Effects of Brush Control and Game-bird Management on Nongame Birds

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Abstract

We observed the responses of nongame birds to brush suppression and habitat management for game birds in the Rolling Plains of Texas during 1981–1983. Data from line transects were used to describe density, species diversity, species richness, and equitability. We observed no difference in these variables between untreated sites and sites late sprayed with herbicides in 1969. The density of northern mockingbirds (*Mimus polyglottos*) was lower on treated than untreated areas, but no other species were affected. Habitat management to favor mourning doves (*Zenaida macroura*) and bobwhites (*Colinus virginianus*) was associated with a 54% increase in combined density of nongame birds and a reduction in equitability. Species diversity and species richness were similar on managed and unmanaged sites. On our study area, past herbicide treatment of mesquite (*Prosopis glandulosa*) and habitat management for game birds were compatible with nongame birds.

Knowledge of the response of nongame bird populations to land use is important because of current emphasis on multiple-use decisions (Buttery and Shields 1975, Crawford 1976). On rangeland nongame birds also are ecologically important because of their role in energy flow, nutrient turnover, and pest control (Weins and Dyer 1975).

In the Rolling Plains of Texas, mesquite suppression is widely practiced to increase forage production for livestock (Dahl et al. 1978). Further, habitats are commonly managed for bobwhites and mourning doves because of their economic and recreational importance. However, effects of these practices on nongame birds

are poorly understood. Consequently, we described responses of nongame-bird populations to brush suppression and game-bird management in northwest Texas.

Study Area and Methods

The study was conducted on the 64,600-ha Pitchford Ranch in Dickens and King counties, Texas, from June 1981 to July 1983. The area had a midlatitude semiarid climate with dry winters and summers and low humidity. Mean annual temperature is 16.7° C and mean annual precipitation is 52 cm (Orton 1970).

Two study sites were established in an area that had been treated with herbicides, and 2 in an untreated area. One study site in each brush treatment was managed to favor game birds, resulting in 4 distinct sites: treated-managed (TM, 45.3 ha), treated-unmanaged (TU, 55.0 ha), untreated-managed (UM, 76.2 ha), and untreated-unmanaged (UU, 60.4 ha).

The treated area was sprayed with 2,4,5-T (2,4,5-trichlorophenoxy acetic acid) by truck sprayer in May and June 1969. Previously, the area had been aerially sprayed with 2,4,5-T in June 1964 and 2,4,5-T + Silvex in May and June 1954. Dead brush stems were left standing (Fig. 1). Herbicide treatment had no effect on the density of brush stems, but reduced the proportion alive from 88% to 9% (Gruver 1984).

Game-bird management included annual discing of strips 6 to 10 m wide and about 600 m long such that 8% of each managed site was disturbed, constructing brush shelters (1/1.8 ha on the TM site, 1/1.5 ha on the UM site), and establishing supplemental feeders at 1/25 ha on both managed areas. A 2:1:1 mixture of 20% protein laying ration, corn, and sorghum was fed from December 1981 to July 1983.

Four linear transects were established on each study site to estimate the density of nongame birds. Transects were parallel and spaced about 120 m apart, except in the UM site where 2 lines were 240 m apart and divided to form 4 transects. Sets of 4 transects

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Fig. 1. Mesquite stems were left standing on the treated study area. This site was last sprayed 13 years before the picture was taken.

totaled about 1.8, 3.3, 3.3, and 3.5 km on the TM, TU, UM, and UU sites, respectively. Counting took place during October, January, April, and July of 1981–1982 and 1982–1983. Each transect was walked twice in the morning and twice in the evening during a sampling month, thus creating 4 sampling periods. Sampling was conducted during the first and last 3 hours of daylight.

Birds were identified to species and the 10-m band parallel to the transect in which they occurred was recorded. The computer program TRANSECT (Burnham et al. 1980) was used to calculate effective strip width. Data were pooled across seasons, study sites, and sampling periods in the calculation of strip width. Combined density of nongame birds, density of selected species and groups, species diversity (MacArthur and MacArthur 1961), species richness, and equitability (Tramer 1969) were calculated for each year $\times$ season $\times$ study site $\times$ sampling period combination. Because there was only 1 df for brush-control and management effects, it was pointless to conduct analysis of variance. Therefore, we present descriptive statistics.

Results

A total of 1,117 nongame birds was observed in 873 flushes during the walking of 1,523.2 km of transect. Thirty-eight species of nongame birds were observed.

