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RESEARCH REPORT 48

MANAGEMENT OF PHEASANT NESTING COVER ON UPLAND SITES IN RELATION TO CROPLAND DIVERSION PROGRAMS

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ABSTRACT

With the advent of Federal cropland diversion programs in the mid-1950's, significant acreages of cropland within Wisconsin's pheasant range have been diverted from agricultural production, offering management opportunity of unparalleled potential for improvement of pheasant production. Between 1961 and 1968, during which the scope of these programs was maximum, diverted acres within the primary pheasant counties of the state averaged nearly ½ million acres, roughly 11 percent of all cropland and 7 percent of the total land area.

Several lines of evidence have demonstrated clear benefits of cropland diversion to Wisconsin pheasants: (1) During the period 1959-1966, rates of increase in county kill statistics were directly correlated with the percentage of county cropland diverted from crop production. (2) On an intensive study area in Fond du Lac and Green Lake Counties, at least a 10 percent increase in pheasant production during 1961 to 1964 was attributable to cropland diversion. (3) In numerous local instances, dramatic short-term changes in pheasant numbers have been associated with temporary provision of nesting cover through cropland diversion.

Unfortunately, benefits of cropland diversion to pheasants have been largely incidental and only a fraction of the full potential has been realized. On study areas in east central Wisconsin, only 36 percent of the diversion acreage was intentionally or unintentionally managed along lines favorable to pheasant nesting. Managing more of such land to allow for better nesting cover would greatly enhance the ability of pheasants to maintain their numbers and provide pheasant hunting on private lands.

Specific suggestions are offered for the establishment and maintenance of nesting cover on diverted cropland, including plant materials and seeding rates, field size and shape, and subsequent management to promote maximum utilization by nesting birds. Broad changes in cropland diversion which would facilitate needed types of management include: (1) Emphasis on long-term instead of annual diversion contracts, (2) Incentives encouraging management diverted cropland for the purpose of pheasant nesting cover, and (3) Prohibition of cover disturbance, particularly clipping, during the major period of pheasant nesting. Most importantly, attitudes should be encouraged that publicly financed programs as expensive as cropland diversion should be multiple-purpose in scope in order to realize as many side benefits to society as possible. Improved recreational opportunity through increased pheasant production is one such benefit that could be realized from minor changes in the basic framework of cropland diversion.

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INTRODUCTION

Capacity of ring-necked pheasants (Phasianus colchicus) to maintain huntable population densities in Wisconsin depends importantly on secure nesting cover, i.e., cover free from agricultural or other disturbance during the critical period of egg-laying and incubation. Over most of Wisconsin's pheasant range, wetlands are the major source of such cover and preservation of wetland habitat is critically needed to ensure pheasant hunting in the future. If pheasant populations are to be improved, secure nesting cover must also be provided on upland sites.

Each cropland acre devoted to pheasant management is an acre removed from agricultural production, or at least significantly devalued in income-producing potential to the private landowner. Unfortunately, direct economic returns from pheasant management have not been sufficient to compensate for loss of farm income, nor have game management funds been sufficient to underwrite more than a token of the costs involved. Management incentive on private lands, apart from shooting preserves, has therefore been virtually absent.

In recent years, Federal cropland diversion programs* have tended to break this impasse. Under various forms of cropland diversion since the mid-1950's, annual payments for removing land from agricultural production have been available with rates of payment competitive with other forms of income production. In instances where cover crops have been maintained on diverted acreages, valuable pheasant nesting cover has been provided.

While cropland diversion appears to be of significant value to Wisconsin pheasants, only a small fraction of the potential benefits have, in fact, been realized. Too often, diverted acres are maintained in cover unattractive to nesting pheasants, or nests are destroyed because of untimely and often unnecessary cover destruction. The purpose of this report is 3-fold: (1) To bring together an extensive backlog of field experience demonstrating the importance of cropland diversion to Wisconsin pheasants, (2) To emphasize the potential benefits that might accrue with greater attention to wildlife values, and (3) To furnish management guidelines for capitalizing on this potential.

To meet these objectives, three principal sources of data are drawn upon: (1) A long-term study of pheasant nesting in east central Wisconsin in which nesting use of diverted cropland was evaluated in connection with alternative cover available for nesting, (2) Evaluation of a 1964-67 pilot project in which Federal cost-sharing was provided for establishment of cover specifically recommended for pheasant nesting, and (3) A current study on the Waterloo Wildlife Area in which techniques for production and management of nesting cover are being developed and refined.

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* The development of these Federal programs since 1956 has been accompanied by changes in terminology. At first they were called land retirement programs. The term land retirement was felt to have unfavorable connotations and so was replaced by land conversion. This term lasted only a short time; cropland diversion is now most widely used.

In Wisconsin, as elsewhere in the midwest, pheasant biologists unanimously regard the coattails of Federal cropland diversion programs as the only effective type of pheasant management on private lands. By comparison, the maximum scale of management possible with state conservation funds pales into insignificance. Our hope is that recommendations in this report will be considered by appropriate Federal agencies and will contribute to better recognition and greater enhancement of wildlife values under future cropland diversion plans.

REVIEW OF FEDERAL CROPLAND DIVERSION PROGRAMS

On May 28, 1956, the Agricultural Act of 1956, popularly known as the Soil Bank Act, was formally signed into law. Under this Act, Federal financial assistance was offered to farmers who voluntarily shifted all or a portion of their cropland from production of over-supplied farm commodities into grasses, trees, wildlife food and cover, or other soil- and water-conserving uses. Enrollment in Soil Bank continued through 1960, the final year that new sign-ups were authorized.

After 1960 a succession of similar controls on crop production were authorized -- the Feed Grain Program (FG) in 1961, the Cropland Conversion Program (CCP) in 1963, and the Cropland Adjustment Program (CAP) in 1966, each administered by the Agricultural Stabilization and Conservation Service (ASCS) of the U. S. Department of Agriculture (USDA).

