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The Conservation Reserve Program and Northern Bobwhite Population Trends in Illinois

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ABSTRACT

We examined 3 indexes of Northern Bobwhite abundance in Illinois at various geographic scales to determine possible relationships with the Conservation Reserve Program. Over 256,000 ha were enrolled in the CRP during the first 9 signup periods (1986-1990). About 87% of this land was in CP-1 vegetation (introduced cool-season grasses and legumes). Male bobwhite call counts in some parts of the state may have been positively related to amounts of CRP land. However, there was no strong evidence that autumn population densities increased as a result of the program. Positive CRP effects on local bobwhite habitat in some areas were probably offset by neutral or negative effects in others. We discuss possible reasons why potential benefits of the CRP for Northern Bobwhite have not been fully realized.
Key words: Conservation Reserve Program, Northern Bobwhite, populations, Illinois.

INTRODUCTION

The Conservation Reserve Program (CRP) of the 1985 Food Security Act encouraged landowners to convert highly erodible cropland to permanent cover (principally grasses) for a minimum of 10 years. From 1986 through 1989, approximately 13.7 million hectares (33.9 million acres) in the United States were enrolled in the program. This represented 8% of the nation's cropland (Bjerke 1991). Although the CRP was primarily intended to reduce soil erosion and grain surpluses, potential benefits for wildlife were widely anticipated (Farmer et al. 1988, Jahn 1988, Isaacs and Howell 1988, Schenck and Williamson 1991).

Among the species expected to benefit from the CRP was the Northern Bobwhite (*Colinus virginianus*) (Burger et al. 1990, Stauffer et al. 1990). Over the past 25-30 years, bobwhite have declined in abundance in Illinois and elsewhere, primarily because of intensified agricultural land use (Klimstra 1982, Brennan 1991). Realistically, large-scale

reversal of this trend can only come about adjunctly to agricultural programs and policies. It is important, therefore, to maximize opportunities offered by land diversion programs such as the CRP. Our objective was to compare CRP participation in Illinois with bobwhite population trends at various spatial scales (local, regional, and statewide). We sought information that would enhance the contribution of future farm programs to bobwhite and other upland wildlife.

STUDY AREAS

For regional analysis, we divided Illinois into 4 areas (South, Southcentral, Westcentral, and Northeast) using criteria of prevailing climate, land use, and estimated bobwhite densities (State of Illinois 1958, 1960) (Fig. 1). Bobwhites are scarce in the Northeast region because of unfavorable climatic and land-use conditions; therefore, we emphasized only the South, Southcentral, and Westcentral regions. We ranked individual counties (n = 56) across all regions according to proportion of CRP land and grouped them into 3 classes (LOW, MID, HIGH) representing the lower, middle, and upper 33 percentiles. Because of smaller sample sizes, counties within each region were divided into only 2 groups: upper 50 percentile (ABOVE) and lower 50 percentile (BELOW).

METHODS

We used 3 indexes of bobwhite abundance: estimated annual hunter harvest per km^2 (HPA), estimated harvest/hunter trip (HPT), and time/area counts of male bobwhite calls in early summer (MBC). Harvest data were obtained annually (1974-1991) by the Illinois Department of Conservation (IDOC) from post-season questionnaires mailed to a random sample of resident hunting license holders (Anderson and Campbell 1991:1-2). Male bobwhite whistle counts were recorded by IDOC biologists annually (1975-1991) along 46 semi-permanent routes located throughout the South, Southcentral, and Westcentral regions of Illinois. The 32-km transects consisted of 19-20 stops at about 1.6-km intervals. Each route was driven once per year in June on calm (wind <16 kph), relatively clear (<75% cloud cover) mornings and number of male bobwhite calls heard during a 2-minute listening period was recorded at each stop.

