Role of Fire in Mourning Dove Nesting Ecology

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THE mourning dove (*Zenaidura macroura*) is distributed throughout the United States, including Alaska, southern Canada, and in most of Mexico. It frequents habitat types as varied as farmlands and ranchlands, woodlands and grasslands, and the desert.

In many parts of this extensive range, fire has been a regular, and presumably important ecological force. The nature of this relationship on grassland fauna, however, has not been thoroughly investigated. This paper thus discusses some of the interactions we have found concerning the role of fire in mourning dove nesting ecology as it relates to a grassland habitat infested with woody vegetation (primarily mesquite, *Prosopis* spp.).

In the West Texas grasslands, the restriction of prairie fires has been suggested as one of the factors responsible for the spread of mesquite (Box 1967). Hence, while mesquite may be the scourge of the rancher, it has also been shown to play a beneficial role in the nesting ecology of the mourning dove (Jackson 1940; Osborn 1943; Gallizioli 1961; Clark 1969). The opportunity to investigate the actual impact of this contradiction developed when experimental burnings were carried out on a tobosagrass (*Hilaria mutica*) community mixed with mesquite (Britton and Wright 1971). We thus began a 2 year study in April of 1970 on the north end of the Renderbrook-Spade Ranch some 13 miles south of Colorado City

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in Mitchell County, Texas. The region is in the Rolling Plains as described by Thomas (*in* Gould 1969).

The specific study area was level to gently sloping with clay soils that supported a dense to scattered overstory of shrub and tree-sized mesquite and a ground cover of dense tobosagrass and scattered patches of buffalograss (*Buchloe dactyloides*). Average annual precipitation in this area is 20 inches but in 1969, 27 inches fell and in 1970, 13 inches. The study area was gripped by drought in early 1971 and no significant precipitation occurred until late May.

PERSPECTIVES

The typical image of a mourning dove nest brings to mind a rather flimsy nest resting loosely on the branches or in the crotch of a tree some 5 to 25 feet above ground. Add a raging fire to this picture and one is most likely to conclude that if fire has any role in the nesting ecology of mourning doves, it must certainly be undesirable. The pervasive antifire syndrome is hardly challenged in this scenario: wooded nesting sites are destroyed with the only remaining prospect one of long-term habitat recovery. Moreover, visions of dove nesting habitats in prairie environments are generally limited to wooded watercourses, farmstead windbreaks, or shelterbelts.

Nonetheless, the literature does reveal incidental references to ground nesting habits for doves in Iowa (McClure 1943), in Illinois (Hanson and Kossack 1963) and in Alabama (Pearson and Moore 1939). Ground nesting by mourning doves is not uncommon in southern California (Cowan 1952), in Oklahoma (Downing 1959) and in Nebraska and South Dakota and possibly throughout the Great Plains (Leo Kirsch per. comm.).

TREATMENTS AND RESULTS

We examined dove nesting (Fig. 1) in an area burned with a "cool" fire in April, after green-up began. This fire reduced ground cover but had only minimal effects on the tree-sized mesquite. In this treatment, the doves nested in the mesquite and the fire apparently rendered no effect on nesting.