Soil Bank Program

The Soil Bank Program actually consisted of two parts. The Acreage Reserve (AR) specifically aimed at reducing production of certain allotment crops, which in Wisconsin were wheat, corn, and tobacco. Farmers agreed to reduce their acreage of allotment crops by the number of acres enrolled in AR. Payment rates varied between crops, between states, and between farms, depending on per-acre yields in previous years. Sign-up was strictly on a year-to-year basis and after the 1958 crop year AR was discontinued. The scope of AR in Wisconsin in 1957-58 is shown in Table 1. Because of its brief duration and limited scope, AR was probably not as beneficial to pheasants as were subsequent forms of cropland diversion.

The Conservation Reserve (CR) was the long-range aspect of the Soil Bank, designed to divert land from generalized crop production under 3-, 5-, or 10-year contracts. Eligible lands for CR consisted of all acreages from which crops were normally harvested. Annual payments consisted of cash rentals; cost-sharing of up to 80 percent was available for certain conservation practices in the year these measures were carried out, e.g., establishment of permanent cover crops, tree planting, pond construction, and development of wildlife food and cover. In general, empahsis under CR was on whole-farm diversion, and contract provisions during its term were gradually modified to encourage farmers to enroll the maximum eligible acreage. The last of the CR contracts in Wisconsin will expire in 1970.

TABLE 1

Statewide Wisconsin Acreages Enrolled in Various Cropland Diversion Programs[1]

Year	Acreage Reserve	Conservation Reserve	Feed Grain	Cropland Adjustment Program	Totals
1957	150,800	123,500	--	--	274,300
1958	190,400	169,600	--	--	360,000
1959	--	542,400	--	--	542,400
1960	--	763,400	--	--	763,400
1961	--	748,900	549,100	--	1,298,000
1962	--	674,000	622,100	--	1,296,100
1963	--	637,000	711,900	--	1,348,900
1964	--	358,700	817,500	--	1,176,200
1965	--	210,100	883,300	--	1,093,400
1966	--	204,400	859,800	211,400	1,275,600
1967	--	184,000	586,200	211,400	981,600
1968	--	170,300	784,900	211,400	1,166,600

[1] Excluding acreages under the Cropland Conversion Program and the Special ACP Pheasant Nesting Cover Project, both of which were insignificant in the overall statewide picture.

At the height of CR in 1960, nearly 3/4 million acres in Wisconsin were under contract, amounting to 6.2 percent of the state's total cropland and roughly 2.2 percent of the land area (Table 1). Within the major pheasant range,* 5.5 percent of the cropland and 3.5 percent of the land area was diverted from crop production under CR.

In terms of pheasant potential, CR had a number of advantages as well as disadvantages over subsequent forms of cropland diversion. Long-term diversion contracts were its chief merit. These contracts allowed for development of semipermanent cover which persisted from one growing season to the next as a source of residual cover for early nesting the following spring. Among its drawbacks, CR payments were sufficiently low that major

* Confined principally to the 20 southeastern-most counties of: Calumet, Columbia, Dane, Dodge, Fond du Lac, Green, Green Lake, Jefferson, Kenosha, Manitowoc, Marquette, Ozaukee, Racine, Rock, Sheboygan, Walworth, Washington, Waukesha, Waushara, and Winnebago.

appeal was in areas of marginal or submarginal agricultural productivity, areas traditionally supporting low or at best mediocre pheasant densities. Another disadvantage was emphasis on whole-farm retirement, resulting in less-than-optimum interspersion of nesting cover with other habitat requirements.

Feed Grain Program

The Soil Bank was superseded in 1961 by the Feed Grain Program (FG), which is the only cropland diversion program still in effect. As with AR, Feed Grain has been strictly an annual program, its purpose being to reduce production of certain livestock feeds, notably corn, barley, and grain sorghums and to divert individual fields rather than whole farms. Higher diversion payments than under CR, plus the greater flexibility of 1-year contracts, has promoted wide acceptance of FG among Wisconsin farmers and has led to increased acreages of more productive farmland being diverted from crop production. In recent years up to 50 percent of the eligible farmers in certain Wisconsin counties have participated in the program.

Under FG, farmers agree to maintain the same amount of land in forage crops and other conserving uses, meanwhile diverting from crop production 20-50 percent of their feed-grain base, or they divert 25 acres, whichever is greatest. Payment is based on the farm's estimated normal yield per acre. Except under emergency conditions, no harvest is allowed on diverted acres nor is grazing permitted before October 1. Unless permission is obtained for summer fallows, cover crops are required on all diverted acres.

Between 1961 and 1968, FG lands in Wisconsin averaged nearly 3/4 million acres (Table 1). Within the major pheasant range, land under FG contract during this period averaged 7.4 percent of the cropland and 4.7 percent of the land area.

Largely because of annual contracts which do not ensure long-term cover, land diverted under FG hastened to be less attractive as nesting cover than land under CR. For the most part, FG benefits to pheasants have been restricted to situations in which individual farmers diverted the same field from cropping 2 or more years in succession, or they diverted fields already vegetated by fairly dense cover. Potential advantages of FG over CR were 2-fold: (1) In diverting larger amounts of more productive farmland from crop production, generally in the better pheasant areas of the state and (2) In promoting better interspersion of diverted-land cover over the agricultural landscape through de-emphasis of whole-farm diversion.

Cropland Conversion Program

Authorized by the Food and Agriculture Act of 1962, the Cropland Conversion Program (CCP) aimed at taking land out of agricultural production and diverting it to recreational uses with income-producing potential

for the private landowner. In 1963, federal appropriations were made to underwrite CCP pilot projects that might eventually find long-range application on a national scale. Several pilot projects were proposed for Wisconsin and received preliminary approval by USDA. One of these projects, on an experimental area in Dodge County, proposed to manage diverted cropland specifically for pheasant nesting. Landowners in the area showed genuine interest in the project; however, CCP payments finally authorized by USDA were prohibitively low in comparison with diversion rates simultaneously available under FG. Income farmers might have received from hunting fees would have been too little to bridge the gap between the CCP and FG payments. As a result, the proposal failed. Other CCP pilot projects eventually activated in Wisconsin were for the most part outside the major pheasant range or involved practices of no significance to pheasants.

