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**FOURTH ANNUAL REPORT OF THE PRAIRIE GROUSE COMMITTEE
ILLINOIS CHAPTER-THE NATURE CONSERVANCY.**

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INTRODUCTION

In contrast to the millions of prairie chickens coinciding with pioneer farming efforts on the Illinois prairie about 100 years ago, current numbers have dwindled to about 450 birds in the spring of 1971 in nine remnant flocks in seven south-central counties. The primary reason for the decline of this native grouse has been the loss of grassland. The prairie is gone except for tiny remnants in such places as railroad and road rights-of-way and old cemeteries. Redtop grass farming provided a substitute prairie for about 50 years in the south-central counties of Illinois, but this compatible form of land use is now a thing of the past. The beneficial effects of the Federal Conservation Reserve Program are also a thing of the past because contracts with Illinois farmers expired in the early 1960's. We are now to the point where diverted acres under the Federal Feed-Grain Program provide about the only form of relatively undisturbed nesting cover on private farmland. Unfortunately, diverted acres provide a poor quality of nesting cover and the future of this program is uncertain.

The need for acquisition of permanent nesting sanctuaries was discussed as early as 1943 when the late Dr. Ralph E. Yeatter published his bulletin on the Illinois prairie chickens. Except for the Green River Conservation Area in Lee County where prairie chickens did not survive the multiple-use programs developed for that area, there was no immediate follow-up to Yeatter's recommendations.

The Prairie Chicken Foundation of Illinois (PCFI) was formed in 1958 and in 1962 this private group acquired the first sanctuary for prairie chickens. Acquisition by a second private group, the Prairie Grouse Committee, Illinois Chapter - The Nature Conservancy (PGC), began in the fall of 1965. During the summer of 1970 the Illinois Department of Conservation (IDC) acting through the Illinois Nature Preserves Commission (INPC) increased its participation in the preservation of prairie chickens by acquiring five sanctuaries totaling 410 acres from the PGC. The PGC is using monies received for these lands to purchase additional sanctuaries. As a result of land acquisition by the above three agencies, 14 tracts totaling 1,322 acres are now available for habitat development for prairie chickens (Table 1). These include 11 acquisitions with 862 acres near Bogota in Jasper County and 4 acquisitions totaling 460 acres near Farina and Kinmundy in Marion County. We anticipate acquisitions in 1971 that will add to the sanctuary system in Marion County. The goals of land acquisition call for a 1,500-acre sanctuary system in both Jasper and Marion counties.

POPULATION RESPONSES

Bogota (Jasper County)

The positive response of prairie chickens to the acquisition and management of the sanctuary system at Bogota (Fig. 2) continues to be very

encouraging. The peak count of 159 cock at Bogota in the spring of 1971 represented a sizeable increase of 47 percent above 1970 and a 330 percent increase above the low count of 37 cocks in 1968. The 1971 count was also more than 100 percent higher than when counts were initiated at Bogota in 1963 (Fig. 1).

Except for three minor booming grounds involving only two or three cocks each, all booming was located on or within 200 yards of the sanctuaries. Between 1970 and 1971, the counts roughly tripled on the Otis, Field, and Mark sanctuaries. They were 75 percent higher on the Yeatter Sanctuary and 63 percent higher on the Donnelley Sanctuary. The count of cocks (seven) remained about the same on the C. McCormick Sanctuary, but the number of hens (up to 25) seen on the booming ground this spring was at least three times higher than in 1970. The J. Woods ground (on private land) lost approximately 24 cocks since last spring but still held about 30 cocks through this spring. The only discouraging note regarding the dispersion of prairie chickens at Bogota this spring was the lack of booming cocks on or near the 80-acre J. McCormick Sanctuary, which is located on the southern edge of the study area.

Marion County and Other Areas

Results of booming ground surveys conducted in nine areas in seven counties of south-central Illinois in the spring of 1971 revealed a total of 222 prairie chicken cocks. The 159 cocks censused at Bogota comprised 72 percent of the known statewide total. Five cocks were censused for the first time this spring near Bible Grove in Clay County. The remaining 58 cocks on seven areas outlying the Bogota Area represent a loss of 28 percent since last spring. Losses of 50 percent or more occurred at Kinmundy-Forbes Park (13 cocks to 6 cocks), LaCleda (3 cocks to 1 cock), Loogootee (17 cocks to 8 cocks), and Hoyleton (4 cocks to 2 cocks). The Farina Area continued to hold the largest flock outside of Bogota, but the count at Farina was 14 percent lower than last spring (28 cocks to 24 cocks). As in the past two springs, four cocks were found at Fairman in western Marion County. A relatively stable population was also noted near Mt. Erie in Wayne County, where the counts were 12 cocks in 1970 and 13 cocks in 1971.

Two sanctuaries totaling 320 acres (Survey 160 and Butler 160) are now established in Marion County in the Kinmundy-Forbes Park Area, and one tract of 140 acres (Lacey 100 and the newly acquired Loy 40 acres) is now available in the Farina Area (Fig. 3). Booming cocks and hens were observed this spring, for the first time since acquisition, on both the Butler and Lacey sanctuaries. Good nesting and brood cover are present on the Survey Sanctuary and it is probable that prairie chicken nests were successfully hatched there in 1967, 1968, 1969, and 1970, as broods were observed there all 4 years. However, no booming has been observed there and the nearest booming ground is nearly 2 miles away. Feral dogs have been a problem, particularly on the Survey Sanctuary and to a lesser extent on the Butler and Lacey sanctuaries. It is probable that wild dogs are responsible for the lack of booming ground establishment, for nest destruction, and for poor brood survival on the Survey Sanctuary.

Thus, for the present, use of the Survey Sanctuary will be relatively low. However, this will be an excellent sanctuary when the feral dog problem is solved and when one or two additional tracts are obtained and developed between it and the Butler Sanctuary. Although the prairie chicken flocks near these sanctuaries are at critically low levels, there is reason to hope for their prompt recovery because of the responsiveness demonstrated by this native grouse at Bogota in Jasper County.

Population Response and Nesting Cover

Each year since 1963, the acreages of potential nest cover for prairie chickens have been recorded on the 16-square-mile Bogota Study Area. The total acreage declined from 837 acres in 1963 to a low of 376 acres in 1966. In 1963, sanctuary grassland amounted to only five percent of the total; undisturbed fields of legumes (leased by the Illinois Department of Conservation) comprised 221 acres or 26 percent of the total, and grassland on private farmland comprised the remaining 561 acres or 69 percent. Since 1966 the total acreage of potential nest cover has steadily increased to 770 acres in 1970, 71 percent of which was due to the establishment of nest cover on sanctuaries.

In 1963, the 837 acres of available nest cover produced a population containing 65 cocks the following spring. By contrast, in 1970 the 770 acres of available nest cover supported a population that contained 159 cocks in the spring of 1971. It is becoming clear that the present sanctuary grasslands are capable of producing a much higher population level than those that occurred on a similar acreage of private farmland.

When the numbers of prairie chicken cocks censused on booming grounds each spring were tested for correlation with the total acreages of grass and leguminous cover available for nesting each preceding spring, a nonsignificant correlation was revealed. However, when only undisturbed fields of grass, grass seed meadows, grass hay meadows, or lightly grazed grass pastures were analyzed with respect to the numbers of prairie chicken cocks, a significant correlation resulted. It is probable that an even better correlation would result if only good nest cover within 600 yards of booming grounds were measured. Use by prairie chickens of otherwise attractive cover is often precluded by such factors as poor drainage, close proximity to woodland, low fertility, excessive grazing, and sometimes by too great a distance from traditional booming grounds.

In 1967 and 1968 when the population of prairie chickens at Bogota was at the lowest level, the total acreage of nest cover was increasing substantially. About 2 years passed before a strong recovery of the Bogota flock was noted. It is now clear that the birds had to shift from traditionally used portions of the study area to the 120-acre Donnelley and 140-acre McCormick sanctuaries, which were newly established in 1967 and 1968.