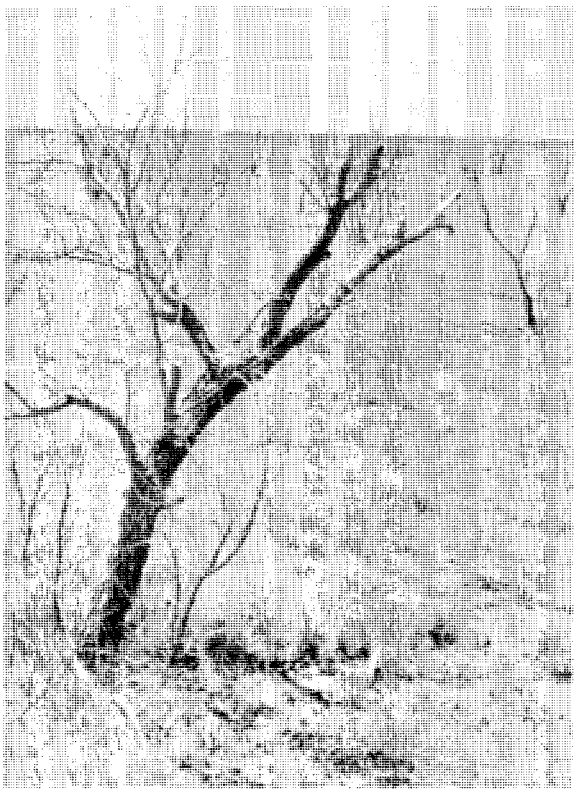

FIG. 1. Doves nesting in the mesquite previously top-killed by herbicide treatment were more successful than were those nesting in untreated live-crown mesquite.

Secondly, we intensively studied an extensive area treated in 1965 with 2,4,5-T and burned in late March, respectively, of 1969, 1970, and 1971. We were, therefore, able to study dove nesting (Fig. 2) in a 1-year old, 2-year old, and a current burn and to compare these burning treatments with an unburned area of mesquite top-killed by spraying; many of the latter trees had resprouted since the 1965 spraying treatment (Fig. 3).

Burning the previously sprayed rangeland partially destroyed the tree-nesting habitat available to mourning doves. The fires burned down 14 to 89 percent of the mesquite trees, leaving behind only charred stumps. The fires were particularly effective in burning

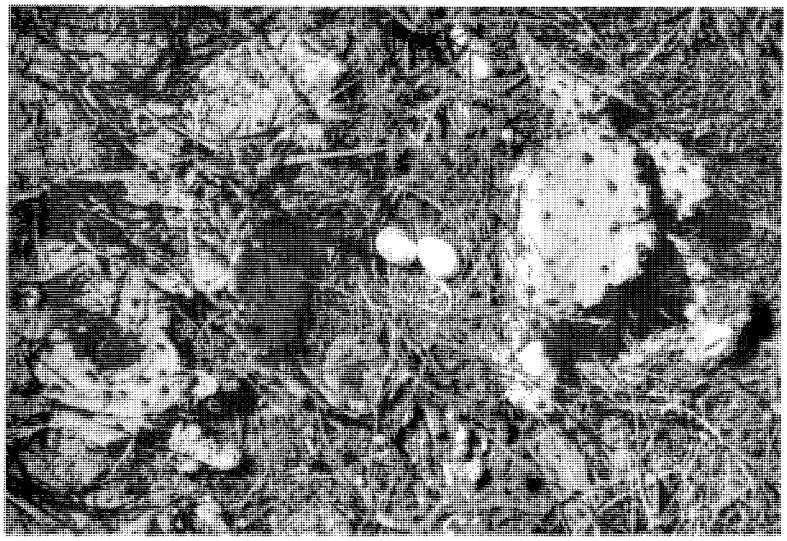

FIG. 2. Most ground-nesting doves in the burned study areas selected nesting sites that provided vertical cover at least on one side of the nest.

FIG. 3. A "cool" fire on an unsprayed site had little effect on the mesquite overstory.

FIG. 4. Ground nests were never more than 200 feet and frequently less than 100 feet from a suitable mesquite.

down the larger diameter mesquite (Britton and Wright 1971).

Taken by itself, the loss of the larger mesquite trees might seem a severe reduction in nesting habitat as mourning doves seemingly prefer larger sized mesquite, apparently in response to the security provided by larger branches and forks. However, most mourning doves nested on the ground as a result of the prescribed burns. There were 4 to 23 times as many ground nestings as there were tree nestings in the burned areas. It is interesting and important to note, however, that this dramatic adjustment in nesting habits was not solely from the lack of suitable tree nesting sites. In no case was a ground nest located more than 200 feet from a suitable mesquite (Fig. 4), and frequently, the distance was less than 100 feet. One might conclude that the mourning doves were also responding to changes in ground cover caused by the March fires.