Special ACP Pheasant Nesting Cover Project

The Agricultural Conservation Program (ACP) is a national program in which the Federal government shares with the landowner the expense of applying certain conservation practices on the individual farm. In 1964-65, a special ACP project was authorized for Dodge and Jefferson Counties, in which 90 percent cost-sharing was offered as an incentive for development of pheasant nesting cover and winter food patches. Cost-sharing covered only cover establishment, but enrollees were required to maintain nesting cover at least 3 years following the year of establishment. Methods of seedbed preparation, seed mixtures, and seeding rates were developed by personnel of the University of Wisconsin Department of Agronomy, the Soil Conservation Service, and the Wisconsin Department of Natural Resources (DNR) and were incorporated as basic project provisions. An additional incentive of $5.00 per acre per year was offered 1964 enrollees by DNR.

Farmers had the option of applying these practices to land simultaneously covered by a diversion contract, although these practices were not contingent upon cropland diversion. Many in fact did so, hence providing cover specifically recommended for pheasant nesting on diverted cropland and ensuring its existence for a 3-year period. On land not covered by diversion contract, ACP provisions allowed for hay harvest or light grazing between July 10 and September 1.

In total, 584 acres of nesting cover were established in the 2-county area in 1964-65, the last of which elapsed from contract in 1968. Results of an evaluation of these practices made by DNR biologists are incorporated in the present report.

Cropland Adjustment Program

The Cropland Adjustment Program (CAP) was established by the Food and Agriculture Act of 1965. Initially authorized through 1969, congressional funding was withdrawn in 1968, so CAP contracts were offered only in 1966 and 1967, Objectives of CAP were to encourage long-term diversion of cropland to conservation uses, among which wildlife production and harvest were

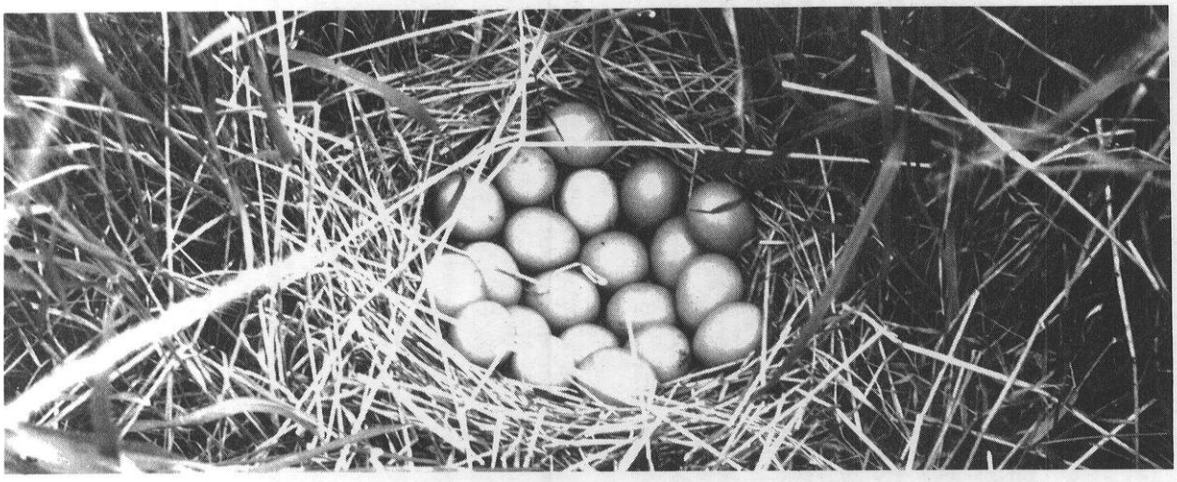
major considerations. Cost-sharing was available for game management practices such as establishment of pheasant nesting cover. Contracts were for 5- or 10-year periods with additional payments offered as incentives to farmers who opened CAP lands to regulated public use. An earlier report on the status of farm-game wildlife in Wisconsin (Natural Resources Committee of State Agencies,(1964) was instrumental in promoting game-management aspects of CAP.

Over 200,000 acres of CAP lands presently exist in Wisconsin (Table 1). About 38 percent are within the primary pheasant range, and constitute 1.8 percent of the cropland and about 1.1 percent of the land area. On a per-acre basis, CAP has doubtless been the most favorable form of cropland diversion to Wisconsin pheasants, combining the desirable features of long-term diversion under CR with de-emphasis of whole-farm diversion and better scattering of diverted acres under FG. Provision for public hunting on CAP lands also has added to game management values of the program.

Overall Scope of Cropland Diversion in Wisconsin

Cropland diversion has become a significant feature of Wisconsin's land use (Table 1). In 1961-68, the combined acreage of all cropland diversion programs in the state averaged 1.2 million acres. Within the primary pheasant range, an annual average of nearly ½ million acres were diverted from crop production; this acreage is roughly 11 percent of all cropland and 7 percent of the total land area. By ecological standards this represents a very substantial part of the landscape, certainly large enough to have a significant population effect if diverted acres could be managed to favor pheasant production.

Among current trends in Wisconsin land use, land diversion is among the few changes clearly favorable, or at any rate potentially favorable, to pheasant welfare. Arranged against adverse effects of earlier hay mowing, drainage of wetlands, and other forms of cover destruction, land diversion could go a long way in offsetting disappearance of secure nesting cover. To reiterate, the present scale of these programs is overwhelming compared with acreage of private lands on which management could be financed by DNR.