Production on Sanctuaries

A total of 61 prairie chicken nests were found on the sanctuaries at Bogota during the summer of 1970. The overall density of prairie chicken

nests in 1970 on sanctuaries represented the third highest rate of nest establishment since 1963. The sanctuary acreage searched increased from 62 acres in 1963 to 566 acres in 1970. During the 8 summers, 1963-1970, the respective number of acres searched per nest found has been 6.9, 5.7, 38.0, 30.4, 21.4, 16.1, 12.4, and 9.3 (an average of 12.4 acres per nest). The number of acres per hatched nest has followed a similar trend and has averaged 19.2 acres per hatched nest. The number of chicks hatched on sanctuaries has ranged from a low of 15 in 1965 to a high of 468 in 1970. The number of sanctuary acres required to hatch a chick has ranged from 1.0 acre per hatched chick in 1963 to the poor production of 10.1 acres per hatched chick in 1965. In 1970, an estimated minimum of 468 hatched eggs were found in 39 nests in a search of 566 acres of sanctuary land--an average of 1.2 acres per chick hatched. Thus, it is evident that both current densities of nests and chick production on the comparatively large sanctuary system are approaching the levels recorded in 1963-1964, when a limited sanctuary acreage was available for the Bogota flock.

The acreage of fields (specific cover types) actually containing one or more of the 61 nests found in 1970 totaled 250 acres. Adjacent cover types containing no nests may also be a determining factor in nest placement; however, only 44 percent of the 566 acres searched were specifically used for the nest sites. Nest densities ranged from no nests in 3 fields (15 acres) of wheat and 16 fields (60 acres) that were burned during March or August preceding the 1970 nest season, to as high as 3 nests in 3.5 acres (1.2 acres per nest) of timothy on the Otis Sanctuary.

Population Response and Nest Success

For a meaningful analysis of nest success, the changing status of the prairie chicken population on the Bogota Study Area during the past 8 years may be divided into three phases. During the 2 years, 1963-1964, the population was decreasing; during the 3 years, 1965-1967, the population was relatively stable; and during the past 3 years, 1968-1970, the population level showed substantial gains.

When the fate of 216 prairie chicken nests (170 nests found by searches on sanctuaries and private land and 46 nests noted from reliable reports by local residents) was analyzed with respect to the above phases, three definite trends were evident. Firstly, hatching success increased from 36.2 to 57.5 to 60.2 percent for the decreasing, relatively stable, and increasing periods, respectively. Secondly, the percentage of nests destroyed by plowing and hay mowing decreased from 51.7 to 30.0 to 9.3 percent for the three periods, respectively. Thirdly, the percentage of nests destroyed by predators or abandoned, or both, increased from 12.1 to 22.5 to 30.5 percent for the 1963-1964, 1965-1967, and 1968-1970 periods, respectively.

Thus, the increased level of hatching success, coupled with the increasing proportion of hens at Bogota that are nesting on the sanctuaries, where hatching success is particularly high (67 percent, 8-year mean), has played the major role in the recent encouraging increases in the population level. In 1963-1964, plowing was eliminating a major proportion

of the potential reproduction. It is probable that most of these nests were destroyed in the late stages of incubation and because of the limited ability of the prairie chicken to renest, there was a low probability for renesting by surviving hens. The increasing level of nest predation indicates that nature's culling agents now have a greater chance at nests that used to fall victim to plows and hay mowers.

Autumn and Winter Display Activities at Bogota

Four booming grounds were used regularly during the autumn of 1970 on the Bogota Study Area. A third consecutive increase in the population level is apparent from the peak count of 158 cocks in the fall of 1970. Up to 70 of the 158 total cocks counted were on the 135-acre Marshall Field III Sanctuary. The main booming ground at Bogota is thus shifting from private land (the J. Woods ground) to sanctuary land. The No. 1 site on the Field Sanctuary was re-established as a booming ground by about 12 cocks in the spring of 1970--the first use since 1964. The mixed redtop and timothy on the 5-acre site was burned in August 1970 to further promote its use for display activities. The subsequent six-fold increase in the number of cocks since the previous spring was ample evidence that the attractiveness of the site was enhanced for booming by the prescribed burn.

Surveys of booming grounds in fall and winter have clearly demonstrated that some booming grounds are consistently active in fall and winter as well as in the spring. During the past 4 years about one-third of the booming grounds that were active in the spring were also active in the fall. In 1966, one-half of the spring grounds were active in the subsequent fall. Relatively large numbers of cocks are found on a relatively few booming grounds in the fall. Apparently, small grounds that were active in the spring condense into the larger grounds in the fall. The population remains concentrated on a few grounds through winter until March. In March, the number of birds on the few large grounds declines and at the same time new and smaller grounds appear. Thus, it seems that March is the time of dispersal and orientation of the population to nesting cover. Clear, calm mornings are particularly conducive to display activities in autumn and winter; however, even on mornings with sub-zero temperatures, strong north winds, cloud cover, and snow on the ground, territorial defense may be vigorous.

A comparison of counts in fall and spring suggests that winter mortality of prairie chickens is relatively low in Illinois. During the first hour of daybreak when most of the cocks are on booming grounds, careful observations of flocks away from booming grounds have revealed that such flocks are predominantly hens. Such flocks seldom contain over 5 or 10 percent cocks. Except for the brood-rearing season, a high degree of segregation of the sexes appears to be the rule throughout the year in prairie chicken populations. Thus, if the peak counts of cocks on booming grounds in both autumn and spring actually include no less than 90-95 percent of the males in the population, a comparison of these counts may be a valid approach to determining winter mortality. Peak counts in autumn are generally made in late October and peak counts in spring are usually made the first week in April; approximately 5.5 months

later. Hence, the counts suggest a winter mortality of male prairie chickens ranging from 5 percent in 1969-70 to 20 percent in 1967-68. Thus, the average mortality for the 4 winters preceding the winter of 1970-71 would amount to about 13 percent.

The use of counts of flocks to determine winter mortality may, however, underestimate actual mortality. In spring, nearly all cocks in a population, assuming they boom, are likely to be found by careful systematic surveys of booming grounds. In autumn, however, the biologist must rely primarily on sight for finding prairie chickens because the cocks are much less audible than in spring. Further research on this aspect may indicate the need for a correction factor to account for the few cocks that accompany flocks of hens in the autumn season.

Discussion

The response by prairie chickens to the acquisition and development of a sanctuary system at Bogota has indeed been encouraging. This native grouse will continue to respond just as far as habitat management will permit. Because of the responsiveness and tenacity of the Illinois prairie chicken, the opportunity to preserve a second flock still exists. That opportunity lies in Marion County near Farina and Kinmundy. Problems encountered in Marion County to date are insufficient land in the right places for a long enough period of time, lower population levels than ever occurred at Bogota in Jasper County, continued high losses of nests by plows and mowers, feral dogs, and high prices of land in the most strategic locations for prairie chickens. If, as anticipated, a substantial increase in use by prairie chickens occurs in 1971 on the Butler and Lacey sanctuaries, the adverse effects of the first three problems should be lessened. The feral dog problem can be solved. Increased participation in land acquisition by the INPC and the IDC can help solve the problem of high land prices for the PGC.

The current distribution of booming grounds at Bogota is anchored to the sanctuary system established there. This fact, plus the results of intensive searches for nests, leave little doubt that the major proportion of the nesting now occurs on the sanctuaries and that hatching success is high. The sanctuaries at Bogota are also used extensively by prairie chickens for brooding, roosting, and loafing throughout the year. The present ownership of 315 acres by the PGC, 297 acres by the PCF1, and 250 acres by the IDC (862 total acres) at Bogota appears adequate to support a spring population of at least 200 to 400 cocks (400-800 total birds). For the immediate future, this flock of prairie chickens is safe enough for highest priority in acquisition to shift to other areas.