GROUND COVER

Ground cover differed greatly between the burning treatments and the control. In the unburned control sites, the grass and forb

cover was good, providing 12 percent basal cover. The litter was dense and matted; it occupied 61 percent of the ground area.

Ground cover in the burned areas varied in proportion with the available moisture and the time since the burn. In general, the amount of cover was lowest in the year of the burn and increased each year thereafter. The best cover was provided by the 2-year old burn; grasses made up 15 percent of the basal area and the light litter covered 45 percent of the ground.

The poorest cover was in the current year's burn (1971). As mentioned, 1971 started with a drought, and from the time of the burn until the first significant rain at the end of May, there was essentially no grass cover. The May rain was a 5 inch downpour, however, and the tobosagrass rapidly grew several inches in a few days. By mid-June, the grass and forbs had a basal area of 6 percent. The litter was light and covered 20 percent of the ground.

Ground-nesting Habits

Mourning doves responded dramatically to prescribed burning in both years of the study (Table 1). The highest densities of ground-nesting pairs were found in the current year's burn and decreased each successive year thereafter. The density of ground nesting was least in the unburned area. Apparently the degree of ground cover became successively less attractive to ground-nesting doves as the proportion of cover approached the unburned condition.

We believe that ground-nesting doves prefer open cover with large amounts of bare soil and little litter. The reports of mourning dove ground nests in grain stubble (Downing 1959; Hanson and Kossack 1963) and cotton fields (Jackson 1940; Cowan 1952) lend some support to this possibility. However, most ground-nesting doves in our study areas additionally selected nesting sites that provided some cover at least on one side of the nest; overhead cover was seldom an important feature of the nest site. Doves nesting on the ground in the current year's burns located 89 percent of their nests beside some vertical cover such as prickly pear pads, mesquite sprouts, or fallen mesquite branches. The incidence of vertical cover decreased in the older burns, and in the unburned control sites, the majority of the nests were located only in tobosagrass.

TABLE 1. SUMMARY OF NESTING DATA FOR MOURNING DOVES ON PRESCRIBED BURNS, MITCHELL COUNTY, TEXAS, 1970–71.

Treatment	Breeding Pairs/Acre		Number of Nests		Percent Nest Success		No. Young Fledged/Acre	
	Tree	Ground	Tree	Ground	Tree	Ground	Tree	Ground
"Cool" fire on unsprayed site[a]	.225	0	34	0	12	0	.175	.000
Sprayed and:								
Burned in current year	.062	.225	14	63	14	24	.050	.325
Burned 1-year earlier	.025	.162	9	67	22	19	.037	.275
Burned 2-years earlier[a]	.025	.125	2	23	0	17	.000	.200
Unburned	.194	.066	54	17	18	47	.213	.208

[a] One year's (1971) data only; all other data are averages for 1970 and 1971 combined.

Surprisingly, no dove ground nests were located in buffalograss or in patches of vegetation that escaped burning.

The availability of nest material is an ecological factor in assessing the attractiveness of burned areas for ground nesting. Goforth and Baskett (1971) have determined that the availability of choice nest material is important in determining the territorial boundaries of mourning doves. Moreover, mourning doves prefer to collect their nest materials from areas with sparse cover (Swank 1955). Thus burning, while it reduced the total amount of available litter, simultaneously added to the suitability of the area by increasing the amount of open space where doves might collect nest materials. Ground-nesting doves in our study areas invariably used dried tobosagrass litter for nest materials.

Drought Conditions

The effects of fire in a drought year could prove disastrous to mourning dove nesting. The density of doves nesting in trees during the drought year of 1971 was only half that of the previous year, whereas the incidence of ground nesting in the older burns was little changed. However, the current year's burn, coupled with the drought, so affected the habitat that only a single ground-nesting dove was found in this treatment prior to 9 June. This nest, which was initiated in early April and later fledged, was located among the branches of a burned-down mesquite. Hence, burns accomplished in years preceding a dry year seemingly serve as buffer habitats for ground-nesting doves.

