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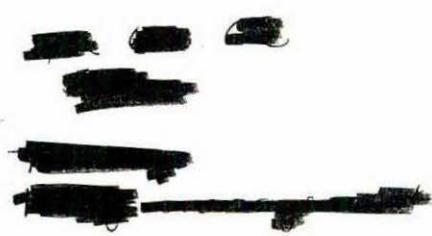
WILD TURKEY MANAGEMENT

CURRENT PROBLEMS AND PROGRAMS

EDITED BY

GLEN C. SANDERSON AND HELEN C. SCHULTZ

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SEASONAL FOOD HABITS
OF MERRIAM'S TURKEYS
ON THE FORT APACHE INDIAN RESERVATION

Virgil E. Scott and Erwin L. Boeker

ABSTRACT

The seasonal feeding habits of Merriam's wild turkey (*Meleagris gallopavo merriami*) were studied on the Fort Apache Indian Reservation over a period of 3 years. Comparative data were obtained from the Moqui District of the Kaibab National Forest. The study included analyses of crops and droppings. Turkeys were found to be opportunists in their feeding habits. Grasses and forbs were important food items yearlong, especially in years of mast crop failures. Fruit- and mast-producing species such as manzanita (*Arctostaphylos pungens*), skunkbush (*Rhus trilobata*), ponderosa pine (*Pinus ponderosa*), and oak (*Quercus* spp.) added substantially to the seasonal diet, and juniper berries (*Juniperus* spp.) were utilized in the absence of other mast crops. Animal material (mostly insects) was consumed throughout the year but was more important during the summer months.

This paper presents information on seasonal and annual changes in the diet of Merriam's wild turkey based on analyses of crops and droppings collected over a 3-year period. Studies by Reeves and Swank (1955) and Hoffman (1962) added significantly to the knowledge of annual food habits; nevertheless, according to Korschgen (1967:187), knowledge of foods and feeding habits of *merriami* is generally inadequate for all seasons.

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STUDY AREA

The study area was located in Arizona on the Fort Apache Indian Reservation in southern Navajo and northern Gila counties and included approximately 11,000 acres. A dry, grassy creek runs through the center of the area. Terrain on both sides of the creek is characterized by rolling hills cut by deep canyons. Elevations range from 5,500 to 7,000 feet. Annual precipitation averages between 17 and 18 inches and occurs with peaks in winter and late summer. The study area has never been logged commercially but is heavily grazed by live-stock during summer and fall months. Elk (*Cervus canadensis*), white-tailed deer (*Odocoileus virginianus*), mule deer (*O. hemionus*), and turkeys are present throughout the year. Peak turkey populations occur during the spring and fall migration periods.

Overstory vegetation at lower elevations is a complex of Colorado piñon pine (*Pinus edulis*), one-seed juniper (*Juniperus monosperma*), alligator juniper (*J. deppeana*), Utah juniper (*J. osteosperma*), and scattered stands of ponderosa pine located on all aspects. Dense stands of manzanita are present on some of the southern slopes. The predominant grass is blue grama (*Bouteloua gracilis*). Lesser amounts of side-oats grama (*B. curtipendula*) and muhlys (*Muhlenbergia* spp.) are common. Forbs, including mountain dandelion (*Agoseris* spp.), common dandelion (*Taraxacum officinale*), common sunflower (*Helianthus annuus*), and golden weed (*Aplopappus* spp.) are present during moist seasons. Gradual changes occur in the overstory composition from lower to higher elevations. At the higher elevations ponderosa pine is more abundant and is found in small pure stands or in association with Gambel oak (*Quercus gambelii*), Emory oak (*Q. emoryi*), gray oak (*Q. grisea*), and juniper. The understory vegetation at all elevations is quite uniform.

METHODS

Data for this paper are based on analyses of 29 turkey crops and 503 fresh droppings collected during the period 1964–1968. Crops were obtained by collecting turkeys during each of the four climatic seasons from 1964 through 1966 under a special permit issued by the Fort Apache Tribal Council. Droppings were collected from January 1966 through February 1969. Additional data for comparison were obtained from 20 crops collected on the Moqui District of the Kaibab National Forest during the regular hunting seasons in 1967 and 1968. Material from each crop was separated by species, percent composition by volume was determined, and samples were oven-dried and weights recorded for each species.