The high density of nearly 100 cocks in the traditional central core section (Section 28) of the Bogota Area in the spring of 1971 is unparalleled in the literature for other states and Illinois as well. In only 1 (1939) of 28 years, Yeatter (1963:746) recorded a population reaching a high of 131 cocks on 4 square miles (32.8 cocks per section) near Hunt City, 12 miles northeast of Bogota. Hamerstrom et al. (1957:83) recorded a top density on Wisconsin's Buena Vista Marsh of 28.0-29.5 cocks

per section on a 2- X 2-mile block. From an extensive survey of North American prairie chicken range and the literature, Hamerstrom et al. (1957:97, 107) found an average of 34.0 cocks per section on the best 5.5-section area in Missouri and 38.8 cocks per section on the best 2- X 2-mile area in Kansas. In Missouri, Arthaud (1971:271) reported on a prairie chicken population on the 2.6-square-mile Taberville Prairie that reached an unusual high of 181 cocks (69 cocks per section) in 1 year (1967) in over 20 years of censusing. On the overall census area of 16.5 square miles, which included Taberville Prairie, Arthaud reported a density of 19.0 cocks per section in 1967. More recent populations on the Taberville census area were 12.7 (1968) and 10.2 (1969) males per section (Christisen 1969). In Kansas, Robel (1970:307) speaks of a 6,000-acre area (9.4 sections) "which has maintained a large stable population of greater prairie chickens for the past several years;" however, an average of about 60 males were found on the area (6.4 cocks per section).

Thus, the high densities of prairie chickens that can be achieved on Illinois prairie farmland is an additional criterion that attests to the uniqueness of the Illinois prairie chicken. Other criteria were outlined in a previous report (Westemeier 1970:6). These unique qualities provide a firm justification for increased efforts aimed at preserving this native grouse in the prairie state. Land may be more expensive for prairie chickens in Illinois than in Kansas, Missouri, and Wisconsin, but our research and management are providing a growing basis for the statement that 1 acre in Illinois will produce as many prairie chickens as 10 acres in other states. The high, and still growing, density of prairie chickens at Bogota was produced on a relatively small portion of the sanctuary system. A large portion of the present sanctuaries are poorly used because of monotypic domestic sods, poor drainage, low fertility, insufficient edge, nearness to woodland, and other reasons. Continued emphasis on the establishment of diversified sods, which include native grasses and forbs, and a combination of management techniques, including burning (in March and August), combining grass seed, late mowing for hay and weed control, and light grazing on most sanctuaries will provide a diversity of cover and a maximum of edge.

The sharecropping approach has proven both efficient and economical in terms of establishing and managing cover on the sanctuaries. Little is given up for what is gained in exchange. The PGC, PCFI, and the IDC cannot afford the men and equipment necessary to make the seedings and do the management they obtain through sharecropping. In our program, agreements are negotiated each year for specific crops, usually wheat or oats, and in specific fields depending on what cover is needed. Seeding of legumes and grasses is part of the agreement. Mowing to control weeds competing with the new seedings is also frequently specified. In return, the sharecropper may receive part or all of the crop depending on its expected value in relation to the services he provides.

METHODS AND PROBLEMS OF SANCTUARY MANAGEMENT

Booming Ground Management

The importance of proper management of booming grounds for prairie chickens has been discussed in previous reports to the PGC. In summary, the requirements for booming grounds are 5- to 10-acre tracts of bare ground or very low, sparse vegetation available from late summer through the following spring (Figs. 4, 5).

Conditions suitable for booming grounds have been effectively produced on tracts of desired size based on sharecropping utilizing local farmers. The basic rotation is soybeans followed by wheat or oats, red clover and then back to soybeans. The red clover is clipped for hay in late summer the year it is seeded and again for hay and for seed the second year.

The sharecropping approach to management has proven effective not only in managing cover, but it is also very efficient and economical from the standpoint of manpower and equipment.

New grass seedings, recently burned sods, close mowing, and heavy grazing are other techniques that have produced suitable booming grounds. The opportunity to see and be seen is of obvious importance to prairie chickens in the selection of booming grounds. Management should aim for the maintenance of one booming ground for each 60 acres of sanctuary land. The optimum spacing between booming grounds appears to be about 600 yards.

Management of Nest Cover

On the Bogota Study Area during the period of 1963-1970, distances between 174 prairie chicken nests and the estimated centers of the nearest booming grounds have ranged from 72 yards to 1,700 yards, with respective mean, mode, and median distances of 364 ± 253 (SD) yards, about 240 yards, and about 300 yards. Thus, few nests occur within 100 yards of, or farther than 600 yards from, centers of booming grounds.

In 1968 and 1969, evidence indicating the existence of a preferred zone for nesting was obtained in situations involving booming grounds surrounded with nesting cover. Nests were found in radial patterns encircling several booming grounds. Although no distinct spokes-in-a-wheel patterns were found at Bogota in 1970, as were found in 1968 and 1969, the most frequently occurring distance of about 240 yards became even more clearly evident. In contrast to average distances exceeding 500 yards between booming grounds and prairie chicken nests in 1963-1964, when the population was declining, the average distance has progressively decreased (275 yards in 1970) as the Bogota flock increased. This gradual change in nest dispersion relative to the booming grounds has occurred because of (1) the provision of suitable sites for booming (and the establishment of nesting cover) on the sanctuaries and (2) the apparently greater advantages accruing to reproduction from the presence of nest cover close to and surrounding booming grounds. Thus, it is important that attractive nest cover be provided within 200-300 yards of traditional booming grounds and that suitable booming grounds be provided adjacent to attractive cover.

Nest searches conducted annually at Bogota since 1963 have repeatedly demonstrated that grasslands reach peak attractiveness for prairie chickens the second year after seeding and decrease rapidly in attractiveness after the third or fourth year unless some form of management is undertaken to assure attractiveness on an annual basis.

Management of grasslands has been based primarily on the commercial value of grass seed, hay, and pasture to local farmers. Haying and pasturing are scheduled so as to not conflict with nesting and brooding.

Redtop.--Redtop continues to be the basic species used on the sanctuaries. Redtop seems to be most attractive to nesting hens when combined for seed, although occasional good densities of nests have been found in undisturbed stands -- usually thin stands containing a heavy admixture of dewberries and weedy forbs such as yarrow. Combining reduces the redtop plant from a height of about 28 inches to a 10-14 inch open stubble that withstands the weather and stays erect for the next nesting season. The redtop stubble permits easy visibility for a standing prairie chicken and ample concealment for nesting. The wheel tracks of a self-propelled combine provide travel lanes and the clipped stems, seed heads, and leaves provide the necessary duff for nesting material. Combining creates a desirable patchwork of holes in an otherwise too-thick stand of redtop by leaving in addition to the wheel tracks, wads of chaff and stems scattered throughout the stubble. These wads of duff smother the sod and the resultant openings, usually 1-2 square feet in size, are commonly found within 1 yard of nest sites.

Redtop sods can be rejuvenated by prescribed burning in either August or March. Seed production is excellent the first year after a light burn, however, good densities of nests are not attained until the second full growing season following a burn.

Examples of good densities of nests in redtop were (1) 8 nests in a 19-acre field on the Yeatter Sanctuary in 1964 (2.4 acres per nest) and (2) 7 nests in a 10-acre field on the Marshall Field Sanctuary in 1971 (1.5 acres per nest). The 1964 field was a second-year seed meadow containing an admixture of red clover. The 10-acre field on the Field Sanctuary had been burned in March of 1970 and combined for seed in July of 1970. The plant composition included an admixture of timothy and several legumes in addition to the dominant redtop.

Redtop seed has been harvested on a 50:50 basis by local farmers. Income from redtop seed typically exceeds \$20.00 per acre. In 1970, the income from redtop seed went as high as \$36.78 per acre. Yields thought to be capable of producing less than \$20.00 per acre of seed are scheduled for rejuvenation and are not harvested.

Timothy.--Timothy has on several occasions proven to be an even more attractive cover to nesting hens than redtop. Timothy is especially attractive during the second full growing season after a burn (in March or August) and the 14-18 inch stubble resulting from a seed harvest has worked exceptionally well at Bogota. The main problem with timothy is the low commercial value of the seed. For this reason it is difficult to get timothy managed by local farmers.

