Responses of Merriam's Turkey to Pinyon-Juniper Control

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Highlight: Merriam's turkeys (*Meleagris gallapavo merriami*) inhabit much of the pinyon-juniper vegetative type in Arizona where ponderosa pines are available for roost sites. A 64% reduction in turkey populations was noted following a pinyon-juniper control program that isolated roost sites 300 m or more from cover. In turkey habitat, cleared areas should not be wider than 90 m to provide good turkey habitat, and strips of cover should be retained as travel lanes to established roost areas.

Pinyon-juniper woodlands (*Pinus edulis* and *Juniperus* spp.) occupy between 4.86 and 5.67 million ha in Arizona (Arnold et al. 1964; Spencer 1966). Ten to 15% of these woodlands have been treated for range improvement or to increase water yield, mostly by cabling or bulldozing to kill trees (McCullough 1973). Approximately one-third of the pinyon-juniper in Arizona is occupied by turkeys, according to distribution maps presented by Jantzen (1961) and Spencer (1966). Most of this occupied range extends from east-central Arizona along the

Mogollon Rim to central Arizona and north to the Grand Canyon. The occupied pinyon-juniper range generally parallels the ponderosa pine (*Pinus ponderosa*) belt of Arizona, and small stands of ponderosa pine are found in valleys and on north-facing slopes. These ponderosa pine trees fulfill the roosting requirements of Merriam's turkeys (Boeker and Scott 1969) and probably are necessary for turkeys to survive in the pinyon-juniper type.

Several studies have been conducted in Arizona to determine the effect of pinyon-juniper control programs on wildlife species (McCullough 1962, 1969a, 1969b, 1973; Neff 1972; Reynolds 1964) and are summarized by Clary et al. (1974). Although

McCullough (1973) mentions that turkeys use the pinyon-juniper areas for food and shelter, especially during winter, his studies were primarily concerned with deer and elk; little has been reported on the possible effects of pinyon-juniper control programs on turkey populations. We had the opportunity to investigate these effects during a 1965–73 study of the ecology of Merriam's turkeys on the Fort Apache Indian Reservation, Ariz., when a pinyon-juniper control program was conducted on a part of the study area in 1969. This paper summarizes our findings and discusses their implications for habitat management. Further information about the study area and other aspects of the 9-year study were reported by Scott and Boeker (1975).

Study Area and Methods

The study area (Fig. 1) was an irregular plot of about 5,000 ha located in the western portion of the Fort Apache Indian Reservation in southern Navajo and north-

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Fig. 1. Study area outline. "Grasshopper" is a summer cow camp; "Kelly Tank" and "Mule Tank" are livestock ponds.

ern Gila counties, Arizona. Elevations ranged from 1,500 to 2,100 m. Units 3 and 4 at the southern end of the study area and at the lower elevations could be classed as pinyon-juniper. Unit 2 was more typical of the transition from pinyon-juniper to ponderosa pine and Unit 1 had some stands of pure ponderosa pine, but most of the unit was a mixed stand of ponderosa pine, pinyon-juniper, and oaks (*Quercus gambelii*, *Q. emoryi*, and *Q. grisea*).

The study area was divided into four units to determine possible effects of timber and range management practices on seasonal turkey populations. As nearly as was practical, the units represented areas of similar vegetation and management practices and were separated by recognizable physical features.

Beginning in fall of 1969 and continuing through fall of 1970, about 800 ha in and adjacent to Unit 4 were subjected to a pinyon-juniper control program. Approximately 300 ha (about one-third of Unit 4) were treated. All trees and shrubs except the small groups of ponderosa pines were removed by chaining and burning. Units 2 and 3 received little disturbance through the study period except for light timber cutting at the northern edge of Unit 2 in winter of 1969–70. Timber was harvested from Unit 1 from fall 1969 through fall 1970; about 65% of the mature ponderosa pines, plus

Fig. 2. Turkeys feeding at meadow edge near escape cover of pinyon-juniper.

suppressed trees, were harvested from all but the northeast corner.

Roadside surveys were conducted from an automobile along established routes (Fig. 1) through the study area from 1965 through the summer of 1973. Turkey populations were calculated from the number of kilometers surveyed and percentage of total number of turkeys recorded in each unit. Winter counts are not included here because many of the roads were inaccessible and most surveys could not be completed. Counts before and after treatment were compared by *t* test, with $P \leq 0.05$) as the criterion of significance.

The 4.8 km of survey road in Unit 4 bisected a meadow and were located between the treated and untreated portions of the unit.