EVIDENCE CONCERNING THE SIGNIFICANCE AND USE OF DIVERTED ACRES BY PHEASANTS

Wisconsin Findings

Response of Statewide Pheasant Populations

Annual estimates of the statewide pheasant kill, reasonably reliable as an index to population trends (Wagner et al. 1965), show the most recent peak in Wisconsin pheasants during the mid-1950's when fall harvests averaged around ½ million. Severe winter losses were sustained throughout the major pheasant range in 1958-59, after which annual harvests dropped by nearly half. Kills barely exceeded ¼ million in 1959 and 1960, the lowest recorded annual harvest since 1938. In general, populations of the 1960's have shown slow but steady improvement, with harvests for every year since 1966 topping the 400,000 mark. Maximum acreages of diverted cropland were present in Wisconsin during the period of population recovery, (Table 1), and it is logical to examine available evidence for a relationship between the two.

Kill estimates were tabulated for each of the major pheasant counties from 1959 to 1966 and the percentage change calculated between the 2-year means for 1959-1960 versus 1965-1966. Though county kill figures are subject to numerous imperfections, trends for individual counties were remarkably smoother than would be expected if degree of bias was highly variable between years, suggesting their validity as a rough approximation of the magnitude of population change over the interval selected. We then totaled the 1961-66 acreage of diverted cropland for each county (Conservation Reserve, Feed Grain and Cropland Adjustment Program), calculated its average percentage of total cropland, and plotted it against population change (Fig. 1).

Taking all 20 counties into consideration, the correlation between the two variables was only 0.20, far short of statistical significance. At least three counties (Marquette, Green Lake, and Waushara), however, should be excluded from analysis since acreages of good pheasant range there are relatively small and land diversion is concentrated in areas lightly populated or uninhabited by pheasants. The 17 remaining counties produced a correlation of 0.50, significant at the 5 percent level (reference value with 15 df = 0.48). Considering the imprecision of county kill figures, plus the disadvantage of relying on political rather than ecological land units in such an analysis, Figure 1 suggests a definite association between abundance of diverted cropland and rates of population recovery after 1959-1960. Our conclusion is that cropland diversion seems to have played a significant role in the dynamics of statewide pheasant populations.

Results of 1959-1965 Nesting Studies

A more clear-cut evaluation of cropland diversion was part of a long-term study of pheasant nesting in Fond du Lac and Green Lake Counties in 1959-1965. Cropland diversion aspects of this project have already been published (Gates and Ostrom, 1966) but bear repetition here.

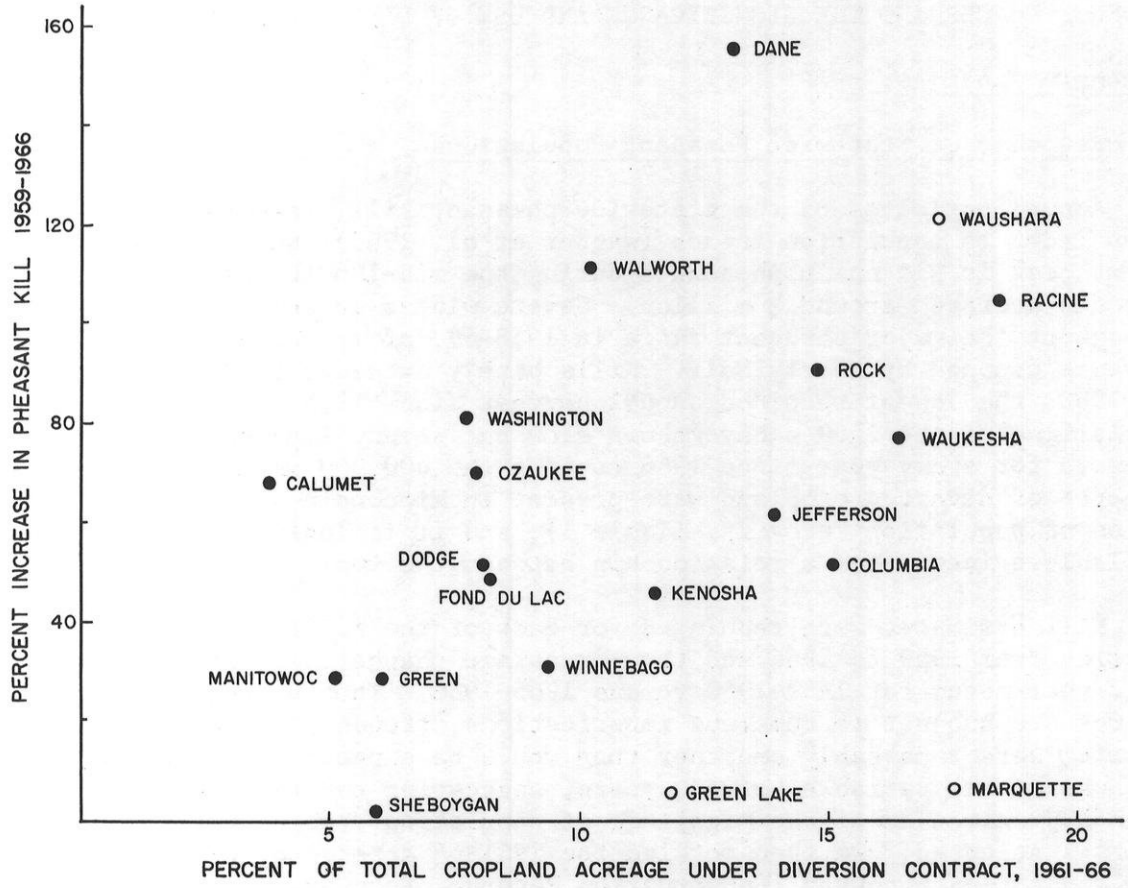


Figure 1. Relationship between the total acreage of diverted cropland, 1961-66, and percentage change in county kill figures, 1959-66 for the major pheasant range in Wisconsin. Counties designated by O have been excluded from the analysis.