Left undisturbed, timothy has generally proven to be poor for nesting (good for roosting, however), especially where old sods are involved. By contrast, in 1970 three nests were found in 3.5 acres (1.2 acres per nest) of timothy on the Otis Sanctuary that were burned in March 1969 and then combined in August 1969 for seed--this cover type comprised only 6.7 percent of the 50 acres searched on the Otis Sanctuary but it contained 38 percent of the eight nests found on that sanctuary in 1970. Timothy, burned in August 1968, was available on 15.4 percent of the 25 acres searched on the Mark 40 Sanctuary but contained all three of the nests found there (1.3 acres per nest). A 4.9-acre field dominated by timothy, burned in August 1968, and combined for seed in 1969 comprised 7.6 percent of the 65 acres searched on the Yeatter Sanctuary but contained 3 (30 percent) of the 10 nests found there in 1970 (1.6 acres per nest).

The only other occurrence of timothy 2 years after a burn was on the Field Sanctuary where only one nest was found in 10 acres--the low use here was attributed to the poorly drained nature of the field in 1970. This view was substantiated following the dry spring of 1971, when three nests were found in a 2.5-acre portion (which was burned in August 1969) of the same field of timothy (0.8 acre per nest).

The regrowth of timothy following a late-June mowing for hay also provides about the right height and density of cover for nesting in the subsequent spring. However, mowing in late June may result in destruction of late nests and it is especially dangerous to chicks. Later mowing of timothy results in an almost worthless hay and in a dry summer the regrowth is not adequate to provide the residual cover so necessary for attracting nesting hens the following spring. The gradual soil depletion that accompanies a haying form of management is also a problem.

Limited success has been achieved with brome and orchard grass as nest cover, but like timothy, they have limitations in a haying form of management. Brome and orchard grass are difficult to combine and difficult to seed.

Legumes.--Our nest study at Bogota has never verified the existence of a high density of nests in legumes. However, farmers have frequently reported such examples as 5 nests in 7 acres of red clover, 12 nests in 40 acres of red clover, and 13 nests in 36 acres of red clover-alfalfa, all of which were destroyed while plowing or mowing. In areas with declining prairie chicken populations, nesting hens generally have no alternative but to nest in a wheat stubble-legume type of cover. Thus, some credence must be given to such reports. Our experience has shown, however, that where both a legume field and a field dominated by grasses are available near a booming ground, the grasses are preferred.

Generally we seed such legumes as red clover, alsike clover, Korean lespedeza, or alfalfa at a rate of 1 pound per acre of each legume along with a new grass seeding. A legume admixture is desirable in a new grass seeding because clover clumps are often found at nest sites, as are clumps of dewberries, goldenrod, yarrow, and similar plants. Legumes help maintain the grass through nitrification of the soil and legumes increase the number and kinds of insects that are essential to growing chicks. Legumes disappear by about the third year after seeding, but they reappear after a March burn and thus help rejuvenate old sods.

Native Vegetation.--Although prairie chickens have readily accepted such exotic vegetation as redtop, timothy, and domestic legumes, it is axiomatic that the establishment and maintenance of native vegetation should be emphasized in prairie chicken management. Seed for five species of native grass including big bluestem, little bluestem, switchgrass, side-oats, grama, and Indian grass are available and have been purchased from dealers in Nebraska. Numerous approaches have been used to establish these grasses and various prairie forbs on the sanctuaries. Thus far, varying degrees of success have resulted. Disking a plowed field, or a field of soybean stubble, three or four times in spring and early summer appears to be an excellent means of minimizing weed competition prior to a prairie seeding. Three species--big bluestem, Indian grass, and switchgrass--are responding well to this approach. Results with little bluestem and side-oats grama have been disappointing. Because of the height and rankness that is characteristic of big bluestem, Indian grass, and switchgrass, a haying or grazing form of management appears best for these grasses. Left totally undisturbed, these grasses, especially big bluestem, develop a rank impenetrable layer of cane-like stems and residual cover on the ground. We have not found prairie chicken nests in this vegetative situation and it is highly unlikely that young broods make use of it. By contrast, an encouraging amount of nesting and brood use has been noted in the more open stands of switchgrass on the Yeatter Sanctuary during the past 5 years. On this sanctuary the rankness of this species has been controlled by annual mowing for seed (redtop and timothy) and for weed control and by burning or haying, or both.

The beauty of working with the native grasses is that they mature later than domestic grasses and legumes. This means that they can be mowed later (late July or early August) for hay with no danger to nests and little danger to broods. Also, the subsequent regrowth is sufficient to produce suitable nest cover the next spring. Unlike timothy or other domestic grasses or legumes that are dry, unpalatable and lacking in nutritive content after mid-July, native prairie grasses are green, palatable, and nutritious at this time. Thus, they should interest local farmers and therefore make a hay or pasture type of management, or both, feasible. Applications of limestone, rock phosphate, and potash should precede a prairie seeding because (1) haying is a soil-depleting form of management, (2) the best time to work minerals into the soil is before the seeding and (3) once satisfactory stands of prairie grass are established on the sanctuaries they should not be plowed because of the difficulty and expense involved in their establishment.

Seeding Mixtures.--One seeding mixture that is showing promise for nesting prairie chickens is 4 to 6 pounds per acre of redtop, 1 pound per acre of timothy, and 1 pound per acre each of red clover, Korean lespedeza, and alsike clover. One pound of alfalfa per acre is added if the soil pH is high enough. The timothy and legumes help diversify the resulting cover, but the stand is still composed of enough redtop to make management (seed combining) practical. For still greater diversity, 1 pound per acre of switchgrass has been added to this mixture in several recent seedings. One important advantage to seeding switchgrass is that this seed can be easily handled, mixed, and broadcast by a sharecropper along with the other mentioned types of seed using oats as a nurse crop. The seed for big bluestem, little bluestem, Indian grass, and side-oats grama comes from a seed dealer as a chaffy, low-purity mass that is difficult to

handle. The seeding of these native grasses has thus far been limited to broadcasting by hand by project personnel.

All five prairie grasses may be added to a mixture containing redtop, timothy, and legumes if the subsequent management is to consist of haying or grazing, or both. The easily established redtop and timothy help control competition by Eurasian weeds and they provide fuel for prescribed burning that can dramatically stimulate the development of prairie grasses. This approach was particularly successful on the McCormick Sanctuary.

Other Management Factors

In addition to such factors as behavior, cover type, and cover management, are such considerations as edge and drainage features. We continue to find most prairie chicken nests within about 25 yards of sharp edges or breaks in the nesting cover--such as plowed, disked, or mowed edges. It is thus important that field size be held down to 20, 10, or even 5 acres to provide a maximum of edge.

During a typical wet spring in southern Illinois, about 95 percent of the nests are located on well-drained sites. Drainage is therefore a factor to consider when acquiring new land, and it is important to promote generally good drainage on sanctuaries. However, a few wet spots may provide desirable brood cover during midsummer, particularly during dry years.

Undoubtedly, additional and more subtle factors are involved in the attractiveness of nest cover and nest placement by prairie chickens. Such factors include social behavior, cover density, depth of duff, soil fertility, disturbance, occurrence of other species of animals, availability of food, and proximity to other cover types, to name but a few. It is anticipated that such factors can be better appreciated on the basis of a more comprehensive analysis.

Taxes and Public Relations

Annual management is essential to meet the ecological needs of prairie chickens in Illinois today. Sharecropping is the most practical means of accomplishing the necessary management. Because profits are received by sharecroppers in the management of state-owned sanctuaries we are required to comply with a recent amendment to the Illinois Revenue Act. This amendment which became effective January 1, 1970, reads as follows:

"When any real property which for any reason is exempt from taxation or is for any other reason not taxed under the provisions of this Act is leased, loaned, or otherwise made available to and used by a private individual, association or corporation for a use which is not otherwise exempt under the provisions of Section 19, that use is subject to taxation to be paid by the lessee or occupant thereof in the same manner and to the same extent as though the lessee or occupant were the owner of the property. The taxes shall be assessed to the lessees or occupants of that

property and collected in the same manner as herein provided, excepting, however, that such taxes do not become a lien against the exempt real property. When due, the taxes under this Section constitute an actionable debt and upon collection the proceeds shall be distributed as provided in Section 280."

