



Ecology of Merriam's wild turkey in the Helena National Forest
by Katharine Albrecht Holzer

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Fish and Wildlife Management
Montana State University
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Abstract:

This study was undertaken to determine why low population levels have been prevalent in the population of Merriam's wild turkey (*Meleagris gallopavo merriami*) north of Canyon Ferry Reservoir near Helena, Montana. Eleven turkeys were trapped in cannon nets and clover traps, and 7 of them were radio marked. They were followed throughout 1987 to determine food habits, seasonal and annual home range, movements and habitat use. Results showed turkeys consumed grass and forbs during the entire year, with a higher proportion during spring and summer, and seeds during fall and winter. The pooled annual home range for all 7 turkeys was 2883 ha. Males had larger mean annual home ranges than females. Movements between winter and summer ranges were 1.58 to >5.0 ha. Turkeys avoided disturbed mining areas and open fields and meadows.

Turkeys used climax ponderosa pine (*Pinus ponderosa*) and mixed Douglas fir (*Pseudotsuga menziesii*)/ponderosa pine more often than the other habitats. The habitat seemed adequate from nutritional and spatial standpoints, so another limiting factor is responsible for their low population levels. The possibility of low production, disease, and predation as limiting factors is discussed.

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APPROVAL

of a thesis submitted by

Katharine Albrecht Holzer

This thesis has been read by each member of the thesis committee and has been found to be satisfactory regarding content, English usage, format, citations, bibliographic style, and consistency, and is ready for submission to the College of Graduate Studies.

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Date July 28, 1989

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ABSTRACT

This study was undertaken to determine why low population levels have been prevalent in the population of Merriam's wild turkey (Meleagris gallopavo merriami) north of Canyon Ferry Reservoir near Helena, Montana. Eleven turkeys were trapped in cannon nets and clover traps, and 7 of them were radio marked. They were followed throughout 1987 to determine food habits, seasonal and annual home range, movements and habitat use. Results showed turkeys consumed grass and forbs during the entire year, with a higher proportion during spring and summer, and seeds during fall and winter. The pooled annual home range for all 7 turkeys was 2883 ha. Males had larger mean annual home ranges than females. Movements between winter and summer ranges were 1.58 to >5.0 ha. Turkeys avoided disturbed mining areas and open fields and meadows. Turkeys used climax ponderosa pine (Pinus ponderosa) and mixed Douglas fir (Pseudotsuga menziesii)/ponderosa pine more often than the other habitats. The habitat seemed adequate from nutritional and spacial standpoints, so another limiting factor is responsible for their low population levels. The possibility of low production, disease, and predation as limiting factors is discussed.

INTRODUCTION

Merriam's wild turkey (Meleagris gallopavo merriami) originally ranged over Colorado, New Mexico, Arizona, and extreme west Texas (Ligon 1946, Schorger 1966). Numerous introductions in the 1940s through the 1960s have resulted in the establishment of Merriam's turkey populations in nearly every western state. Turkeys were originally introduced by private individuals into Montana as early as 1939 (Jonas 1966), although those released were pen-reared "wild" Eastern (M.g. sylvestris) or Rio Grande (M.g. intermedia) turkeys. The Montana Fish and Game Department first introduced Merriam's turkeys from Colorado into the Judith Mountains in 1954 after that subspecies had been successfully transplanted into South Dakota and Wyoming (Rose 1956). In 1955, 18 birds from Wyoming were introduced into the Long Pines of southeastern Montana (Rose 1956). These 2 transplants have provided a source for nearly every subsequent transplant in the state.

Many of these transplants, including my study population, consisted of relatively few birds, all taken from the same area which were placed in large isolated "islands" of habitat. Several of the populations inhabiting these isolated habitats apparently experienced

exponential growth for a few years followed by a "crash" resulting in long-term population lows. This phenomenon is not uncommon in Montana or in other western states, but it is unclear why it occurs.

