer. Wildl. Conf. 3:719-723.

_____. 1938b. Censusing quail in early fall. J. Wildl. Manage. 2:169-171.

EDWARDS, W.R. 1984. Early ACP and pheasant boom and bust - a historic perspective with rationale. Pages 71-83 *In* R.T. Dumke, R.B. Stiehl and R.B. Kahl eds. Perdix III. Wisconsin Dept. Natural Resources, Madison, WI. 203pp.

FARRIS, A.L., E.D. KLONGLAN and R.C. NOMSEN. 1977. The ring-necked pheasant in Iowa. Iowa Cons. Comm., Des Moines, IA. 147pp.

HENDRICKSON, G.O. 1939. Inventory methods for Mearms cottontail. Trans. N. Am. Wildl. Conf. 4:209-215.

JOSELYN, G.B. and J.E. WARNOCK. 1964. Value of federal feed grain to production of pheasants in Illinois. J. Wildl. Manage. 28:547-551.

KIENZLER, J.M. 1989. Game harvest surveys. Unpubl. Pittman-Robertson report. Iowa Dept. Nat. Res., Des Moines, IA. 87 pp.

KLINE, P.D. 1965. Factors influencing roadside counts of cottontails. J. Wildl. Manage. 29:665-671.

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

_____. 1962. Iowa late summer pheasant populations - 1962. Iowa Cons. Comm. Q. Rep. 14(3):12-22.

KOZICKY, E.L. 1952. Variations in two spring indices of male ring-necked pheasant populations. J. Wildl. Manage. 16:429-437.

KOZICKY, E.L., G.O. HENDRICKSON and P.G. HOMEYER. 1952. The adequacy of the fall roadside pheasant census in Iowa. Trans. N. Amer. Wildl. Conf. 17:293-305.

KOZICKY, E.L., R.J. JESSEN, G.L. HENDRICKSON and E.B. SPEAKER. 1956. Estimates of fall quail populations in Iowa. J. Wildl. Manage. 20:97-104.

NOMSEN, R.C. 1953. Crowing cock count. Proc Iowa Acad. Sci. 60:700-706.

SCWARTZ, C.C. 1973. The bobwhite in Iowa - 1972. Iowa Cons. Comm. Res. Bull. No. 5. Des Moines, IA. 20 pp.

_____. 1974. Analysis of survey data collected on bobwhite quail in Iowa. J. Wildl. Manage. 38:674-678.

_____. 1975. Analysis of cottontail and white-tailed jackrabbit surveys. Iowa Cons. Comm. Res. Bull. No. 14. Des Moines, IA. 17 pp.

STEEL, R.G. and J.H. TORRIE. 1980. Principles and procedures of statistics. McGraw-Hill Co., New York. 633 pp.

STEMPLE, M.E. 1962. Calling quail in Iowa, 1962. Iowa Cons. Comm. Q. Rep. 14(3):23-26.

TAYLOR, M.W., L.W. WOLFE and W.L. BAXTER. 1978. Land-use change and ring-necked pheasants in Nebraska. Wildl. Soc. Bull. 6:226-230.

VORIS, J.C. 1956. Factors influencing the summer roadside counts of the cottontail rabbit in south-central Iowa. M.S. Thesis. Iowa State Univ., Ames, 61 pp.

WAITE, P. 1982. Special weather summary - January 1982. Iowa Climatological Data. 93:29.

WAITE, P. 1983. Special weather summary - December 1983. Iowa Climatological Data. 94:24.

WAITE, P. 1983a. Special weather summary - June 1983. Iowa Climatological Data. 94:27.

WAITE, P. 1984a. Special weather summary - December 1984. Iowa Climatological Data. 95:29.

WAITE, P. 1984b. Special weather summary - June 1984. Iowa Climatological Data. 95:28.

WAITE, P. 1985a. Special weather summary - June 1985. Iowa Climatological Data. 96:27.

WAITE, P. 1985b. Special weather summary - February 1985. Iowa Climatological Data. 96:29.

WAITE, P. 1986a. Special weather summary - June 1986. Iowa Climatological Data. 97:29.

WAITE, P. 1986b. Special weather summary - January 1986. Iowa Climatological Data. 97:30.

WAITE, P. 1987. Special weather summary - February 1987. Iowa Climatological Data. 98:30.

WARNER, R.E. and S.L. ETTER. 1986. The dynamics of agriculture and ring-necked pheasant populations in the corn belt, USA. World Pheasant Assoc. J. 11:76-89.

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 Cons. Comm. Res. Bull. No. 24. Des Moines, IA. 22 pp.