Two study areas totaling 7,600 acres were searched for pheasant nests according to sampling procedures which allowed pheasant production to be measured in all potential nesting cover. During 1961-64, cropland diverted under the Feed Grain Program comprised 4.3 percent of the land area, about half of which was maintained in cover types suitable for pheasant nesting -- either grass-legume mixtures otherwise mowed for hay or lowland tract cover that reverted to natural succession. The remainder of the diverted acreage, about equally divided between summer-fallow and small-grain cover crops, was not used for nesting.

On the average, nesting use and hatching success on diverted lands were higher than in nondiverted cover (Table 2). Even though additional nesting cover provided by cropland diversion made up only 2.4 percent of the landscape, its contribution in successful nests comprised 17 percent of the calculated total, second only to wetlands in overall importance to brood production. To assess the true value of Feed Grain Program lands to the population, however, it was necessary to consider how production might have fared in its absence.

TABLE 2

Pheasant Production by Cover Type Observed on 7,600 Acres in Fond du Lac and Green Lake Counties, 1961-64*

Cover Type	Nests Found		Percent Success	Calculated Production**		Percent of Total Successful Nests
	Total Nests	Nests per 100 Acres		Total Nests	Successful Nests	
Feed Grain Program lands						
Unmowed hayfields	51	29.6	60.8	128	78	8.3
Diverted lowlands	36	46.2	55.5	144	80	8.4
Subtotal	87	34.8	58.6	272	158	16.7
Nonprogram lands						
Strip cover[1]	163	92.1	23.9	604	145	15.4
Wetlands	170	27.7	45.3	1,333	513	54.5
Mowed hayfields	189	15.9	11.1	727	81	8.6
Peas	24	8.1	0.0	171	0	--
Small grains	7	1.5	57.2	78	45	4.8
Subtotal	553	20.3	25.5	2,913	784	83.3

* Adapted from earlier publication of these statistics (Gates and Ostrom 1966).

** Calculated from stratified random sampling of each potential nesting-cover type.

1 Includes fencerows, roadsides, and ditch banks.

Under provisions of the Feed Grain Program, virtually all diverted acres in the area would otherwise have been planted to corn, a crop not used for nesting. Hence it is reasonable to assume that the 272 clutches in retired cropland would otherwise have been randomly distributed in nondiverted cover and would have experienced the observed 26 percent average hatching rate of the latter. Under such an assumption, 72 successful clutches would have been produced, versus 158 actually estimated on diverted lands. The net increase in successful nests attributable to cropland diversion was therefore 86, a production gain averaging 10 percent. In general, reproductive success on these two study areas was considerably enhanced by land cropland diversion, and if better reproductive success in one year were followed by higher breeding populations the next, then long-term benefits must have been even greater than indicated.

However, alternative sources of nesting cover, chiefly wetlands, were comparatively abundant in this study and acreages of diverted cropland were below average for Wisconsin pheasant range. Accordingly, diverted acres may have been proportionally less important as nesting cover than in many other parts of the state and their net contribution to reproductive success, even lower than elsewhere.

Evaluation of 1964-1967 ACP Project

At the conclusion of the 1967 nesting season, nest searches were conducted on diverted cropland in Dodge and Jefferson Counties where nesting cover had been established under the special ACP practice. A random sample of 51 acres in 17 fields was examined. Nine pheasant nests and 2 duck nests were found -- a density of 18 pheasant nests per 100 acres. Two of the pheasant clutches were successful, 6 were unsuccessful, and the fate of the other could not be determined.

Significance of these data was difficult to evaluate in absence of comparative results from alternative types of nesting cover. Nest densities appeared to average somewhat lower on ACP diverted land than in similar cover types (unmowed hayfields) in the Fond du Lac - Green Lake County study (Table 2); however, this was to be expected because pheasant densities also differed between the two areas. It was clear in any event that cover established by ACP on diverted acres was used by nesting hens.

Response of Local Populations

The Waupun Study Area, within which were located the two Fond du Lac-Green Lake County nesting-study areas, covered 42 sq miles. Pheasant populations on this area were closely associated with wetland cover, and large sections devoid of wetlands supported few or no pheasants. Importance of nesting cover to this population, and probably to pheasants throughout the state, was unequivocally demonstrated where cropland diversion temporarily provided disturbance-free cover previously absent or in critically short supply.

To recount but a single instance, in 1962 a 25-acre field on a 200-acre dairy farm was enrolled in the Feed Grain Program. Agriculture was particularly intensive in this area of level terrain and highly fertile

prairie-derived soils. The nearest wetland was over 2 miles distant and nonagricultural cover available to nesting birds was restricted to roadsides and fencelines. In 1959-1962, spring censuses within a mile radius of this farm averaged only 2 territorial cocks and an estimated 10-15 breeding hens. Summer brood observations prior to 1962 also confirmed a very low pheasant population. A rough index to fall populations in the vicinity was available from results of September nightlighting in which pheasants were captured and marked for investigation of movement and survival; only 17 birds were captured in 1960-1961 in small-grain stubble within a 1-mile radius of the farm.

At time of initial sign-up in 1962, composition of the field was alfalfa-brome which had been previously mowed and harvested for hay. Diversion contracts were renewed in 1963 and 1964, during which time lack of disturbance produced a rank undergrowth of cover ideal for nesting. By the spring of 1963 a notable upswing in local pheasant numbers was already apparent. The number of breeding hens within a mile radius was estimated at 36 in 1963 and 46 in 1964. Brood counts showed a sharp increase in summer production, and nightlighting success in the vicinity, based on less effort than expended in previous years, jumped to 31 captures in 1963 and 66 in 1964. Excellent hunting success was experienced in the vicinity of the farm in both autumns. Where few if any pheasants previously wintered in the area, a nearby shelterbelt held flocks of 35-50 birds during the winters of 1963-64 and 1964-65. Despite the crudeness of these population indices, a dramatic local response to cropland diversion was undeniable. During the same period, study area populations at large increased only about 40 percent.