The turkeys inhabiting my study area apparently came from releases made on the Hilger Ranch in 1959 (6 toms and 16 hens) and/or the Spokane Hills in 1964 (10 toms and 16 hens) near Helena, Montana (Greene and Ellis 1971).

Presently, 40-60 turkeys are estimated to inhabit the study area, a mere fraction of those present on the same area during the late 1960s to the early 1970s according to many long-time residents of the area. The population was sufficiently large to warrant a hunting season in the fall of 1965. However, there has not been a hunting season since then.

This study was undertaken to assess food habits, seasonal and annual home range, movements, and habitat use of the Merriam's wild turkey north of Canyon Ferry Reservoir in west-central Montana. Field work was done continuously from January 1987 through December 1987 and periodically from January 1988 to July 1988.

STUDY AREA DESCRIPTION

The study area was located approximately 20 km east and 13 km north of Helena, Montana, and directly north of Canyon Ferry Reservoir in Lewis and Clark County (Figure 1). The area was composed of the Helena National Forest, Bureau of Land Management and private lands. Land uses included recreational, residential, limited (selective) logging, and 1 small agricultural operation which grazed cattle on the study area from June through October on National Forest land. No paved roads existed on the study area, and the topography was generally rough and rugged.

Nine stands which were earlier determined to be representative of the vegetation on the entire study area were examined by a range scientist (Olsen, pers. comm.) and were categorized into habitat types as per Pfister et al. (1977). A list of plant species on the area was also compiled using references by Taylor (1982), Stubbendieck et al. (1986), Spellenberg (1987).

On south-facing slopes the predominant habitat type was ponderosa pine/bluebunch wheatgrass (Pinus ponderosa/Agropyron spicatum), which is typical for this elevation and climate (Pfister et al. 1977). Ponderosa pine and Rocky Mountain juniper (Juniperus scopulorum) were the only