Thus, sharecroppers are required to pay taxes on the portions of state-owned sanctuaries from which they derive revenue. This includes combining of grasses and legumes for seed, haying, and grazing, as well as the growing of such crops as wheat, oats, and soybeans. The mechanics for handling monies accruing to the State from sharecropping of prairie chicken sanctuaries have not as yet been adequately established. Temporarily, we have prepared sharecropping agreements whereby the lessor has realized a sufficient sum from a crop to cover the tax payment. It has been stipulated that monies amounting to the state's share be spent for limestone, fertilizer, fence building and maintenance, mowing for weed and brush control, and otherwise utilized in sanctuary management and maintenance in such a manner that the state ultimately receives its fair share of all revenues from sharecropping.

To facilitate compliance with the new taxing amendment, it is the responsibility of the individual designated as supervisor of sanctuary management to send an annual report each summer to the Supervisors of Assessments in Jasper and Marion counties. The report designates (1) the legal description of the land involved, (2) the number of acres that were farmed, and (3) the name of the farmer to be assessed for taxes. In 1971, 112 acres of the 250 acres of state-owned sanctuaries in Jasper County and 132 acres of the 160 acres of state-owned sanctuaries in Marion County were subject to taxation. Thus, about 60 percent of state-owned land in the prairie chicken sanctuary system was subject to taxation in 1971.

The recent acquisition of 410 acres of PGC sanctuaries by the Illinois Department of Conservation has caused a real concern among local residents over the loss of tax revenue. While the loss is still relatively small, it will increase with the transfer of 140 acres to the State on dissolution of the PCFI. The new amendment to the Illinois Revenue Act quoted previously will help with this problem.

If we are to accomplish our management objective for prairie chickens the local residents must be actively involved in sanctuary management. The most feasible approach to sanctuary management (sharecropping) involves the production of income as well as the production of prairie chickens. Since profits are involved we can hardly rationalize non-payment of local taxes. Except for one year when the Yeatter and McGraw sanctuaries were exempted from taxes, the taxes have always been paid on PCFI and PGC sanctuaries. To maintain a cooperative attitude among local residents it is important that taxes continue to be paid on as much sanctuary land as possible.

FINANCIAL

The PGC has land valued at approximately \$191,600 (not including the 80 acres of the Louis J. Lacey Sanctuary which the PGC leases) and a

working cash balance of \$76,955 giving total assets of about \$268,555 (Table 2). Liabilities include \$20,520 owed on the Burr ridge D. Butler Sanctuary (\$6,840 per year for the next 3 years) and \$24,000 owed on the Mr. and Mrs. Chauncey McCormick Sanctuary (\$6,000 per year for the next 4 years). This is a total debt of \$44,520, not including interest. The annual income from the management of the sanctuaries should take care of the taxes, costs of habitat management, and miscellaneous expenses exclusive of the managers salary and routine operating expenses (Tables 3, 4, and 5).

PCFI DISBANDING

The board of directors of the Prairie Chicken Foundation of Illinois has voted to disband that organization following their 1971 fund raising campaign. It is their intention to give the Yeatter, McGraw and the west one-half of the Donnelley sanctuaries to the Department of Conservation with the understanding that they will be managed as prairie chicken sanctuaries and ultimately dedicated as Nature Preserves by the Illinois Nature Preserves Commission. These sanctuaries are owned free and clear by the PCFI.

The PGC has agreed to accept all other assets and liabilities of the PCFI. The primary liabilities include an annual lease payment of \$750.00 plus taxes on the 80-acre Jamerson McCormack Sanctuary and the unpaid balance of \$9,500 plus interest and taxes, owed on the purchase contract for the east one-half of the Donnelley Sanctuary. The Board of the PCFI anticipates that current cash assets plus 1971 income will be sufficient, or nearly so, to cover the remaining payments on the purchase contract for the east half of the Donnelley Sanctuary.

Although soon to be disbanded, all who have been involved in the fight to save the native Illinois prairie chicken will always remember the pioneering efforts of Mr. J. W. Galbreath and others of the PCFI. Certainly we would not be where we are at Bogota today if it were not for those efforts.

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Table 1. Summary of land acquisition for prairie chickens in Illinois

Name of Sanctuary	Date Obtained	Acreage	Total Cost of Sanctuary	Bought or Leased by
JASPER COUNTY				
Ralph E. Yeatter	5-15-62	77	\$17,325	PCFI ^a
Max McGraw	2-17-64	20	5,500	PCFI ^a
Donnelley Brothers	7-64	60	18,000	PCFI ^a
Donnelley Brothers	Summer 67	60	31,500	PCFI ^a
Jamerson McCormack	11-1-65	80	25,000	PCFI ^a
Subtotal		297		
Cyrus Mark	10-18-65	17	\$ 6,800	PGC ^c
Mr. & Mrs Chauncey McCormick	3-1-66	140	60,000	PGC
Cyrus Mark	4-18-66	40	17,400	PGC ^c
Stuart H. Otis	7-1-66	58.3	15,250	PGC ^c
Marshall Field III	3-1-68	135	63,750	PGC ^c
Fuson Farm	8-29-70	175	58,000	PGC
Subtotal		565.3		
Subtotal (Jasper County)		862.3		
MARION COUNTY				
Illinois Natural History Survey	4-17-67	160	56,500	PGC ^c
Burridge D. Butler	3-20-69	160	45,600	PGC
Louis J. Lacey	5-7-69	100	42,000	PGC
Loy Tract	5-28-71	40	20,000	PGC
Subtotal (Marion County)		460		
TOTAL		1,322.3		

^a The Prairie Chicken Foundation of Illinois (PCFI) plans to give this land to the Illinois Department of Conservation this year.

^b The PCFI plans to turn this land, and the payments due, over to the Prairie Grouse Committee (PGC) this year.

^c Purchased by the State from the PGC in June 1969 (total cost, \$165,500).

Table 2. Balance sheet for fiscal years ending 6-30-70 and 6-30-71.

	<u>6-30-70</u>	<u>6-30-71</u>
ASSETS		
Cash	\$ 5,744	\$ 76,955
Land at Cost		
Mark I	17 acres (1965) 6,800 ^a	
McCormick	140 acres (1966) 60,000	60,000
Mark II	40 acres (1966) 17,400 ^a	
Otis	58.3 acres (1966) 15,250 ^a	
Field	135 acres (1968) 63,750 ^a	
Fuson	175 acres (8-29-70) 58,000	58,000
Butler	160 acres (1969) 45,600	45,600
Survey	160 acres (1969) 44,800 ^a	
Lacey	20 acres (1969) 8,000 ^b	8,000 ^b
Loy	40 acres (5-28-71) 20,000	20,000
	<u>\$261,600</u>	<u>\$191,600</u>
TOTAL ASSETS	<u>\$267,344</u>	<u>\$268,555</u>
LIABILITIES		
Obligations on Land		
McCormick contract	\$ 30,000	\$ 24,000
Field bank loan	34,081	0
Butler contract	27,360	20,520
	<u>\$ 91,441</u>	<u>\$ 44,520</u>
TOTAL LIABILITIES	<u>\$ 91,441</u>	<u>\$ 44,520</u>
EQUITY	<u>\$175,903</u>	<u>\$224,035</u>
TOTAL LIABILITIES & EQUITY	<u>\$267,344</u>	<u>\$268,555</u>

^a Sold to state.

^b Estimated value; land was donated.

Table 3. Cash position; income and expenses for fiscal years ending 6-30-70 and 6-30-71.