Results

The pinyon-juniper community was used by turkeys year-round and contributed the highest brood counts recorded on the study area. Pinyon pine seed is a preferred food for turkeys but cannot be depended on as an annual food source; juniper is one of the more consistent mast producers and was used extensively during drought periods or in years when seed production by pines and oaks was low (Scott and Boeker 1973). Turkeys used small open

meadows among the forested areas quite heavily as feeding sites (Fig. 2), particularly in summer, but they seldom ranged farther than 45 m from escape cover. They consistently chose roosting sites in mature or over-mature ponderosa pines that were within 45 m of open meadows 0.2 ha or larger.

The partial harvest of pine trees on Unit 1 caused only a temporary reduction in turkey populations using the area. After cutting operations ceased, turkeys returned in numbers similar to those on Units 2 and 3 (Fig. 3, Table 1), although they partially or completely abandoned some former roosting sites after these were heavily cut.

In contrast, turkey numbers declined significantly in Unit 4 following the pinyon-juniper control program. During the 4 years before treatment, 30% of all turkeys recorded on the study area were in Unit 4; only 13% were recorded there during the 4 years after treatment (Table 1). The most drastic reduction occurred during summers, when 32% of the turkeys were seen in Unit 4 before treatment and only 3% after. Turkey observations during spring dropped from 29 to 20%, and fall

Table 1. Distribution of turkeys before and after treatments (timber harvest in Unit 1 and pinyon-juniper control in Unit 4).

Season	Total turkeys seen		Percent of total seen					
			Unit 1		Units 2 and 3		Unit 4	
	Before	After	Before	After	Before	After	Before	After
Spring	1410	1185	27	43	44	37	29	20
Summer	790	467	22	27	46	70	32	3
Fall	1728	739	37	36	32	54	31	10
Total	3928	2391	31	38	39	49	30	13

Fig. 3. Mean numbers of turkeys observed per kilometer of survey roads driven before and after treatments.

observations dropped from 31 to 10%. These post-treatment reductions were significant for all three seasons.

Before treatment, the highest numbers of birds observed per kilometer were recorded in Unit 4 for each of the three seasons (Fig. 3). After treatment, mean numbers declined from 0.69 to 0.48 turkeys/km in spring, from 0.41 to 0.08 in summer, and from 1.35 to 0.32 in fall. The reductions for summer and fall were statistically significant.

Since turkeys used the extensive pinyon-juniper woodlands south of the study area as winter range, it is likely that many of the spring and fall turkey observations in Unit 4 were of birds migrating to and from the wintering area. Results of the summer surveys

probably give the best indication of the effect of the pinyon-juniper control program, when an 80% reduction was indicated after treatment.

Conclusions and Management Recommendations

Although only about one-third of Unit 4 received treatment from the pinyon-juniper control program, total turkey observations in Unit 4 were reduced by 64% and most of those turkeys were observed in the untreated portion of the unit. Two year-round roost sites (small ponderosa pine stands located in the treated area) were isolated from travel lanes at least 300 m by the treatment and were not used again. The few scattered ponderosa

pinos on the untreated west side of the unit were used only sporadically as roost sites. The lack of suitable roost sites that could be reached through cover lanes probably was responsible for much of the reduced turkey populations in Unit 4.

An irregular, steep limestone outcropping, 10–30 m wide (Fig. 4), extended through the treated area from north to south and intercepted both major roost areas on the treated portion of Unit 4. If the pinyon-juniper trees on the steep rocky slopes had not been removed, travel lanes to the roost sites would have been available and the treatment would undoubtedly have had less detrimental effect on the turkey population. While the opportunity was not available to verify the use of such cover lanes, Gehrken (1975) found that travel corridors, 60 m wide, in clear-cut areas were sufficient for turkeys in Georgia.

McCullough (1973) suggested that, for deer and elk habitat, no more than one-third of the area should be cleared of juniper, that cleared areas should be no wider than 200 m, and that uncleared woodland left between clearings should be at least as wide as the treated areas. Cleared strips of 200 m are wider than desired for turkeys. Since they seldom feed in open areas farther than 45 m from cover, cleared strips no wider than 90 m would be more adequate for turkey management. Good roosting sites are also important, and pinyon-juniper removal should be planned so that travel lanes to stands of mature ponderosa pines, particularly those where turkeys already roost, are maintained.

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Fig. 4. Steep, rocky slopes (3 years after treatment) that cross the treated portion of Unit 4.

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