We obtained CRP areal enrollment by county and signup period (1-9; 1986-1989) from Agricultural Stabilization and Conservation Service (ASCS) records. Locations of individual CRP fields within 1.6 km of each call-count route were obtained from ASCS offices, recorded on 1:12,600 scale black and white aerial photographs, and later digitized using the Map and Image Processing System (MIPS, Miller et al. 1989). We determined proportion of CRP land in the various Conservation Practices (CP 1-14) from Soil Conservation Service (SCS) data.

We performed repeated measures Analysis of Variance (ANOVA) using PROC GLM (SAS Institute Inc. 1985:433-506). We used CONTRAST statements to test the hypothesis that linear trends in HPT, HPA, and MBC over time (1985-1991) did not differ among counties grouped according to relative amounts of CRP land ($\alpha = 0.10$). LOW, MID, and HIGH groups were compared at the statewide level and ABOVE and BELOW groups at the regional level. For statewide and regional analyses, groupings were based on county-wide amounts of CRP land. For analysis of MBC at the local

level, groupings were based on relative amounts of CRP land within 1.6 km of each call route (3.2-km wide corridors) and within 0.4 km of each listening stop (0.8-km diameter circles).

RESULTS

CRP Participation

Approximately 256,260 ha in Illinois (1.8%) were enrolled in the CRP during the first 9 signup periods (1986-1990). Areal representation in the South, Southcentral, Westcentral, and Northeast regions was 4.0, 2.7, 2.3, and 1.0%, respectively (Table 1). Twenty four (42.9%) of 56 counties in the 3 primary quail regions contained 0.1-1.8% CRP land, 27 (48.2%) contained 2.1-5.3%, and 5 (8.9%) had 8.0-9.0%. This latter group included Hamilton, Jefferson, and Franklin counties in the Southcentral region and Union and Johnson counties in the South region. Based on timing of and response to signups 1-9, we estimated percentage of total CRP land extant during the 1985-1991 growing seasons as 0, 5, 29, 57, 80, 100, and 100%, respectively.

Nearly 87% of the state's CRP land was under CP-1 contract (introduced cool-season grasses and legumes), ranging from 80.0% in the Northeast to 92.2% in the Southcentral region (Table 1). CP-1 plantings varied widely among counties, apparently reflecting different recommendations by local ASCS and SCS offices. For example, the adjacent counties of Hamilton and Jefferson had about 96% of their >23,000 ha of CRP land in CP-1 contracts. In Jefferson County, >94% of CP-1 land was planted to timothy (*Phleum pratense*)-redtop (*Agrostis alba*)-Korean lespedeza (*Lespedeza stipulacea*), whereas tall fescue (*Festuca arundinaceae*) was the predominant (78%) CP-1 planting in Hamilton County (David et al. 1992).

Bobwhite Population Trends

Statewide. -- Temporal trends (1974-1991) for the 3 indexes of bobwhite abundance (HPT, HPA, and MBC) were relatively similar at the statewide level (Fig. 2). Each declined precipitously in the late 1970's, primarily from 3 consecutive severe winters (Roseberry and Klimstra 1984:212). Recovery began in the early 1980's, and by the end of the decade HPT and MBC had regained or exceeded former levels but HPA had not, probably due in part to reduced numbers of quail hunters (Roseberry and David 1992).

During the period 1985-1991, counties grouped according to amount of CRP land (LOW, MID, HIGH) showed similar trends in MBC ($P = 0.443$) and HPT ($P = 0.195$). There was, however, a negative CRP effect on HPA ($P = 0.021$), i.e., total harvest declined most in counties with the most CRP land.

Regional. -- In the South region, temporal trends in MBC, HPT, and HPA did not differ between ABOVE and BELOW groups ($P = 0.177$, 0.129, and 0.724, respectively). ABOVE and BELOW groups in the Southcentral region did not differ for MBC ($P = 0.560$) or HPT ($P = 0.591$), but total harvest (HPA) declined most in counties with the most CRP land ($P = 0.002$). In the Westcentral region, ABOVE and BELOW counties had similar trends in HPT ($P = 0.631$) and HPA ($P = 0.841$), but increases in MBC were more pronounced in the ABOVE group than in the BELOW group ($P < 0.001$).