All seasons were represented by collections of droppings, made during at least 2 months of each year, except the summer of 1968 when collections were made only in August. Quantitative determinations of the contents of droppings were made by an ocular estimate through a binocular microscope in increments of 5 percent. We recognize that an ocular estimate of the composition of the droppings is not as accurate as crop analysis, and some foods may be over-rated because of different digestion rates. Martin et al. (1951:30) stated: "The fact that digestion alters the proportion of different foods in a stomach makes it necessary to keep constantly in mind that food information is not precise, exact, and final. Instead, it gives only an approximate indication of the kind and extent of food use." Reeves and Swank (1955) questioned the validity of analysis of droppings since they found large differences between analyses of crops and droppings from collections made in the same general locations. However, the differences found may indicate a difference in feeding behavior of individual turkeys or local availability of food items rather than errors in analysis of droppings. In our study, large differences were also noted among crop contents collected from the same location at the same time.

Comparative analyses were made of turkey droppings and crops collected in 1966. Even though the number of crops was small, nearly the same items were identified in both crops and droppings (Table 42). The largest difference was noted in the March collections, when 77 percent (by volume) of the crop contents but only 21 percent of the droppings consisted of juniper berries. However, differences were even greater between crop contents of two turkeys collected from one roost on the same evening in February 1966. Juniper berries made up 88 percent of the contents of one crop and 21 percent of the other. In October 1967, piñon pine seed ranged from 0 to 72 percent of the crop con-

Table 42. Comparative percentage, by volume, of food items in crops and in droppings from Merriam's turkeys in 1966 on the Fort Apache Indian Reservation, Arizona. (Numbers of samples are given in parentheses.)

Food Item	February 1966		March 1966		April 1966		November 1966	
	Crop (2)	Dropping (9)	Crop (1)	Dropping (5)	Crop (1)	Dropping (16)	Crop (2)	Dropping (8)
Juniper	55	60	77	21	5	10	—	<1
Grasses	15	28	5	40	7	23	37	37
Forbs	4	6	13	26	79	61	38	42
Acorns	<1	3	<1	5	—	2	14	17
Pine seed	10	<1	1	—	—	<1	—	1
Insects	<1	1	1	4	<1	3	<1	4

tents from turkeys harvested on the Kaibab National Forest. On the same area, acorns ranged from 0 to 84 percent in October 1968.

RESULTS AND DISCUSSION

Analysis of 29 turkey crops, collected on the study area over a 3-year period and during all four seasons, revealed 51 separate food items. Smith and Browning (1967) reported 64 food items taken throughout the year in California, and Dalke et al. (1942) reported 73 genera of plants taken by turkeys in Missouri. Reeves and Swank (1955) showed 42 genera of plants taken in Arizona during October. The number of crop samples collected in this study is not considered adequate to show annual changes in seasonal diet, but it does indicate the seasonal changes and variation in the diet of Merriam's turkey (Table 43).

Juniper berries were consumed in large quantities during the winter of 1965-66 and in the spring of 1966. One crop collected in February contained 134 grams (oven-dried weight) of juniper berries and another collected in March contained 125 grams. The high consumption of juniper berries during winter probably resulted from availability rather than from a food preference. Since the ground under dense juniper canopies usually remained free from snow, the juniper berries were exposed at a time when other food supplies were snow covered. During the summer of 1967, juniper berries comprised 20 percent (by volume) of the contents of turkey droppings on the study area. Fruits of manzanita and skunkbush, normally taken in large quantities in June, July, and August, failed to mature, and the turkeys apparently resorted to juniper berries as a substitute.

Forbs and grasses were important food sources throughout the year. Leaves, flowers, and seed heads of both mountain dandelion and common dandelion were taken in large quantities when available during wet seasons. Results from crop analyses of turkeys harvested in October on the Kaibab National Forest also showed relatively high use of common dandelion, averaging 4.4 percent (by volume) in 1967 and 5.9 percent in 1968 (Table 44).

Whole plants of rock jasmine (*Androsace* spp.) were taken by turkeys in the spring months. Black medic (*Medicago lupulina*) and filaree (*Erodium cicutarium*) were used in small amounts consistently throughout the year. Higher use of mature forb seeds was noted on the Kaibab Forest than on the Fort Apache study area during the fall months. Seeds of tansy mustard (*Descurainia* spp.), stickseed (*Lappula* spp.), and vetch (*Vicia* spp.), which were used on the Forest, were not available in quantity on Fort Apache because of heavy cattle grazing.