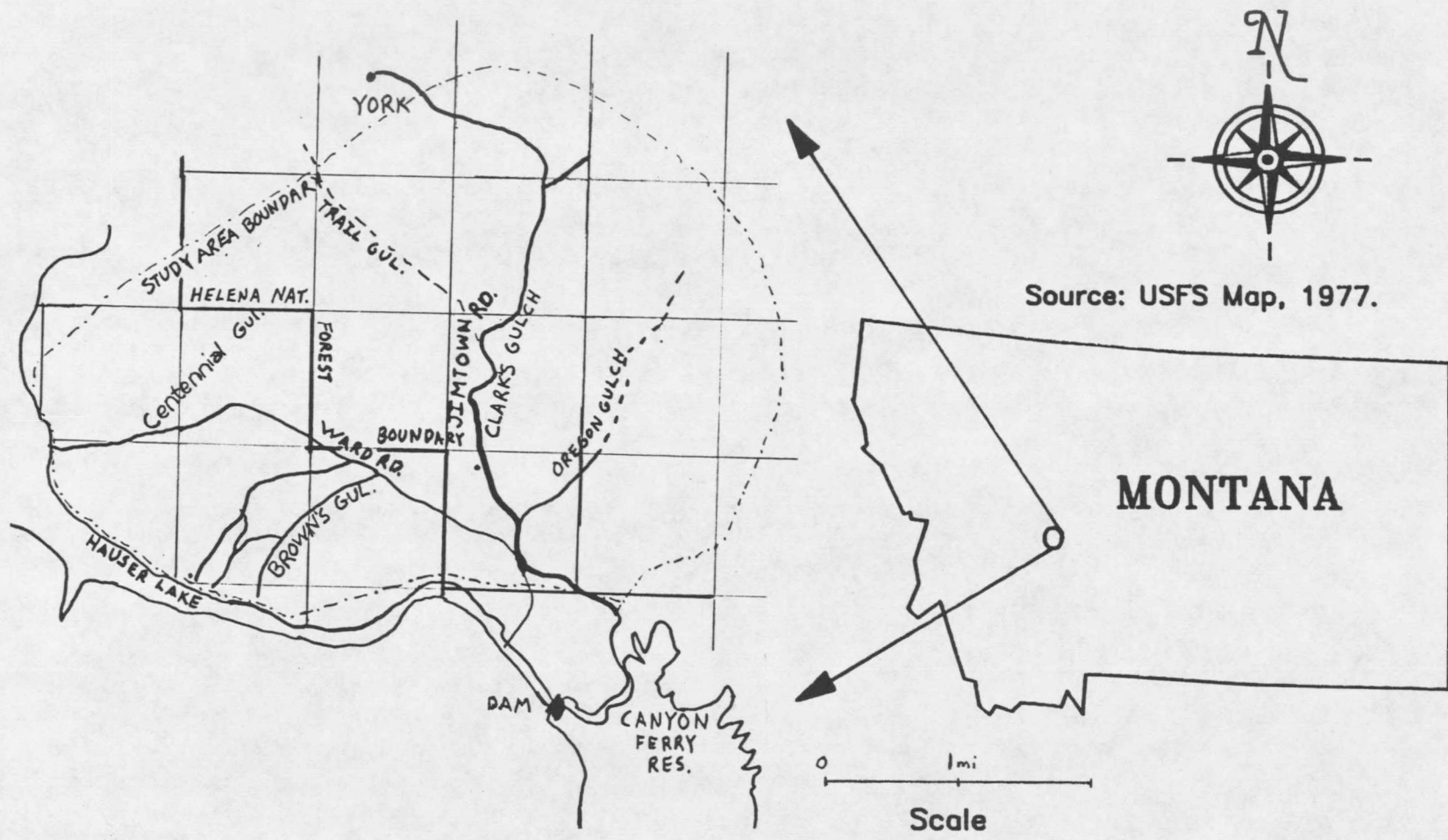


Figure 1. Study area for Merriam's wild turkey in Helena National Forest.

successful conifers on these sights. An occasional Douglas fir (Pseudotsuga menziesii) was found in areas with a more closed canopy. Shrubs and forbs included fringed sagewort (Artemisia frigida) in open areas, skunkbush sumac (Rhus trilobata), currant (Ribes sp.), arrowleaf balsamroot (Balsamorhiza sagittata), sedge (Carex sp.), hairy goldenaster (Heterotheca villosa), wild buckwheat (Eriogonum heracleoides), broom snakeweed (Gutierrezia sarothrae), cacti (Opuntia sp.), bluebunch wheatgrass, rough fescue (Festuca scabrella), needle-and-thread (Stipa comata), and red threeawn (Aristida longisetata). Pfister et al. (1977) found timber productivity to be low on this habitat type and the potential for livestock forage production to be moderate. Estimated production on these sites was 56 kg grass/ha (50 lbs grass/acre).

On north-facing slopes, the Douglas fir/rough fescue habitat type prevailed, a condition typical for the region (Pfister et al. 1977). Ponderosa pine seedlings were sparsely scattered in open areas. Russet buffaloberry (Shepherdia canadensis) was the dominant shrub with some Rocky Mountain juniper and common juniper (Juniperus communis) evident, as well as currant bushes. Forbs included nodding onion (Allium cernuum), chickweed (Cerastium arvense), Nuttall's pussytoes (Antennaria parvifolia), and prairie smoke (Geum triflorum). Grasses included mountain brome (Bromus marginatus) and rough

fescue. Production of grass was estimated to be 450-560 kg grass/ha (400-500 lbs grass/acre), which is considered excellent for domestic stock grazing (Pfister et al. 1983).

The habitat type on most east-facing slopes was Douglas fir/rough fescue with a bluebunch wheatgrass influence. Rocky Mountain juniper was the dominant shrub. Fringed sagewort and skunkbush sumac were common on these slopes as well. Penstemon (Penstemon sp.), Nuttall's pussytoes and prairie smoke were the prevailing forbs. Grasses included Idaho fescue, rough fescue, and basin wildrye (Elymus cinereus). Cacti were also represented. Estimated grass production was 56-112 kg grass/ha (50-100 lbs grass/acre).