Local. -- Group memberships based on amount of CRP land within 1.6 km of the route and 0.4 km of each listening stop were similar to those based on county-wide totals, hence results were similar to those reported above. The only detectable CRP effect was in the Westcentral region where call count trends over time differed between groups with above- and below-average amounts of CRP land within 1.6 km of the route (P = 0.058).

DISCUSSION

With the possible exception of call counts in the Westcentral region, our study provided no conclusive or consistent evidence that the CRP had a measurable effect on bobwhite population trends in Illinois through 1991. This may have been because (1) our study design and/or data were not adequate to demonstrate a CRP effect, or (2) a CRP effect did not exist. If we reject the former and accept the latter, then there may have been 1 or more possible reasons.

Habitat modeling (Roseberry et al. 1992:17) suggested that CRP fields may have little potential impact on bobwhite habitat if they comprise <6% of the total land area. At the time of our study, only 5 of Illinois' 102 counties contained >6% CRP land and the 3 primary quail regions totalled <3%. Currently (through signup 12), 9 counties in Illinois have >6% CRP, but 84 still have <4%. It is perhaps unrealistic, therefore, to assume the CRP could have exerted a major impact on bobwhite abundance at the regional or statewide level given the relatively small amount of land involved.

Even in areas with considerable CRP land, suitability of individual fields likely varied spatially so that beneficial effects in some localities were offset by neutral or negative effects in others. Roseberry et al. (1992:9) concluded that CRP contribution to local bobwhite habitat would depend on: "a) the amount of CRP land present, b) its suitability for bobwhite use, c) the suitability of replaced and remaining cropland for bobwhite use, d) the juxtaposition of CRP fields with other habitat components, and e) the composition and quality of existing bobwhite habitat, in particular the limiting factors."

During our study, >93% of the CRP land was planted to grass or a grass-legume mix and would therefore be potentially useful to bobwhite primarily as nesting, brood rearing, or roosting cover. Thus, even though individual CRP fields might receive considerable seasonal use by bobwhite, total population densities would not necessarily be increased in areas where food or protective cover were limiting. In fact, overall habitat suitability might be reduced if replaced cropland had been an essential food source. Even where nesting or brood rearing habitat was limiting, addition of CRP land might not have been beneficial because of unsuitable vegetation or excessive or untimely disturbance such as summer mowing.

Burger et al. (1990) suggested that CP-2 (warm-season grasses) and CP-4 (wildlife habitat) fields were superior to CP-1 vegetation (cool-season grasses and legumes) for bobwhite. However, the latter CP was the prevailing choice of CRP participants in Illinois, probably reflecting relative cost of seed, availability of equipment, familiarity, and recommendations from agricultural advisors (David et al. 1992). Only 3.5% of the CRP land in Illinois was committed to CP-2 or CP-4 with 86.9% going into CP-1. The latter commonly featured tall fescue, orchard grass (*Dactylis glomerata*), or orchard grass-

legume mixes (David et al. 1992), which is of fair to poor suitability for bobwhite nesting or brood rearing (Martin 1988).

Even when vegetative composition of CRP fields is potentially suitable for bobwhite, use often is severely limited by mowing. In northern Missouri, Burger et al. (1990:82) considered mowing a "major factor limiting habitat quality of CRP lands." As much as 40% of Illinois CRP fields may be subject to seasonal mowing (David et al. 1992). Mid-summer mowing may actually turn some CRP fields into ecological traps where nesting birds and/or broods are initially attracted, then either killed by mowing or forced into inferior habitat where mortality from other causes is increased.

Langner (1989:388) compared nationwide CRP enrollment to estimated amounts of existing habitat and concluded that the CRP had: ". . . little impact on total habitat availability, and therefore [resulted in] . . . few new entrants into the hunting population." Instead, she predicted that it would result in ". . . additional days of small game hunting from existing hunters." In Illinois, however, neither estimated number of quail hunters, nor their average days afield changed significantly during the period of potential CRP influence (1985-1991) (Roseberry and David 1992). As noted earlier, CRP actually seemed to have a negative impact on total bobwhite harvest in some parts of Illinois. Conceivably, bobwhite harvesting is less efficient in block cover provided by CRP fields than in linear hedgerow-fencerow cover adjacent to cropfields.