Seedpods of prostrate loco (*Astragalus humistratus*) were not found in the

Table 43. Percentage of volume and occurrence of food items identified in 29 Merriam's turkey crops from 1964 to 1969 on the Fort Apache Indian Reservation, Arizona. (Numbers of samples are given in parentheses.)

Food Item	Spring (3)		Summer (7)		Fall (16)		Winter (3)	
	Vol.	Occ.	Vol.	Occ.	Vol.	Occ.	Vol.	Occ.
Juniper berries (<i>Juniperus</i> spp.)	27.7	100	—	—	<0.1	19	36.3	66
Dandelion (<i>Taraxacum officinale</i>)	6.3	66	17.6	57	9.7	94	27.9	100
Manzanita (<i>Arctostaphylos pungens</i>)	—	—	37.8	86	12.4	44	—	—
Pine seed (<i>Pinus ponderosa</i>)	0.3	33	—	—	24.0	50	6.7	66
Mt. dandelion (<i>Agoseris</i> spp.)	38.7	100	—	—	—	—	—	—
Acorns (<i>Quercus</i> spp.)	<0.1	33	0.3	29	23.4	94	<0.1	66
Animal material (insects)	0.3	100	9.2	100	2.4	88	1.2	100
Unidentified forbs	6.3	66	3.3	86	0.4	44	3.1	100
Unidentified grasses	1.7	66	4.6	71	3.1	50	3.4	33
Lovegrass (<i>Eragrostis</i> spp.)	<0.1	33	—	—	10.0	50	—	—
Bluegrass (<i>Poa</i> spp.)	2.3	33	—	—	—	—	7.0	33
Rock jasmine (<i>Androsace</i> spp.)	8.0	66	0.7	43	—	—	—	—
Junegrass (<i>Koeleria cristata</i>)	—	—	5.3	14	—	—	—	—
Skunkbush (<i>Rhus trilobata</i>)	—	—	5.3	57	—	—	—	—
Unidentified mass	1.1	66	1.1	100	1.1	44	1.8	100
Black medic (<i>Medicago lupulina</i>)	3.7	66	0.3	14	0.3	38	<0.1	33
Buttercup (<i>Ranunculus</i> spp.)	—	—	4.3	14	—	—	—	—
Fleabane (<i>Erigeron</i> spp.)	—	—	3.5	29	<0.1	19	—	—
Needlegrass (<i>Stipa</i> spp.)	—	—	3.3	14	—	—	—	—
Bromegrass (<i>Bromus</i> spp.)	—	—	—	—	—	—	3.2	66
Ticklegrass (<i>Muhlenbergia sinuosa</i>)	—	—	—	—	2.7	44	—	—
Mariposa (<i>Calochortus</i> spp.)	0.3	33	1.3	29	<0.1	6	—	—
Goldeneye (<i>Viguiera annua</i>)	—	—	—	—	1.6	19	—	—
Filaree (<i>Erodium cicutarium</i>)	<0.1	66	<0.1	43	1.4	44	<0.1	66
Purslane (<i>Portulaca oleracea</i>)	—	—	0.1	14	1.1	13	—	—
Blue grama (<i>Bouteloua gracilis</i>)	—	—	—	—	1.4	31	—	—
Stinkgrass (<i>Eragrostis cilianensis</i>)	—	—	—	—	1.2	19	—	—
Hymenoxys (<i>Hymenoxys</i> spp.)	—	—	1.0	14	—	—	—	—
Wood betony (<i>Pedicularis centranthera</i>)	—	—	0.4	14	—	—	—	—
Milk vetch (<i>Astragalus</i> spp.)	—	—	0.1	14	0.4	14	—	—
Wild buckwheat (<i>Eriogonum</i> spp.)	—	—	0.1	14	0.4	38	—	—
Panicum (<i>Panicum</i> spp.)	—	—	—	—	0.4	6	—	—
Green algae (<i>Chlorophyceae</i>)	—	—	—	—	0.4	6	—	—
Scurf pea (<i>Psoralea tenuiflora</i>)	—	—	—	—	0.3	13	—	—
Euphorbia (<i>Euphorbia</i> spp.)	—	—	—	—	0.3	13	—	—
Side-oats grama (<i>B. curtipendula</i>)	—	—	—	—	0.3	6	—	—
Wormwood (<i>Artemisia</i> spp.)	—	—	—	—	0.3	6	—	—
Hog potato (<i>Hoffmanseggia</i> spp.)	—	—	—	—	—	—	0.3	66
Wooly yarrow (<i>Archillea lanulosa</i>)	<0.1	66	—	—	—	—	—	—
Piñon (<i>Pinus edulis</i>)	<0.1	33	—	—	—	—	<0.1	33
Tansy mustard (<i>Descurainia</i> spp.)	—	—	0.1	14	—	—	—	—
Rocky Mt. iris (<i>Iris missouriensis</i>)	—	—	<0.1	14	—	—	—	—
Gaura (<i>Gaura</i> spp.)	—	—	—	—	0.1	19	—	—
Bluestem (<i>Andropogon</i> spp.)	—	—	—	—	0.1	6	—	—
Lupine (<i>Lupinus</i> spp.)	—	—	—	—	<0.1	13	—	—
Menodora (<i>Menodora</i> spp.)	—	—	—	—	<0.1	6	—	—
Prickly pear (<i>Opuntia</i> spp.)	—	—	—	—	<0.1	6	—	—
Hymenothrix (<i>Hymenothrix</i> spp.)	—	—	—	—	<0.1	6	—	—
Amaranth (<i>Amaranthus</i> spp.)	—	—	—	—	<0.1	6	—	—
Sand dropseed (<i>Sporobolus cryptandrus</i>)	—	—	—	—	<0.1	6	—	—
Crownbeard (<i>Verbesina</i> spp.)	—	—	—	—	<0.1	6	—	—
Common sunflower (<i>Helianthus annuus</i>)	—	—	—	—	<0.1	6	—	—
Unidentified seeds	—	—	—	—	<0.1	6	—	—
Fungi	—	—	—	—	—	—	8.3	33
Stones and gravel	3.3	100	0.3	71	0.8	81	0.8	100
Total forbs	63.3		32.8		16.3		31.3	
Total grasses	4.0		13.2		19.2		13.6	