Douglas fir/bluebunch wheatgrass was the predominant habitat type on west-facing slopes, although on some slopes there was a dense canopy of ponderosa pine. Rocky Mountain juniper was the dominant shrub along with skunkbush sumac. Understory included rough fescue, prairie junegrass (Koeleria pyramidata), and penstemon. Forage production was estimated to be 56-112 kg grass/ha (50-100 lbs grass/acre).

Three open grassland/shrubland areas were also examined. One area, thought to be in low condition from grazing and drought, was Idaho fescue/bluebunch wheatgrass habitat type. Grasses present included western wheatgrass (Agropyron smithii), prairie junegrass, and blue grama (Bouteloua gracilis). The shrubs, broom snakeweed and

fringed sagewort, were scattered sparsely throughout. Common forbs occurring in the meadow were scarlet globemallow (Sphaeralcea coccinea), curlycup gumweed (Grindelia squarrosa), salsify (Tragopogon dubius), western yarrow (Achillea millefolium), wavy-leaf thistle (Cirsium undulatum) and Nuttall's pussytoes. Grass production was estimated at 340 kg grass/ha (300 lbs/acre).

The other 2 areas were adjacent to each other, but because an underground spring fed one of them, they were markedly different. The stands were places turkeys were known to have frequented for many years. Both areas were severely disturbed sites, so habitat typing was not practical. The drier area was characterized by scattered fringed sagewort, rubber rabbitbrush (Chrysothamnus nauseosus), broom snakeweed, and skunkbush sumac. Forbs included spotted knapweed (Centaurea maculosa), penstemon, wild buckwheat, hairy goldenaster, and western yarrow. Grasses present were western wheatgrass, blue grama, needlegrass (Stipa sp.), and prairie junegrass. Cacti were also present. Estimated grass production was 450-560 kg grass/ha (400-500 lbs/acre).

At the moist area, Woods rose (Rosa woodsii) was the only shrub. Rocky Mountain iris (Iris missouriensis), clematis (Clematis sp.), and curlycup gumweed were the prevalent forbs. Grasses included foxtail barley (Hordeum jubatum), Kentucky bluegrass (Poa pratensis), basin

wildrye, redbtop (Agrostis stolonifera), cheatgrass (Bromus tectorum), and slender wheatgrass (Agropyron trachycaulum).

Cover types identified and their coverage of the study area (percentage) were 0-40 year old ponderosa pine (32.2%), 100-200 years post-fire ponderosa pine (26.5%), 300-plus years post-fire ponderosa pine (13.7%), climax to near climax stands of ponderosa pine (15.4%), 40-100 year old mixed Douglas fir and ponderosa pine (7.8%), fields or meadows (2.4%), and disturbed mining areas (2.0%) following the classification of Mattson and Despain (1985).

Although the study area was bounded by water on the east and south sides, very little permanent standing water existed within it. A small spring surfaced along Jimtown road and created a small pond. Another spring surfaced in the north part of the study area and formed a short stream. Ephemeral streams and puddles were available throughout the year.

METHODS

Capture and Monitoring

Wild turkeys were baited with oats, sunflower seeds, wheat and barley hay in areas where they were known to frequent. On 29 January 1987, 8 turkeys (4 hens and 4 toms) were trapped with a rocket net trap on private land directly adjacent to Hauser Lake. From 19 February to 5 March 1987, 3 toms were trapped with a walk-in clover trap. Upon capture, each turkey was secured in a burlap sack. A black sock was placed over each turkey's head while it was sexed, aged (adult or yearling), weighed to the nearest 0.1 kilogram (kg) (Table 1), and tagged with 1 metal and 3 plastic color-coded leg bands. The hens from the first trapping and the last 3 toms trapped were fitted with radio transmitters. The radios were strapped to the back with 4 millimeter (mm)-wide bungee cord that looped under the base of each wing. The radios weighed approximately 119 grams (g) and measured 8 centimeters (cm) long, 3 cm high, with a 30 cm whip antenna extending along the tail. The radios were not visible on the turkeys except for the black antennas. Nenko and Healy (1979) found that radio packages similar to those used in this study did not introduce serious bias into the study of wild

turkey ecology. After processing, the turkeys were released together on the same capture site. No mortalities occurred during capture or processing.