When abundant rains finally break a drought, however, the current year's burn is quickly utilized. Five inches of rain on 28–29 May 1971, quickly induced rapid growth of tobosagrass on the newly burned areas. The mourning doves responded with a burst of nesting activity beginning on 9 June. The density of breeding pairs on the 1971 burn thereafter exceeded that of any other treatment. Nonetheless, we wish to emphasize that spring burning in a drought year will preclude the development of suitable ground-nesting habitat for mourning doves.

Nest Success

Prescribed burning as practiced in our study had no apparent

effect on the success of tree-nesting mourning doves. Doves nesting in the mesquite previously top-killed by the 1965 herbicide treatment (Fig. 5) were more successful (18 percent) than were those nesting in untreated, live-crown mesquite (12 percent). This difference was due to the greater loss of nests to wind damage in the live crown trees. The "cool" April fire in the unsprayed stand rendered little damage to the tree-sized mesquite yet we believe had this fire been hot enough to similarly top-kill the trees, the effect on dove nesting would have been no different than the spraying treatment.

Indirectly, prescribed burning in the tobosagrass communities increased the success of mourning dove nesting by increasing the occurrence of ground nesting activities; whereas only 15 percent of all the tree nests were successful, 21 percent of all the ground nests fledged. Ground nests were particularly safe from the high winds which, as mentioned, destroyed many tree nests. It is particularly interesting that predators exerted an equal pressure on both tree and ground nests (Soutiere and Bolen, *in* press).

Young doves were fledged from 47 percent of the ground nests in the unburned areas whereas only 21 percent of the ground nests located on the burned areas fledged young. Among the ground nests within the burning treatments, nesting success was similar although, in both years of our study, the current year's burn had the highest success (Fig. 6) and the oldest burns, the lowest nesting success (Table 1). Ground cover (i.e. litter and basal area), as mentioned earlier, was higher in the older burns, yet, here nesting success was lowest; this inverse relationship held for both years of the study.

Fire produced a varying effect on mourning dove productivity (young fledged per acre). When tree-nesting densities were high, as they were in 1970, the increased production from ground-nesting doves in the current year's burn equalled or exceeded production from tree nesting on unburned rangeland. However, the production from the older burns was less. Conversely, when tree-nesting activities declined by 50 percent, apparently because of the drought in 1971, all the burned areas maintained a stable level of production from doves nesting on the ground (Fig. 7). The buffering effect of ground-nesting doves seems important under these conditions.

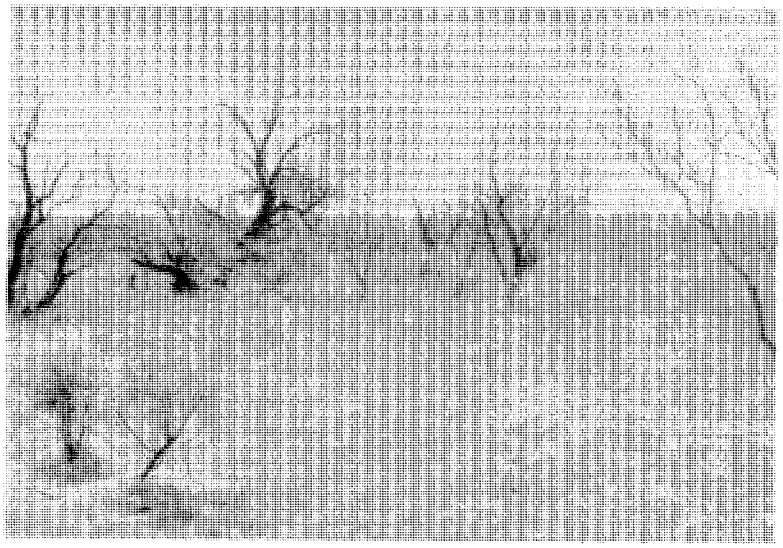

FIG. 5. Rangeland sprayed with 2,4,5-T in 1965. Some trees had made extensive sprout regrowth by 1970.