Diversion of this field ended with the 1964 crop year, and in late May of 1965 the entire tract was forage-chopped and blown back onto the field to facilitate spring plowing. Cursory examination before plowing revealed at least 9 active pheasant nests and 4 nesting hens destroyed by farm machinery. Brood counts in 1965 showed a comparative dearth of summer production and the spring census of 1966 dropped to an estimated 18 hens in the vicinity. Reversal of population trends left little room for doubt that the temporary period of pheasant prosperity was directly related to cropland diversion.

Many similar examples could be cited showing short-term buildup and decline in local pheasant numbers associated with cropland that has been diverted and then returned to agricultural production. Laboratory experiments could not better demonstrate the importance of secure nesting cover to Wisconsin pheasants.

Findings Elsewhere

On an intensively cultivated area in east central Illinois, Joselyn and Warnock (1964) reported on the significance to nesting pheasants of land diverted under FG. In a 2-year study, brood production on diverted cropland made up 33 percent of the total. Since most of the diverted acreage would otherwise have been planted to row crops lightly used by nesting hens in Illinois, most of this production represented a net gain to the population. Joselyn and Warnock concluded that the Feed Grain program contributed significantly to pheasant production.

In South Dakota, Dahlgren (1967) examined the relationship between the cropland diversion and trends in statewide pheasant populations. In the mid-1950's, before Soil Bank, South Dakota's fall pheasant population fluctuated between 4 and 6 million. At the height of cropland diversion in that state, in the late 1950's and early 1960's, populations averaged nearly twice as high -- between 8 and 11 million. With progressive expiration of Soil Bank contracts in the current decade, Dahlgren showed a generalized correlation between year-to-year population decline and statewide acreages withdrawn from diversion and returned to agricultural production.

In south central Minnesota, Nelson and Chesness (1964) reported that 10 percent of the total pheasants on their study area laid clutches and brought off broods on land diverted under the Feed Grain program. In this particular study the potential value of diverted cropland to pheasants was believed to be considerable; however, benefits were seriously compromised by preponderance of second-rate nesting cover and frequent disturbance due to clipping or plowing at the height of nesting. Nelson and Chesness concluded that cropland diversion could be highly useful in improving pheasant populations and pheasant hunting on private farmlands.

Conclusions

Cropland diversion has clearly provided significant benefits to pheasants, both in Wisconsin and in other states where similar evaluations have been conducted. It is also clear that management of diverted acres for the purpose of pheasant production would produce much greater population increases.

For example, in the Fond du Lac-Green Lake County study, nearly half of all diverted acreages were maintained in cover types not used for nesting. Of the remainder, about one-third were clipped at the peak of nesting because of real or imagined need for weed control and thus contributed little or nothing to brood production. On the average, only 36 percent of the diversion acreage was unintentionally managed along lines favorable to pheasants. Yet this small acreage accounted for no less than a 10 percent gain in reproductive success, giving insight into the possible benefits that might result under a system of land-retirement that accorded pheasant management rightful status as a multiple-use objective.

MANAGEMENT RECOMMENDATIONS

Background

As background for management recommendations which follow, it is pertinent to review certain ecological principles of pheasant nesting under Wisconsin conditions. Discussion is based largely on 1959-65 nesting studies in Green Lake and Fond du Lac Counties. Subsequent management recommendations drew most heavily on data from the Waterloo Wildlife Area in Dodge and Jefferson Counties.

Major types of nesting cover in Wisconsin, apart from retired cropland, consist of wetlands, strip cover (roadsides, fencelines, and ditch banks), hayfields, peas, and small grains. Among these, the first three are of primary importance. Contrary to many other states, farm woodlots and small grains receive proportionally light nesting use.

In normal springs, egg-laying begins in mid-to late April, with the large majority of all hens in full egg production or already incubating clutches by the first week in May. At this season, new growth of crops is insufficient for nest concealment and nesting is necessarily concentrated in left-over residual cover from the previous growing season. Three cover types furnish the bulk of this residual cover: wetlands, strip cover, and diverted cropland where plant material has not been removed or destroyed during the previous growing season.

In general, wetlands are preferred over strip cover for early nesting and are characterized by higher rates of hatching success. Areas with abundant wetland cover thus afford better chances of early nest success and are generally characterized by higher rates of pheasant productivity. Where early nesting is concentrated in strip cover, high nest mortality typically occurs because of the ease with which these cover types can be hunted by nest predators. On these grounds, one of the broad aims of

Early nesting is concentrated mainly in permanent cover where nest concealment is dependent on carry-over of residual plant material from previous growing seasons. Where wetlands are common, these serve as the primary source of early nesting cover and are highly favorable to production because of high hatching success. Recent nesting studies show better than 40-percent hatching success in wetland cover.

Where wetlands are absent or in short supply, early nesting hens are forced to rely on less secure nest sites, for example, ditch banks or fence rows (shown here). These commonly serve as travel lanes for nest predators, resulting in low rates of hatching success under which population maintenance is impossible without alternative sources of nesting cover. In an average year, less than 20 percent of the nests found on these less secure sites are successful.

land diversion should be provision of residual cover which will be available throughout the nesting season. Need is especially critical in areas of limited wetland availability where nesting hens are forced to rely on less secure nest sites.

In most years, hayfields and other cropland do not provide adequate nest concealment until early to mid-May, but subsequently receive heavy use for nesting. Much of the nesting on cropland consists of renests. In the Fond du Lac-Green Lake County studies, over 75 percent of all nests in hayfields belonged to hens whose nests had previously failed elsewhere. Unfortunately, the large majority of these renests are doomed to destruction by hay mowing and other harvest operations. Allowing at least 5 weeks for egg laying and incubation, only the earliest clutches established on cropland have adequate time to succeed before hay-cutting in early to mid-June. The result is widespread destruction of both nests and incubating hens.

In the above-mentioned studies, 86 percent of the hayfield nests were destroyed by farm machinery and 40 percent of the nesting hens were killed outright or seriously maimed in mowing accidents. Because of the attenuated starting dates of renest clutches, even lengthy delays in hay harvest would not have avoided serious production losses. To insure 40 percent hatching success in hay, hay mowing would have to be delayed to July 1, and 60 percent success, to July 15. Accordingly, another

management goal of cropland diversion should be to minimize cover disturbance through mid-July, and longer if possible, to ensure maximum rates of nest success.