Brush treatment had no effect on nongame-bird diversity, species richness, equitability (Table 1), or combined density (Table 2). However, treatment reduced densities of northern mockingbirds (Table 2). As a group, grassland sparrows appeared more abundant in the treated than untreated area. This group included Cassin's (*Aimophila cassinii*), clay-colored (*Spizella pallida*), field (*S. pusilla*), grasshopper (*Ammodramus savannarum*), and vesper (*Poocetes gramineus*) sparrows.

Game-bird management had no effect on species diversity or species richness of nongame birds but was associated with an 8% decline in equitability (Table 1) and an increase in combined density (Table 2). Northern mockingbirds, grassland sparrows, and brushland sparrows appeared more abundant on managed than unmanaged sites (Table 2). The group of brushland sparrows included black-throated (*Amphispiza bilineata*), lark (*Chondestes grammacus*), and white-crowned (*Zonotrichia leucophrys*) sparrows. A combined group of other uncommon species which indi-

Table 1. Mean population attributes, pooled over 2 years, 4 seasons, and 4 sampling periods, for nongame birds on sites treated and not treated for brush suppression and managed and not managed for game birds, Dickens County, Tex., 1981–1983.

Attribute	Treated		Untreated	
	Managed	Unmanaged	Managed	Unmanaged
Diversity	1.00	1.0	1.1	1.0
Species richness	3.4	3.5	3.6	3.6
Equitability	0.83	0.90	0.85	0.91

Table 2. Mean densities (N/40 ha) of selected species and groups of nongame birds, pooled over 2 years, 4 seasons, and 4 sampling periods, on sites treated and not treated for brush suppression and managed and not managed for game birds, Dickens County, Tex., 1981–1983.

Species or group	Treated		Untreated	
	Managed	Unmanaged	Managed	Unmanaged
All birds	78.9	49.9	57.1	43.1
Grassland sparrows	32.4	10.1	18.4	11.5
Brushland sparrows	14.8	5.9	5.7	3.3
Western meadowlark (<i>Sturnella neglecta</i>)	8.4	12.6	15.5	12.6
Northern mockingbird (<i>Mimus polyglottos</i>)	6.0	1.7	5.2	3.8
Scissor-tailed flycatcher (<i>Muscivora forficata</i>)	4.6	4.6	3.8	5.7
Golden-fronted woodpecker (<i>Melanerpes aurifrons</i>)	1.5	1.5	0.7	2.2
Other species	11.0	8.6	8.0	4.0

vidually accounted for less than 4% of observations was also more abundant on managed areas. Golden-fronted woodpeckers (*Melanerpes aurifrons*), conversely, were more abundant on unmanaged than managed sites.

Discussion

Although immediate effects of herbicide treatment to suppress mesquite could not be determined, conditions 12–13 years post-treatment had little influence on the nongame bird population of our study area. This probably resulted because the avifauna consisted largely of species that foraged and nested in grass or low-brush habitats. These were also accessible to mobile nongame birds. Further, treated and untreated areas were structurally similar in density of brush stems; total coverage by forbs, grasses, and bare ground; and profile of herbaceous vegetation (Gruver 1984). Although vegetation composition may affect bird populations (Rice et al. 1984), structure is also important (James 1971, Whitmore 1975).

Northern mockingbirds were the only species with reduced numbers on the treated area. These birds may have been more abundant on the untreated than treated area because a greater number of large (>5 m) trees was available on the untreated area. Larger trees were used as song posts by mockingbirds during late winter through summer.

Combined density of nongame birds averaged 54% higher in sites managed for game birds than in unmanaged sites. The increase was due to increase in the density of several species rather than 1 or 2 species, including primarily grassland sparrows (defined earlier) and a group of uncommon birds that individually accounted for less than 4% of all observations. These birds, mostly granivores, may have responded to the increased availability of seed-producing forbs on the disced strips of managed sites (Gruver 1984). Nongame birds, particularly sparrows, also used supple-

mental feeders.

Equitability appeared higher on unmanaged than managed sites. This occurred mainly because we observed a higher proportion of grassland sparrows on the managed site. This group accounted for 37% of managed-site observations, but only 24% of unmanaged-site observations.

Golden-fronted woodpeckers were the only species significantly less abundant in managed than unmanaged areas. Many of these birds were often seen in a small part of the UU site that had a higher density of large mesquite trees than were available in the surrounding area. Transects on other sites did not intersect similar habitat.

Our results suggest that in northwest Texas nongame bird populations are not affected by herbicide treatments of brush after 12 to 13 years have elapsed where dead mesquite stems were left standing (Fig. 1). Our findings support the conclusion of Webb and Guthery (1983) that habitat management to favor game birds in this region appears compatible with nongame birds.

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