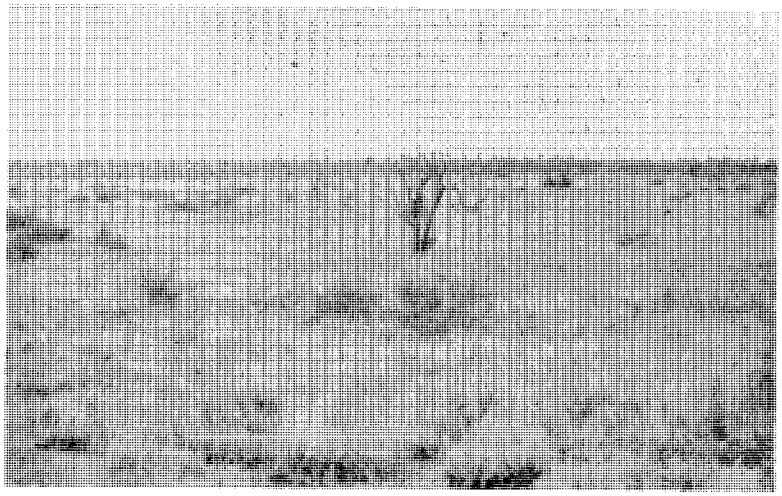

FIG. 6. Fire burned down 85 percent of the previously sprayed mesquite in this plot.

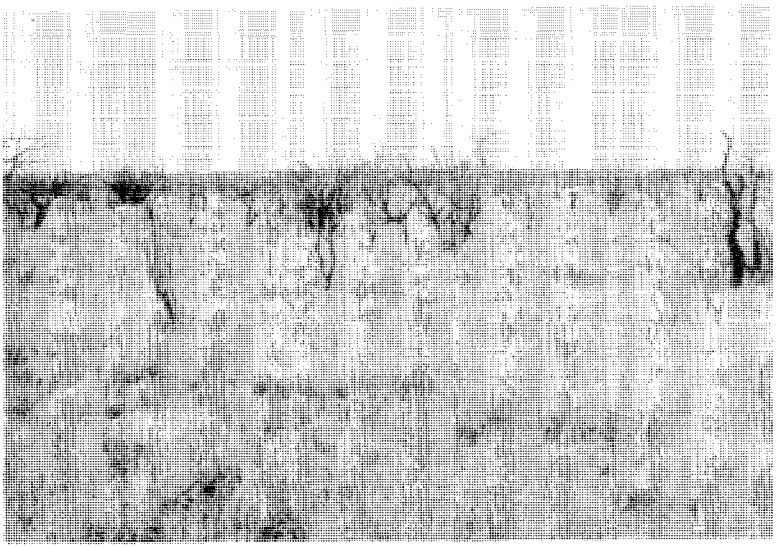

FIG. 7. Previously sprayed rangeland 1 year after a prescribe burn in a year with good moisture.

SUMMARY

A 2-year study of dove nesting on burned rangelands in Mitchell County, Texas, revealed that a "cool" fire on otherwise untreated rangelands produced little effect on either mesquite trees or their use as nesting sites by mourning doves.

Intensive study of fire on rangelands earlier treated with herbicides, however, indicated that the loss of larger mesquite trees as nesting sites was accompanied by the occurrence of ground-nesting in mourning doves. Ground cover was also an important consideration in the incidence and success of ground nests in the burned areas; current year burns fostered better ground-nesting habitat than did older burns except under drought conditions. Predation on mourning dove ground nests was no greater than on those located in trees and because of wind damage to tree nests, the success of ground nests was actually higher than tree nests.

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