Table 1. Sex, age, and weight of Merriam's turkeys trapped in Helena National Forest in 1987.

Turkey ID No.	Sex	Age	Weight(kg)
7104	F	adult	4.6
2	M	yearling	7.4
3	M	yearling	5.0
1122	F	adult	3.9
5351	F	adult	4.8
7152	F	yearling	3.6
7	M	yearling	4.8
8	M	yearling	4.7
1212	M	adult	7.7
8102	M	adult	7.9
8114	M	adult	7.8

Locations of radio-tagged birds were determined by triangulating 2 azimuths taken no more than 10 minutes apart at landmarks within the study area. Readings were taken using a hand-held 3-element Yagi antenna-receiver system. Sightings were used to supplement radio telemetry locations. As often as possible, I used the radio receiver to locate turkeys so that I could make observations of them for a period without their being aware of my presence. Walking to the turkeys was not always feasible because of the rugged topography and because of time limitations.

Food Habits

Wild turkey droppings found fresh or nearly fresh were picked up and put into bags labeled with date and location. The droppings were later sorted by month and combined. June had 2 samples because clocker droppings from an incubating radioed hen were collected near her nest from 1-9 June. For all other samples, sexes and ages were mixed. Although many droppings were collected from under trees where radioed birds roosted, some were found on the study area which were probably not from radioed birds.

The droppings were sent to Colorado State University Composition Analysis Laboratory to be classified by microhistological analysis (Hansen et al. 1974). In the analysis, samples were washed and strained through different sized screens. Five microscope slides were made from each sample, and 20 fields per slide were examined under high power. Results were sent back in the form of means and standard deviations of discerned plant fragments found on each slide. Slides were also examined under low power to identify the minimum number of individuals (insects) and number of seeds per slide.

Home Range

Turkey locations were plotted by hand on 1:24,000 scale U.S. Geological Survey topographical maps of the area. Universal Transverse Mercator coordinates, elevations, and date and time, were then logged into the computer program TELDAY (Lonner and Burkhalter 1988), which calculated home ranges by the convex polygon method (Mohr 1947), rates of movements and geographic centers of activity. The procedure of Huntsberger and Billingsley (1987) was used to determine significant differences among home range sizes.

Movements

The daily movements determined by TELDAY were presented as a maximum value, a minimum value and a mean value for kilometers moved in 1 day. The mean was taken to be the average daily movement. Annual and seasonal daily movements were determined for each turkey as well as for all 7 turkeys as a group. The daily movement value should be interpreted as an index to activity, not as actual distances travelled during a day.

Seasonal movements between winter and summer ranges were determined by measuring distances between geographic activity centers for winter and summer home ranges. Statistically significant differences were determined using the procedure of Huntsberger and Billingsley (1987).

Habitat Use

Seasonal and annual habitat uses were determined for each turkey when possible. Telemetry locations were plotted by TELDAY on a 1:24,000 scale, printed out, and transparent overlays of the cover type maps were used to determine the proportion of total telemetry fixes that fell within each cover type. The procedures of Neu et al. (1974) and Byers et al. (1984) were used to determine if the observed use of habitats was proportional to the occurrence of habitats on the study area.

RESULTS

Relocations

The captured turkeys marked with the colored leg bands were never positively identified again probably because of leg band loss. The radioed turkeys were followed and located regularly from January 1987 through December 1987 and subsequently located at less frequent intervals until June 1988. One hen turkey was lost in April 1987 due to radio failure, but she was later seen with the inactive radio intact in a winter flock in November and December 1987. One tom's radio ceased being received, and he was not seen again. One hen left the study area and went quite far north of the study area so that daily relocation of her was impractical.