MANAGEMENT RECOMMENDATIONS

Brennan (1991:552) suggested that the CRP may have been a "lost opportunity" for enhancing Northern Bobwhite habitat because potential benefits were not fully realized. Merits of the CRP cannot, of course, be judged solely on its contribution to a single species. Other wildlife species and communities also must be considered along with the primary mission of reducing soil erosion and grain surpluses (Young and Osborn 1990). Nevertheless, we agree that the program could have benefited bobwhite much more than it apparently did in Illinois. Under certain circumstances, CRP lands undoubtedly contribute positively to local bobwhite habitat. In other situations, however, their effect may be neutral or even negative. This, coupled with the fact that CRP land comprises a relatively small proportion of the total habitat base, are thought to be the principal reasons why regional and statewide Illinois bobwhite population levels did not respond positively to the CRP, at least through 1991. In retrospect, we believe CRP value for bobwhite in Illinois would have been enhanced had there been: (1) less mowing, especially mid-summer mowing, (2) more weedy vegetation via strip discing and controlled burning, (3) more CP-2 and CP-4 plantings and less CP-1, especially tall fescue, and (4) more provision of food in the form of food plots or Korean lespedeza seedings.

Greater promotion and implementation of wildlife interests in future CRP or related conservation-agricultural programs will require action at the national, state, and local levels. Nationally, Cook (1989) suggested: improvement of contract features to enhance wildlife, targeting enrollment to areas of special significance for wildlife, and development of longer term retirement programs, probably involving conservation easements. At the state level, cost-sharing and other landowner incentives must be developed and

implemented to maximize opportunities for wildlife afforded by federal conservation-agricultural programs. Locally, there must be (1) greater awareness and cooperation among ASCS/SCS officials regarding wildlife interests (Miller and Bromley 1989), (2) more direct input from wildlife biologists regarding specific practices to benefit wildlife (e.g., White 1992), and (3) greater effort to inform and educate participating land owners regarding available cost/sharing opportunities (Kurzejeski et al. 1992).

The future of the CRP as it now exists is unclear. Contracts on the oldest fields will begin to expire in 1996 and significant area could be removed from the program by 1998. Fate of fields currently enrolled is uncertain, but many will likely be returned to cropland while others probably will be hayed or grazed (Carek 1988). In any event, it is probable that the area of relatively undisturbed perennial vegetation will be substantially reduced. For this reason, efforts should be directed toward maximizing potential contribution of these areas to wildlife. To do this, it is essential that juxtaposition of retired land to other cover types be considered (Langner 1989) and that specific management recommendations be cognizant of existing local and regional habitat conditions, especially components or life requisites that seem to be limiting (Roseberry et al. 1992).

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Table 1. Regional and statewide CRP enrollment and major Conservation Practices in Illinois during signups 1-9 (1986-1989).

Region	Percent of Area in CRP	Percent of CRP land in				
		CP-1[a]	CP-2[b]	CP-3[c]	CP-4[d]	CP-10[e]
South	4.01	83.00	0.42	2.43	1.12	10.90
Southcentral	2.71	92.24	1.32	2.23	0.98	1.85
Westcentral	2.26	89.91	0.76	1.21	2.19	3.20
Northeast	0.96	79.95	2.01	4.01	4.47	7.77
Statewide	1.77	86.93	1.25	2.53	2.23	5.16

[a] Introduced grasses and legumes.
[b] Native grasses.
[c] Trees.
[d] Wildlife habitat.
[e] Already in grass.

Figure 1. Study regions of Illinois.

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Figure 2. Trends in indexes of Illinois bobwhite abundance: harvest/hunter trip (HPT), harvest/area (HPA), and male whistling counts (MBC).

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