	<u>1969-70</u>	<u>1970-71</u>
CASH BALANCE 7/1	\$ 3,766.80	\$ 5,743.90
INCOME		
Sale of Land		165,500.00
Government Programs	1,417.88	2,803.45
Sale of Crops, House Rent and Refunds	1,330.97	7,656.74
Donations for Land	27,453.81	30,116.75
Other Donations	<u>3,871.80</u>	<u>1,192.80</u>
Total Income	<u>\$ 34,074.40</u>	<u>\$207,269.74</u>
	\$ 37,841.20	\$213,013.64
EXPENSES		
Habitat Management	1,260.15	1,873.76
Taxes	2,575.56	2,830.12
Building Operations		412.92
Land	21,031.06	124,921.37
Interest and Legal Fees	6,020.94	4,974.14
Rent	800.00	800.00
Misc.	<u>409.59</u>	<u>246.30</u>
Total Expenses	<u>\$ 32,097.30</u>	<u>\$136,058.61</u>
CASH BALANCE 6/30	5,743.90	76,955.03
GIFTS OF LAND AT COST		
INHS Sanctuary - 160 acres	44,800.00	
Lacey Sanctuary - 20 acres	8,000.00	
Memo - Land Payments 1970-71		
Paid off note on Field Sanctuary		34,081.37
Principal payment - McCormick		6,000.00
Principal payment - Butler Sanctuary		6,840.00
Fuson Farm purchase (175 acres)		58,000.00
Loy purchase (40 acres)		20,000.00

Table 4. Summary of income from PGC sanctuaries, annual totals for 1966 through 6-30-70, detailed for 7-1-70 through 6-30-71.

Year	Sanctuary	Item	Amount	Total
1966	All			\$ 1,154.36
1967	All			3,577.74
1968(to 5/31)	All			409.59
1969(to 6/30)	All			4,501.81
1970(to 6/30)	All			2,782.22
1971(to 6/30)	All			10,460.19
Jasper County				
	All	Federal Feed Grain Payment	\$1,079.23	
	All	Redtop seed	1,745.50	
	Field	Clover hay	176.00	
		Soybeans	285.59	
		Pasture	86.40	
	Fuson	Soybeans	2,502.30	
		Corn	575.73	
		House rent (1/20-6/19)	295.00	
		LP gas refund	58.01	
Marion County				
	Survey and			
	Butler	Federal Feed Grain Payment	1,053.36	
	Lacey	Federal Feed Grain Payment	360.36	
	Butler	Federal cost sharing, lime and phosphate	310.50	
	Survey	Pasture fee (1969)	77.00	
		Pasture fee (1970)	116.25	
		Redtop seed	441.00	
	Butler	Oats and hay	85.73	
		Wheat seed	167.06	
		Redtop seed	236.64	
		Soybeans	189.81	
		Pasture fee	116.87	
	Lacey	Soybeans	421.85	
		Timothy hay	80.00	
				\$10,460.19

Table 5. Summary of expenses for PGC sanctuaries, annual totals for fall 1965 through 6-30-70, detailed for 7-1-70 through 6-30-71.

Year	Sanctuary	Item	Amount	Total
1965	All			\$ 69.00
1966	All			1,146.66
1967	All			7,333.09
1968(to 5/30)	All			4,861.85
1969(to 6/30)	All			11,947.99
1970(to 6/30)	All			11,066.24
1971(to 6/30)	All			9,302.65
Jasper County				
	McCormick	Taxes	\$ 662.50	
		Interest	1,800.00	
		Electricity	47.35	
	Fuson Farm	Taxes	759.58	
		Insurance on buildings	106.00	
		LP gas and tank rental	172.07	
		Water heater	73.50	
		Fertilizer	94.17	
		Legal Fees	3.00	
		Title insurance	220.50	
	Mark 17 & 40, Field and Otis Field	Taxes	628.80	
		Interest	1,136.04	
Marion County				
	Butler	Taxes	489.68	
		Interest	1,641.60	
		Insurance (Fire)	7.00	
		Insurance (Wind)	7.00	
		Lime and fertilizer	810.46	
		Soil samples	4.20	
	Lacey	Taxes (on 20 acres)	58.50	
		Rent (on 80 acres)	800.00	
		Legal fees (Loy addition)	73.00	
		Fertilizer	32.85	
	Survey Several Sanctuaries	Taxes	231.16	
		Prairie grass seed	649.50	
		Shipping charges	35.06	
		Domestic grass & legume seed	235.30	
		2-4-5-T brush killer	17.22	

Table 5. Cont'd.

Miscellaneous

Meeting expense - Chicago	68.80
Meeting expense - Effingham	168.50
Legal fees - Engel	100.00
Shipping chicks	15.00

\$11,137.24

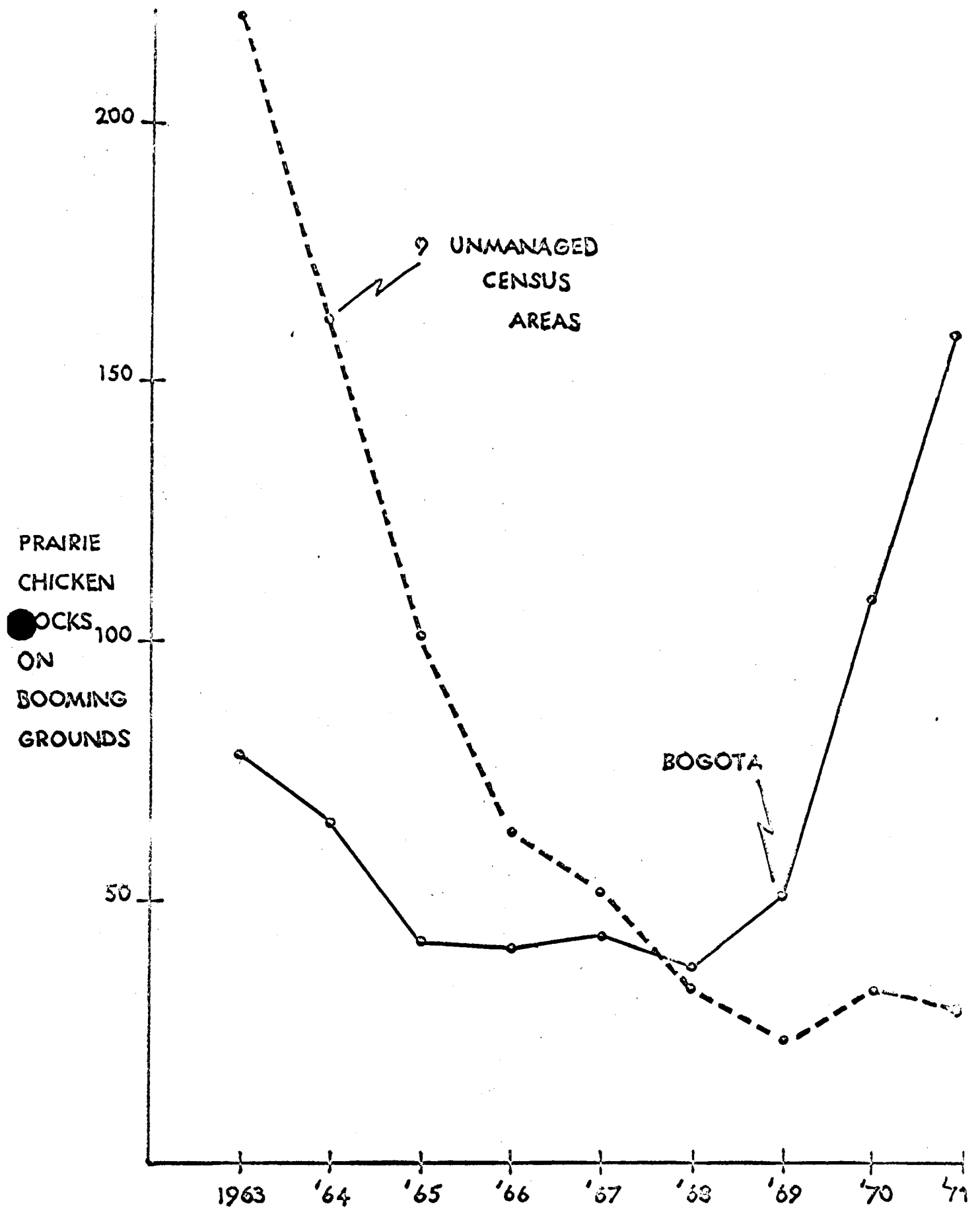
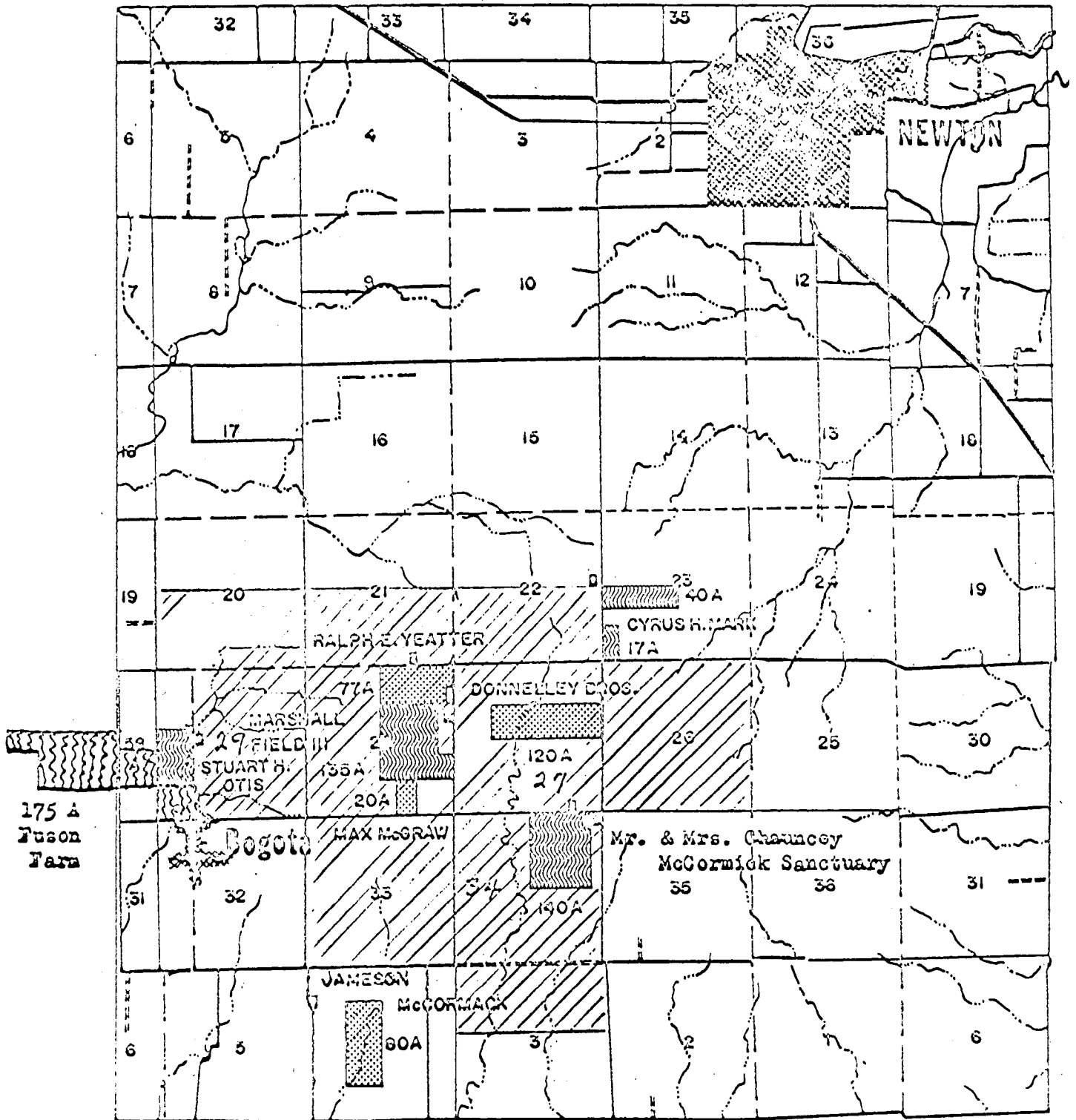