Food Habits

The monthly food habits results are presented in Figures 2-14. The Colorado State University Range Analysis Lab was able to identify most plants to the genus or family. Items not completely identifiable were classified as seeds, forbs, or grasses. Flower parts from different plants were classified simply as "flowers". The miscellaneous category included trace amounts of items such

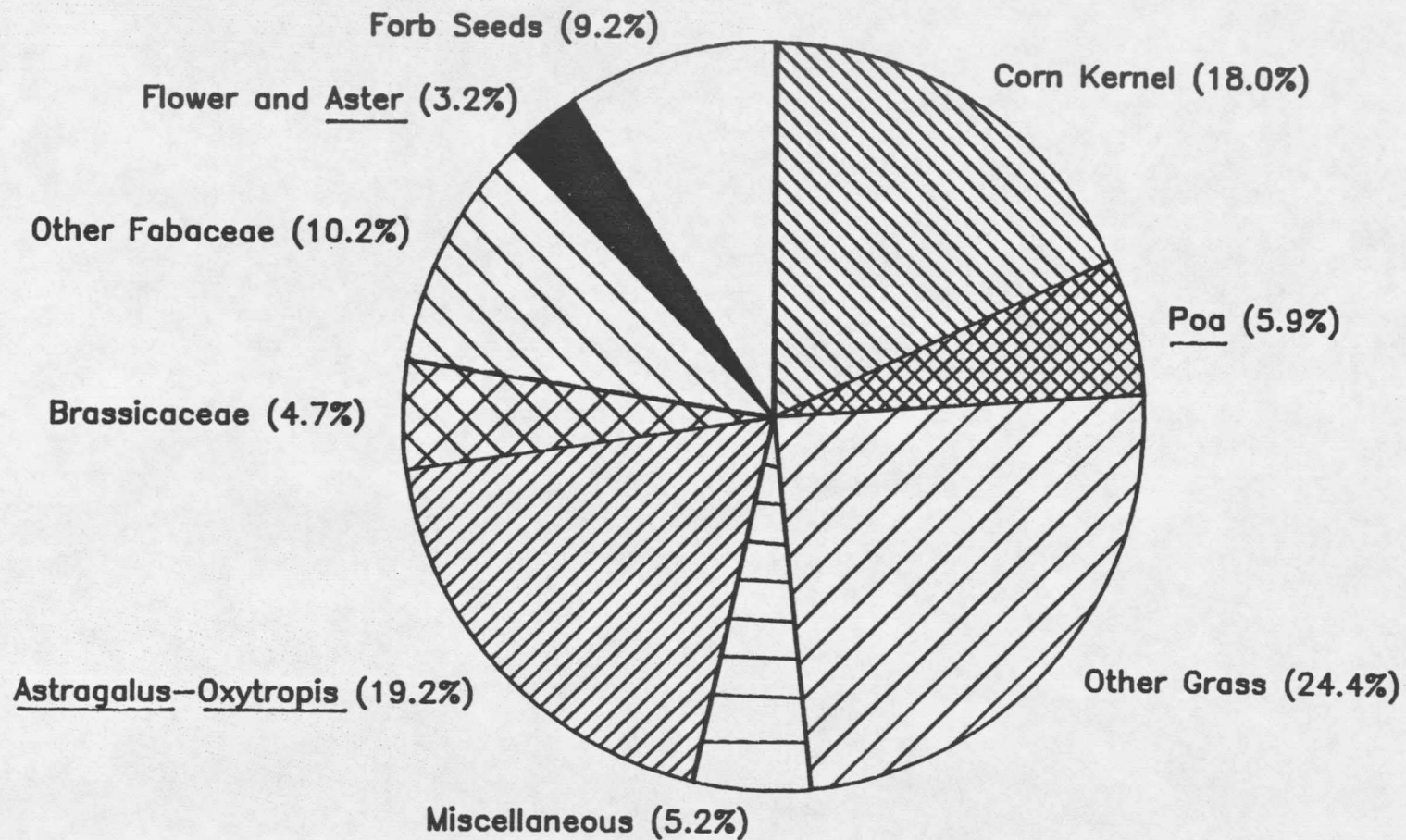


Figure 2. January 1987 food habits for Merriam's turkey in Helena National Forest.