As a rule of thumb, it appears that pheasants in Wisconsin are unable to maintain population levels when hatching success is less than 30 percent. Only wetlands and diverted cropland consistently have a higher percent hatching success (Table 2). All remaining cover types, apart from small grains which are seldom used for nesting, may be regarded as liabilities as far as pheasant production is concerned. Doubtless this accounts in large measure for the well-known dependence of pheasants on wetlands in this state and for the population responses connected with cropland diversion.

In summary, value of land diversion to pheasant production would be proportionate to the fulfillment of three broad objectives:

(1) Provision of maximum acreages of grass and/or legume cover crops as opposed to small-grain cover crops or summer fallow which are seldom if ever used as nesting cover.

(2) Provision of maximum carry-over of residual cover which will be available for early nesting at the onset of the next growing season.

At the onset of nesting in late April and early May, cover in hayfields and other cropland is too sparse for nest concealment and is avoided by nesting hens. Such cover is used predominantly for renesting, but renests are usually begun too late for incubation to be completed before hay mowing occurs. The result is heavy nest and hen mortality. Only 15 percent of the hayfield clutches are successful in an average year.

(3) Protection against cover disturbance during the nesting season to allow highest possible rates of hatching success.

Cover Establishment

Upland fields on which grass-legume hay crops have been produced require only normal maintenance to provide optimum nesting cover. Pure stands of legumes and stands dominated by bluegrass should be renovated if attractive nesting cover is to be furnished.

Where nesting cover is to be established, brome grass or brome-alfalfa should receive top priority. Fields consisting of quackgrass provide fair nesting cover, but cannot be successfully converted to other grasses or grass-legume mixtures without quackgrass control. Seedbed preparation and planting should be completed no later than May 15. Weed competition must also be controlled. An oats companion crop seeded at 2-3 bushels per acre gives satisfactory results, provided straw is removed at harvest time. If the oat crop is not to be harvested, the entire stand should be clipped whenever oat growth exceeds 10-12 inches in height.

In establishing brome-alfalfa mixtures for long-term arrangement as residual cover, recommended seeding rates are 4 lb. of alfalfa and 4-6 lb. of bromegrass per acre. In this combination, alfalfa furnishes attractive new-growth nesting cover the first season after establishment and is gradually replaced in subsequent years by bromegrass. Pure stands of brome should be seeded at 6 lb. per acre.

These remarks apply to stands to be managed specifically for pheasant nesting, i.e., for optimum production of residual cover which precludes regular harvest or grazing. In situations where plant cover is to be removed after nesting is completed, as through delayed mowing or for late-summer pasture, higher per-acre ratios of alfalfa to brome are recommended -- 8-10 lb. of alfalfa and 4-6 lb. of brome. Where residual cover cannot be provided, alfalfa's faster growth furnishes suitable nesting cover earlier in spring than stands made up predominantly of brome.

On muck or peat soils retired from cropping, good-quality residual cover may be obtained by seeding timothy or canary-grass, since neither alfalfa or bromegrass are well adapted to such sites. On the Waterloo Wildlife Area, success in establishing these grasses has been best with August seedings that avoided excessive competition with annual weeds. Recommended seeding rates are 4 lb. per acre of either timothy or canary-grass without a companion crop.

Alternatively, retired lowland sites often produce ideal nesting cover if left undisturbed such that natural succession is allowed to take over. Especially attractive are stands which eventually develop mixed plant cover of canary-grass, bluejoint-grass, aster, goldenrod, and other lowland herbs. Disadvantages of this method are that succession is highly unpredictable and annual weeds may become temporarily objectionable to farmers with agricultural interests. In addition, two or more growing seasons frequently are required before optimum cover density is produced.

Management of diverted cropland should aim at establishment and development of residual cover resistant to lodging and flattening under winter snow. Brome-grass is particularly well suited for this purpose. Clumps of upright, leafy plant material make ideal nest sites which are preferentially sought for nest concealment.

Field Size and Shape

In Wisconsin, larger field size seems to be related to heavier use by nesting pheasants. In hayfields on the Fond du Lac-Green Lake County area, nest densities averaged 16 per 100 acres in fields smaller than 10 acres compared with 23 per 100 acres in fields 10 acres or larger. A similar trend was also noted in nonhay cover, indicating something of a preference for larger blocks of nesting cover. In South Dakota, Dahlgren (S.D. State Univ., in litt., Sept. 20, 1967) observed that Soil Bank fields about 20 acres in size contained the maximum density of pheasant nests. In smaller fields, nesting use tended to drop off as field shape became progressively longer and narrower. Based on such findings, fields in the 10- to 20-acre category probably should receive highest priority for nesting cover. If smaller acreages are to be managed, field outlines probably should be "squared up" as much as possible.

It bears emphasis that these recommendations pertain to optimum cover conditions. Nesting cover on fields of other sizes and shapes, though not receiving maximum use, could nevertheless make a significant contribution to pheasant production.

Cropland diversion fills an important habitat need when it provides dense stands of residual cover available for early nesting. Benefits are especially striking when such cover is added to upland areas where existing cover was continually subjected to agricultural disturbance.

Cover Maintenance

Value of diverted cropland to nesting pheasants will be in direct proportion to quality of residual cover provided. In the Fond du Lac-Green Lake County studies, fields planted in grass-legume mixtures from which plant cover had not been removed the previous year averaged 39 nests per 100 acres, compared with 21 per 100 acres in fields that had been harvested, pastured, or clipped the season before. Fields of residual cover provided an abundance of old-growth clumps essential for early nesting and were available to nesting birds throughout the season. By comparison, diverted acres where hens had to wait for new growth for nest concealment were scarcely more attractive than other types of cropland.