Table 44. Percentage of volume and occurrence of food items identified in 20 Merriam's turkey crops in 1967 and 1968 from the Moqui District of the Kaibab National Forest, Arizona. (Sample sizes given in parentheses.)

Food Item	October 1967 (11)		October 1968 (9)	
	Vol.	Occ.	Vol.	Occ.
Acorns (<i>Quercus</i> spp.)	5.4	36	29.0	67
Piñon (<i>Pinus edulis</i>)	18.2	46	—	—
Animal material	7.6	100	10.3	89
Leaves of grasses (Gramineae)	7.8	100	8.0	89
Lovegrass (<i>Eragrostis</i> spp.)	14.8	55	<0.1	11
Mt. muhly (<i>Muhlenbergia montana</i>)	6.5	27	6.7	33
Dandelion (<i>Taraxacum officinale</i>)	4.4	55	5.9	67
Tansy mustard (<i>Descurainia</i> spp.)	0.3	9	8.4	44
Goosefoot (<i>Chenopodium</i> spp.)	2.0	64	5.9	67
Blue grama (<i>Bouteloua gracilis</i>)	5.1	82	2.1	22
Spike muhly (<i>Muhlenbergia wrightii</i>)	1.0	55	4.9	33
Loco (<i>Astragalus</i> spp.)	—	—	5.6	56
Salsify (<i>Tragopogon</i> spp.)	2.8	73	2.2	78
False buffalo grass (<i>Munroa squarrosa</i>)	3.2	36	1.0	33
Unidentified forb leaves	3.7	73	—	—
Pine dropseed (<i>Blepharoneuron tricholepis</i>)	3.6	27	—	—
Prostrate loco (<i>Astragalus humistratus</i>)	3.3	64	—	—
Stickseed (<i>Lappula redowskii</i>)	0.7	36	2.2	22
Lettuce (<i>Lactuca</i> spp.)	1.9	27	—	—
Thistle (<i>Cirsium</i> spp.)	1.3	27	2.1	67
Unidentified seeds	<0.1	18	1.9	22
Vetch (<i>Vicia</i> spp.)	1.4	27	0.1	33
Bromegrass (<i>Bromus</i> spp.)	1.6	27	<0.1	11
Ticklegrass (<i>Muhlenbergia sinuosa</i>)	0.7	18	0.2	11
Filaree (<i>Erodium cicutarium</i>)	0.3	18	0.6	44
Silene (<i>Silene</i> spp.)	0.6	18	<0.1	11
Rocky Mt. iris (<i>Iris missouriensis</i>)	—	—	0.6	33
Goldeneye (<i>Viguiera annua</i>)	0.1	18	0.4	11
Scarlet gaura (<i>Gaura coccinea</i>)	0.3	18	—	—
Plantain (<i>Plantago</i> spp.)	0.2	9	—	—
Unidentified mass	<0.1	9	0.3	44
Indian ricegrass (<i>Oryzopsis hymenoides</i>)	<0.1	9	—	—
Needlegrass (<i>Stipa</i> spp.)	<0.1	9	—	—
Prickly pear (<i>Opuntia</i> spp.)	<0.1	9	—	—
Grape (<i>Vitis</i> spp.)	<0.1	9	—	—
Pine seed (<i>Pinus ponderosa</i>)	<0.1	9	<0.1	11
Rose (<i>Rosa</i> spp.)	<0.1	9	—	—
Juniper (<i>Juniperus</i> spp.)	—	—	<0.1	11
Stones and gravel	1.2	100	1.6	100
Total forbs	21.9		23.9	
Total grasses	44.3		34.9	