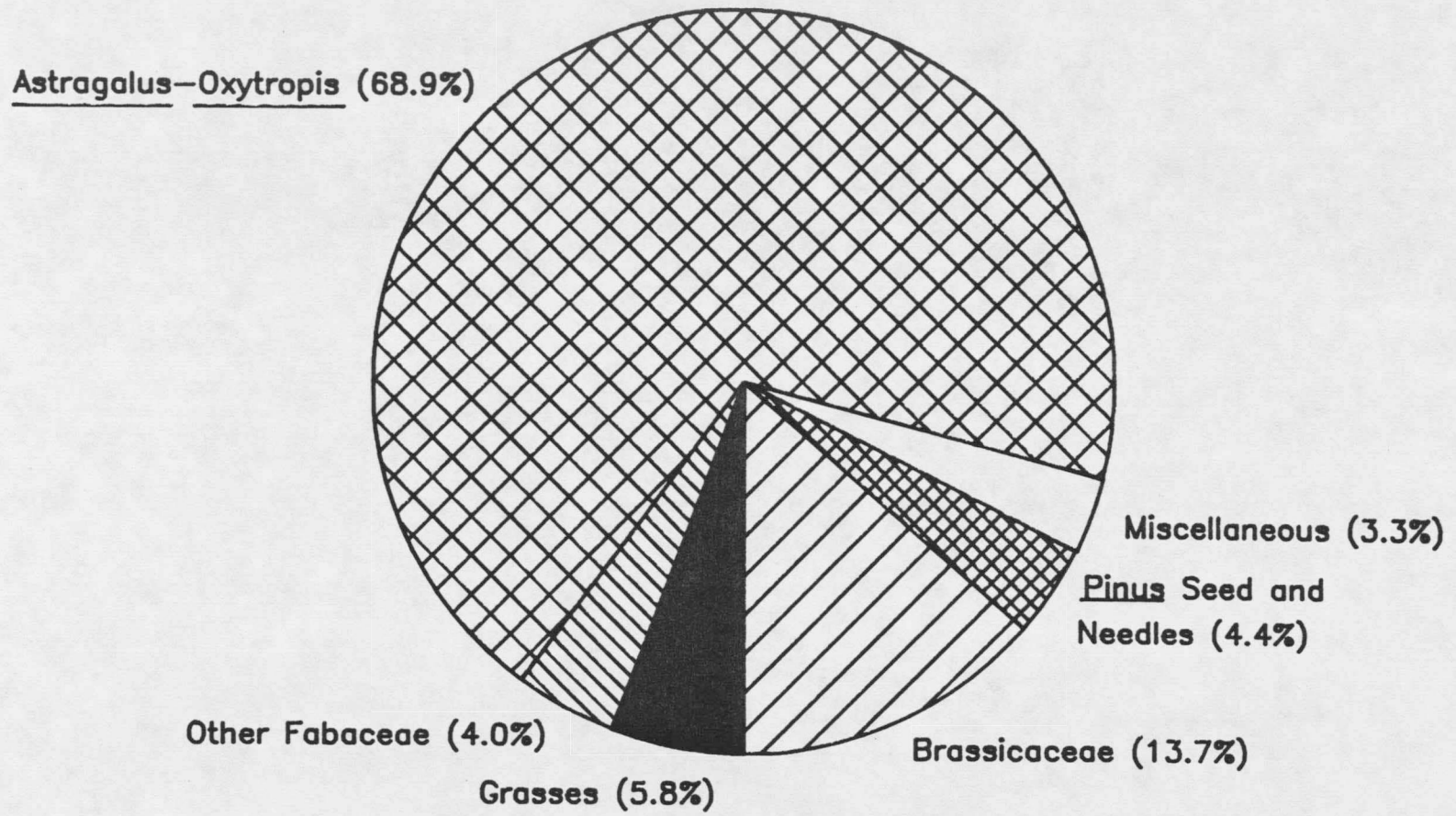


Figure 3. February 1987 food habits for Merriam's turkey in Helena National Forest.