Figure 1. Trends in abundance of prairie chicken cocks on 9 unmanaged areas with trends of the managed flock at Bogota.

PRAIRIE CHICKEN SANCTUARIES

BOGOTA AREA



PRAIRIE GROUSE COMMITTEE, ILLINOIS CHAPTER - THE NATURE CONSERVANCY



PRAIRIE CHICKEN FOUNDATION OF ILLINOIS

Figure 2. Prairie chicken sanctuaries in Jasper County, as of July 1, 1971. Shaded areas in vicinity of sanctuaries indicate land with high acquisition priority.

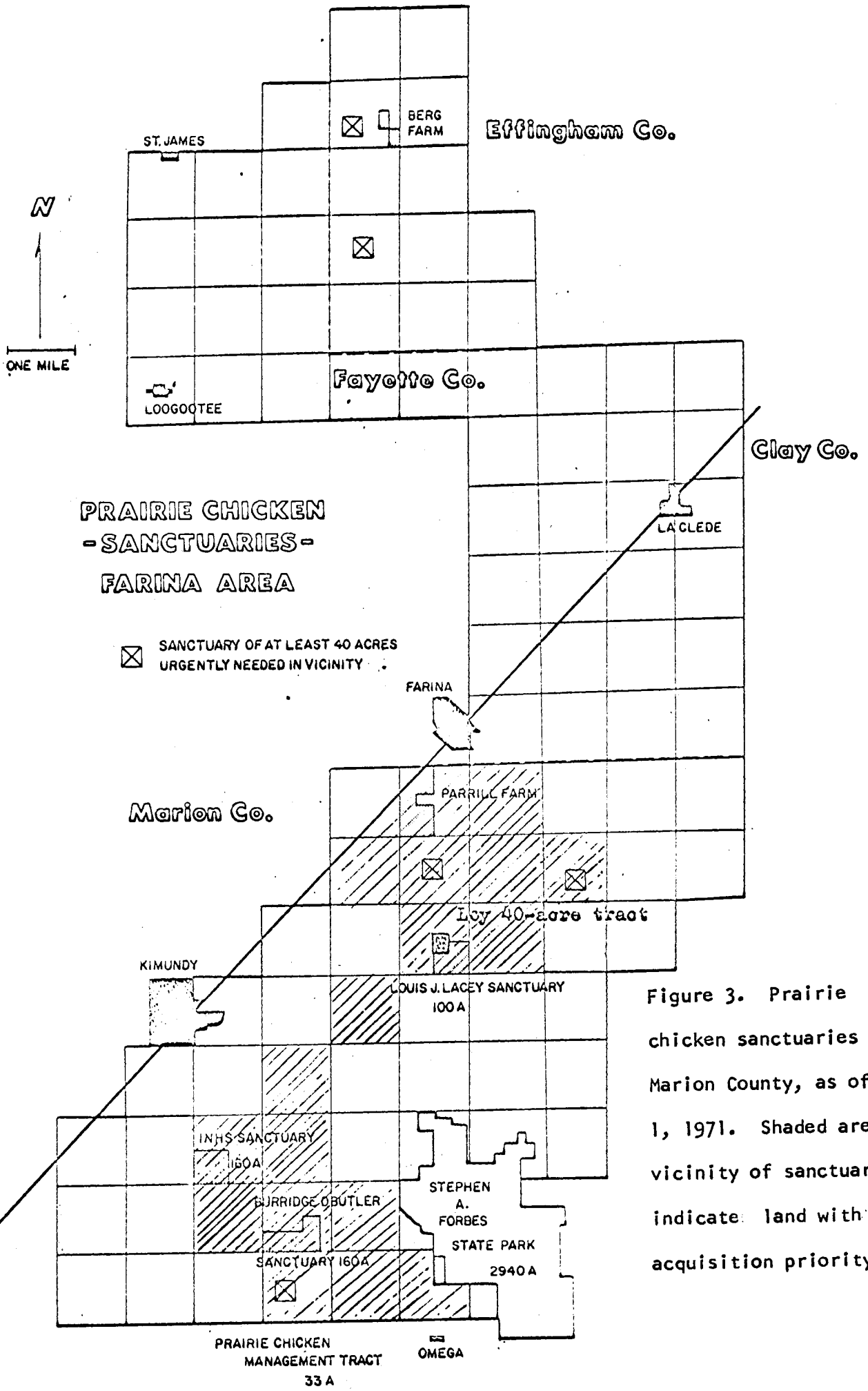


Figure 3. Prairie chicken sanctuaries in Marion County, as of July 1, 1971. Shaded areas in vicinity of sanctuaries indicate land with high acquisition priority.