crop samples taken on the study area, but fragments of the pods were found in abundance in the samples of droppings collected during the spring and summer of 1967 and 1968. Seeds of Indian root (*Lomatium* spp.) were also identified in droppings during summer months.

The greatest use of grasses was noted during fall months when seeds of several species of lovegrass (*Eragrostis* spp.), muhlys, needlegrass (*Stipa* spp.), brome grass (*Bromus* spp.), and gramas had matured. During the fall of 1967, a year of poor mast crops, ticklegrass (*Muhlenbergia sinuosa*) accounted for an unusually high proportion of the turkey diet. Seeds and leaves of bluegrass

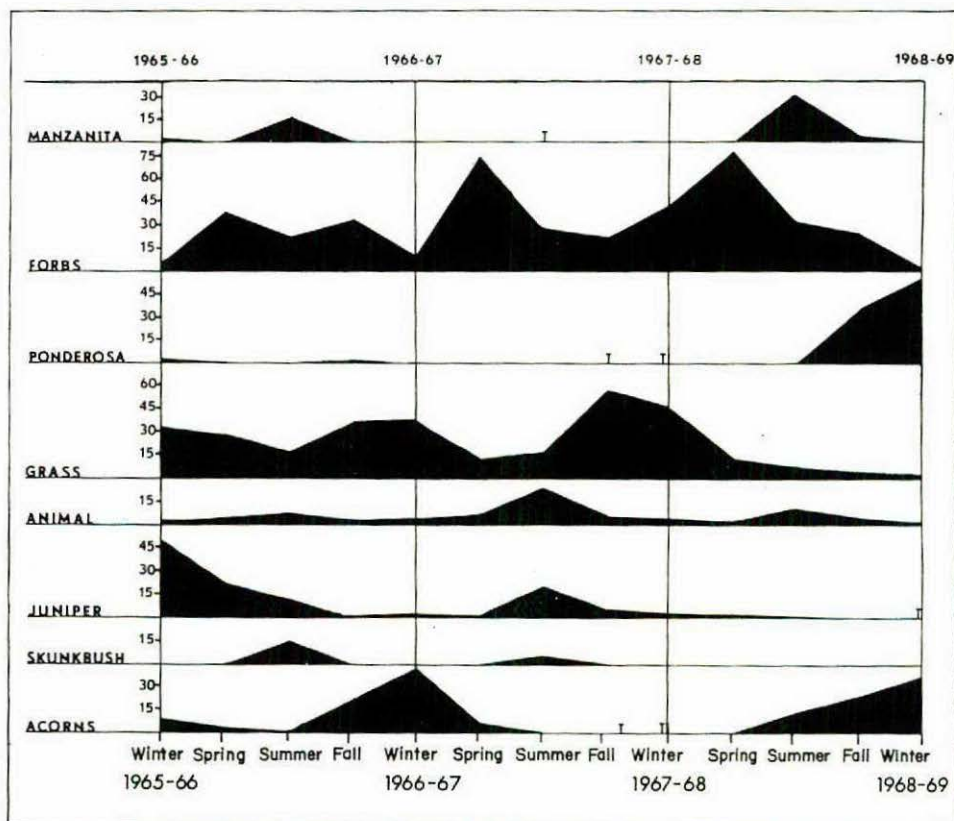


Figure 40. Seasonal percentages, by volume, of eight major food items in the droppings of Merriam's turkeys on the Fort Apache Indian Reservation. T = trace.