A large backlog of experience indicates that no form of cover removal is compatible with maintenance of optimum nesting cover. In the special ACP nesting cover project, where conservation practices were applied to diverted land, hay could not be harvested but weeds could be clipped at the landowner's discretion any time during the growing season. Where these special ACP practices were applied to nondiverted land, farmers were allowed to remove a hay crop or lightly pasture these stands between

July 10 and September 1 but could clip for weeds only during the above-mentioned period. In 1967, quality of residual cover was rated in early spring according to treatment during the 1966 growing season. Of 33 fields left totally undisturbed, all but 2 received "good" to "excellent" ratings. Out of 37 that had been clipped (other than spot clipping), only 4 were rated as "good", the remainder as "poor" or without residual cover. Among 6 stands that had been pastured, only one that received very light grazing pressure retained an appreciable amount of residual cover, the others little or none. Finally, in 15 fields from which hay crops had been removed, residual cover was rated as "poor" or absent. It was clear from these inspections that regrowth after September 1 was wholly inadequate as a source of residual nesting cover the following spring.

Hence to insure high-quality residual cover, all forms of cover destruction or removal applied indiscriminately to entire fields should be minimized or prohibited. Circumstances will occassionally develop where cover density might benefit from rotational disturbance, e.g., at 3- to 5-year intervals, but annual removals of the sort described above should be avoided if maximum nesting use by pheasants is to be expected. If spring burning is used for rotational disturbance, treatment should be completed before April 15. If cover is to be pastured or mechanically removed, this should begin no earlier than August 1.

Cover Disturbance

Control of noxious weeds on diverted cropland is specified by both State and Federal regulations. Control methods, however, are usually left to the individual farmer. On occasion certain county committees of ASCS have required that all diverted acres in the county be clipped by a specified date.

Routine practice among many farmers is to clip diverted lands whether weed problems exist or not. Commonly this occurs at time of normal hay harvest with disastrous effects on nesting pheasants. To illustrate, on one 10-acre field in Green Lake County, clipped on June 18, 1963, the following losses were sustained: 7 clutches destroyed (4 within a week of hatching); 3 incubating hens killed outright and 2 others seriously injured whose survival was problematic; an entire brood of 9 newly hatched chicks destroyed; and at least 3 chicks killed out of a 4-week-old brood. In the Fond du Lac-Green Lake County investigation, only 32 percent of the clutches succeeded in clipped cover on Feed Grain Program land compared with 73 percent hatching success in cover left undisturbed throughout the nesting season.

Cropland diversion regulations should therefore prohibit or strongly discourage clipping until the major period of pheasant nesting is completed. To ensure success of renesting attempts, clipping should be prohibited before July 15, or better still July 31, and should be restricted to situations where weed problems actually exist. Wherever possible, clipping should be limited to spot treatment of weed-infested areas rather than indiscriminate mowing of entire stands. Herbicide control, particularly for spot treatment, should be encouraged over clipping.

Other types of disturbance to nesting birds should also be minimized. This includes manure-spreading, a common practice on diverted cropland, which not only destroys cover but also attracts potential nest predators because dead farm animals are frequently disposed of in such manner. Plow-down of cover for green manure should also be discouraged before nesting has been completed. Finally, disturbance of nesting hens by farm dogs or human intrusion should be avoided as much as possible between mid-April and late July.

Potential benefits of diverted cropland to nesting pheasants are frequently wasted when diverted acres are clipped before nesting has been completed. In this 10-acre field, casualties due to clipping totaled 7 nests, 5 nesting hens, and 2 young broods. To minimize such losses, clipping should be delayed until July 15 or later.

CONCLUDING REMARKS

Recommendations prescribed in this report could be most effectively implemented by cropland diversion programs built around long-term rather than annual contracts. The Cropland Adjustment Program, based on 5- or 10-year contracts, was a model form of land diversion within which framework maximum benefits to pheasant production were possible. To reiterate, advantages of CAP over previous forms of cropland diversion were:

(1) Long-term contracts which made it worthwhile to establish cover specifically for wildlife and allow development of residual cover for pheasant nesting,

(2) De-emphasis of whole-farm diversion which promoted better interspersion of diverted cropland with other food and cover requirements, and

(3) Incentives to landowners who opened their lands to regulated public use. Assuming that some form of land diversion can be counted on in the future, programs built along the lines of CAP would be most beneficial to pheasants. In general, contracts for 3- year periods are probably the shortest that should be considered in deliberately managing diverted acres as pheasant nesting cover.

On the other hand, even with annual contracts as the basic form of land diversion, there is much that could be done to improve pheasant production. A more rational view of the need for weed control and regulations against untimely clipping could add significantly to reproductive success, as could provisions to minimize cover disturbance by pasturing and manure spreading. Farmers should be encouraged to divert the same fields from crop production several years in succession, thereby allowing residual nesting cover to develop. One means of accomplishing this might be to offer a small bonus payment each time contract are renewed for the same field, especially if cover thereon is not removed or disturbed from year to year. Practices such as summer fallow and use of small-grain cover crops could be discouraged in favor of grass or grass-legume mixtures more attractive as nesting cover. None of these management recommendations would add materially to the cost of cropland diversion, nor would any of them compromise the original intent of these programs to manage agricultural production.

Finally, we suggest that programs as expensive as land diversion ought to be closely scrutinized for ways in which other values to society might be served. The now defunct Cropland Adjustment Program, which granted special attention to wildlife and other recreational potentials, stands as testimony that attitudes have already developed along this line, a trend that will hopefully continue in future plans for land diversion. Guidelines have been listed in this report that could lead to improved pheasant hunting on Wisconsin farmlands. Only minor administrative changes would be required to increase the recreational potential of cropland diversion in the best tradition of multiple use. While recommendations in this report have been geared to the pheasant, other types of farm-game wildlife, both game and nongame species, would also benefit from additional cover provided by land diversion. In addition, the soil-and water-conserving aspects of land diversion would also be enhanced by the recommended types of cover production and management.

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