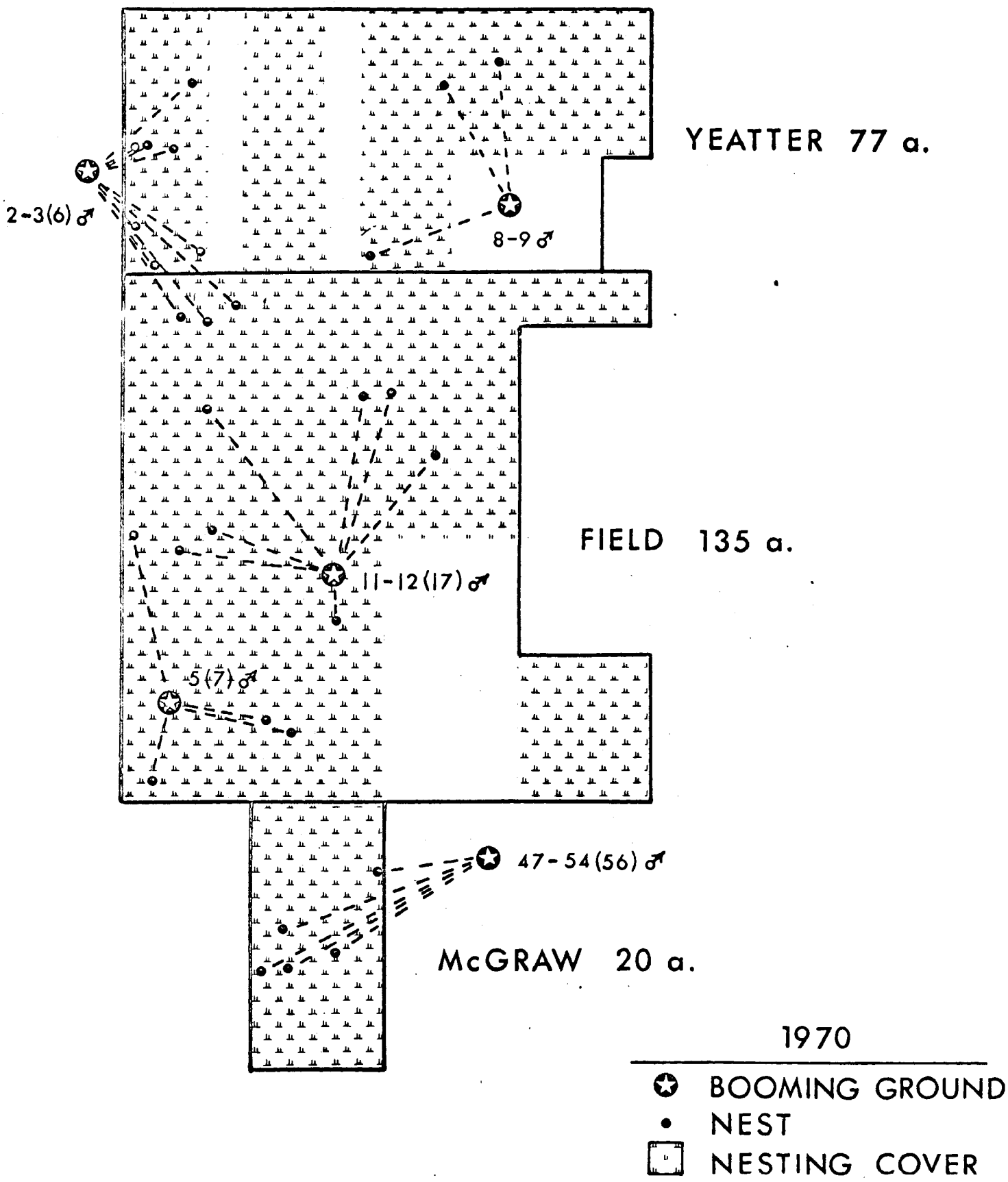


Fig. 4. The relationship of booming grounds, nest cover, and nests on three sanctuaries in Jasper County, 1970.

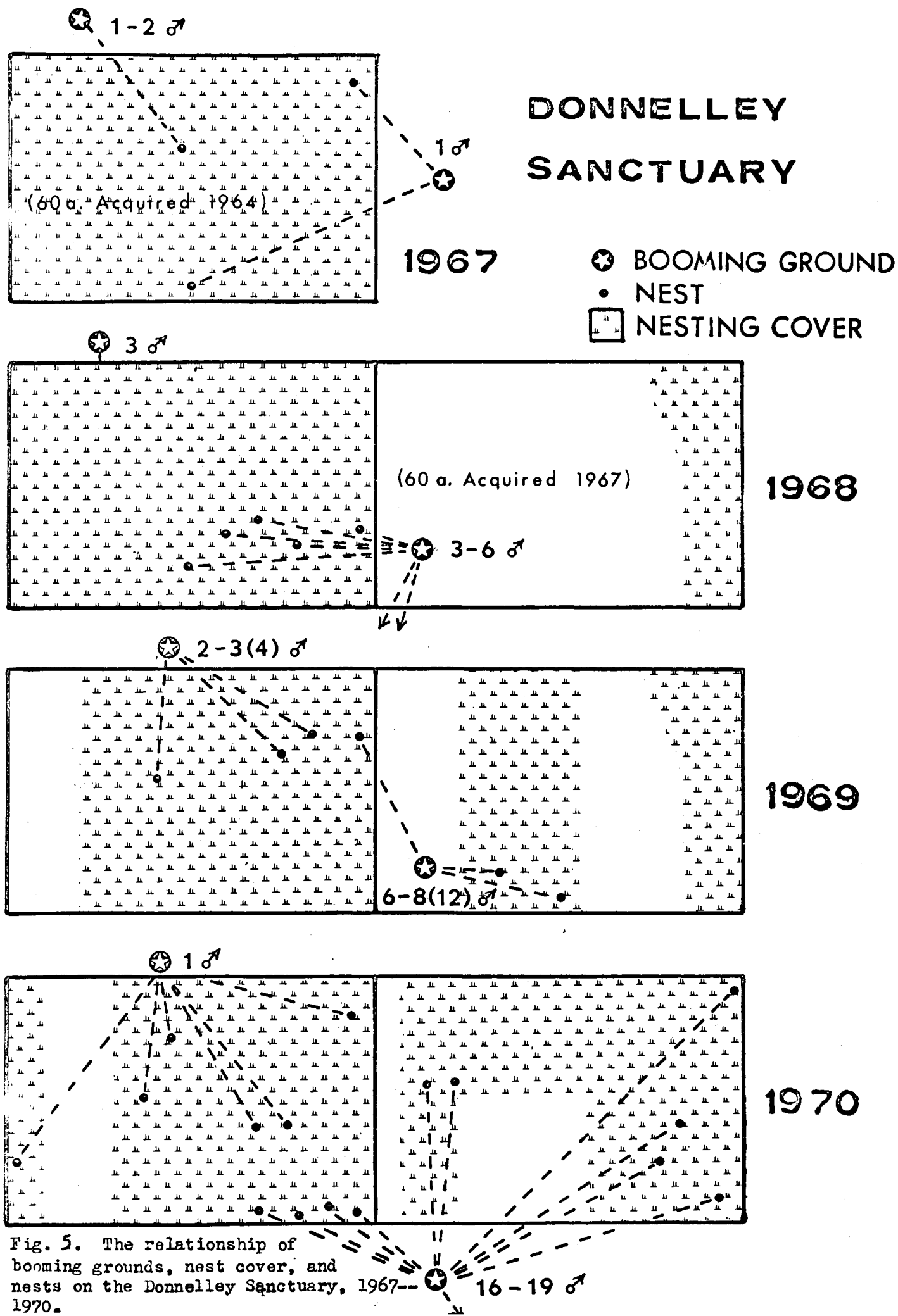


Fig. 5. The relationship of booming grounds, nest cover, and nests on the Donnelley Sanctuary, 1967-1970.

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~~SECOND~~ ANNUAL REPORT OF THE PRAIRIE GROUSE COMMITTEE

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