(*Poa* spp.) and Junegrass (*Koeleria cristata*) were taken in small amounts when they were available during the wetter winter and summer seasons. Extremely heavy livestock grazing on the study area during the summer and fall of 1968 resulted in a shortage of forbs and grasses for turkeys, as indicated by the absence of these items in droppings collected during the fall and winter of 1968-69 (Figure 40).

Results of this study indicated high utilization of pine seeds when they were available. Crops collected in November 1965 contained 18 to 64 grams (oven-dried weight) of ponderosa pine seeds. The contents of two crops collected on the Kaibab Forest in 1967 were nearly all piñon pine seed; one contained 629 seeds (171 grams, oven-dried weight) and the other 480 (123 grams). Jonas (1966) also found that pine seeds were used extensively in Montana when they were available. As pointed out by Fowells (1965), however,

pine seed production occurs at irregular intervals and cannot be relied on as a source of food every year.

At least four species of oak, Gambel, Emory, gray, and shrub live oak (*Quercus turbinella*), are present on the study area. Some acorns are available throughout the year, but the greatest number and use occur in fall months. Twelve crops collected in October and November 1964 and 1965 all contained acorns. The average oven-dried weight of acorns from these crops was 36.5 grams with a range of 7 to 65 grams per crop. A crop from an adult gobbler harvested on the Kaibab Forest in 1968 contained 198 grams of acorns.

Table 45. Percentage of volume and occurrence of food items identified in 503 Merriam's turkey droppings from January 1966 to February 1969 on the Fort Apache Indian Reservation, Arizona. (Numbers of samples are given in parentheses.)

Food Item	Spring (109)		Summer (170)		Fall (111)		Winter (113)	
	Vol.	Occ.	Vol.	Occ.	Vol.	Occ.	Vol.	Occ.
Forbs	63.0	100	27.0	96	28.0	71	15.0	87
Grasses	19.0	93	17.0	88	36.0	71	31.0	97
Acorns	3.0	33	3.0	25	16.0	51	22.0	83
Animal material	5.0	70	17.0	90	4.0	57	4.0	75
Juniper berries	9.0	60	15.0	78	2.0	24	14.0	49
Manzanita (fruit)	—	—	10.0	44	1.0	14	<1.0	20
Skunkbush (fruit)	—	—	8.0	44	<1.0	1	—	—
Pine seeds	<1.0	1	—	—	13.0	32	14.0	36
<i>Garrya</i> spp. (fruit)	—	—	—	—	—	—	<1.0	6
Unidentified seeds	1.0	7	3.0	13	—	—	—	—

The fruits of manzanita and skunkbush received heavy use by turkeys. Since skunkbush berries normally mature in June and manzanita a month later on this study area, they provide important food sources during the dry, late-spring period.

Animal material, primarily insects (not separated by species), was found yearlong in turkey crops and droppings (Table 45). Heaviest use occurred during summer months, when animal material appeared to be highly important food for poults. Snails were also found in the crops, and in one instance a horned lizard (*Phrynosoma* sp.) 5.5 inches long was found in the crop of an adult gobbler from the Kaibab Forest.

CONCLUSIONS

Food habits data presented in this paper indicate that Merriam's turkeys are highly diversified in their feeding habits and have the ability to substitute less desirable foods for preferred foods, when preferred foods are not available. Wide fluctuation in yearly precipitation on Arizona turkey ranges results in highly variable production of forbs and grasses. This, coupled with the cyclic nature of mast production, implies that turkey habitat should be managed to include a wide variety of plant species to insure against a complete failure of food supplies in any one year.

Overgrazing by livestock reduces the availability of turkey foods and becomes a serious factor in years of mast crop failure. The high yearlong use of forbs and grasses indicates that range quality is an important factor in the evaluation of turkey habitat.