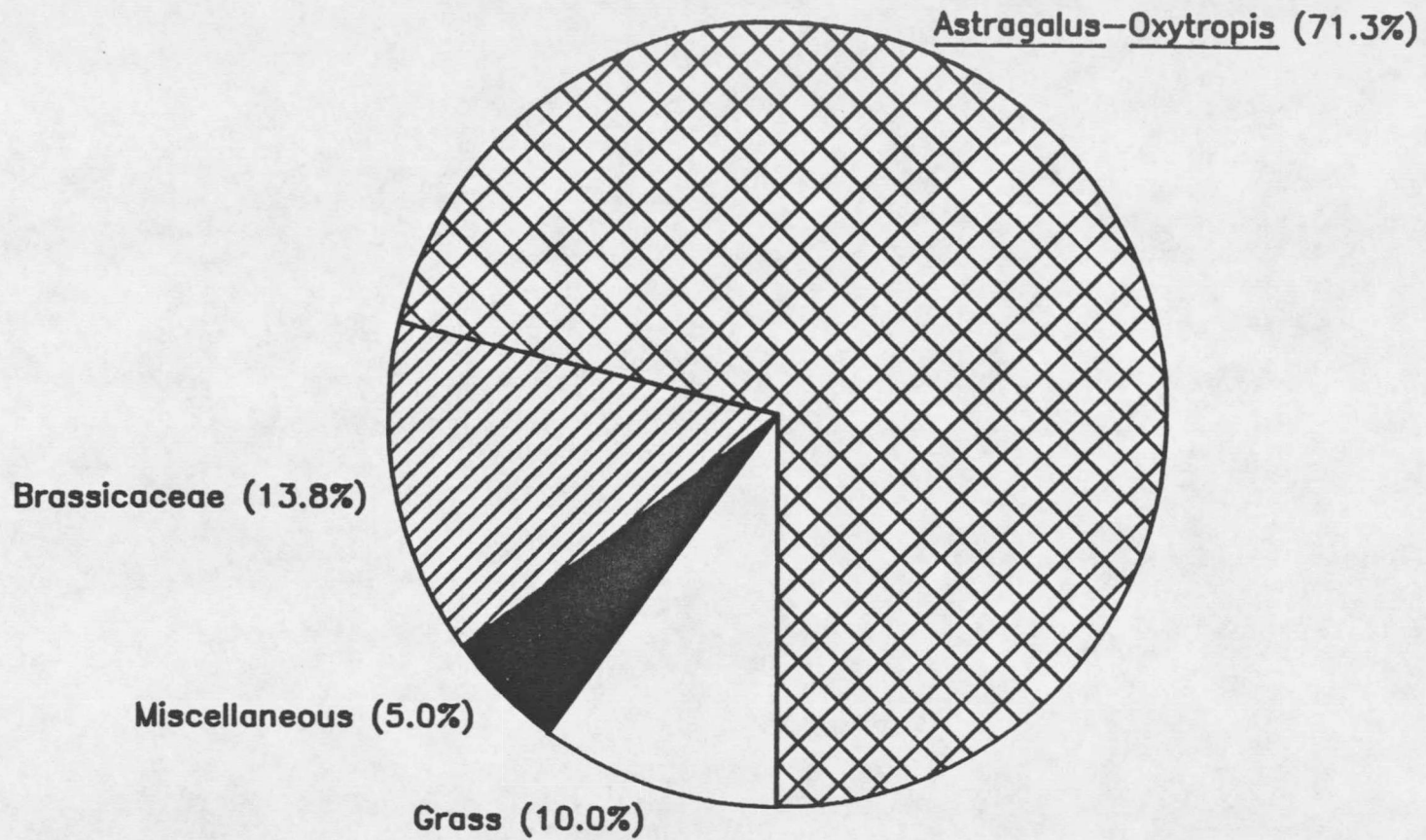


Figure 4. March 1987 food habits for Merriam's turkey in Helena National Forest.

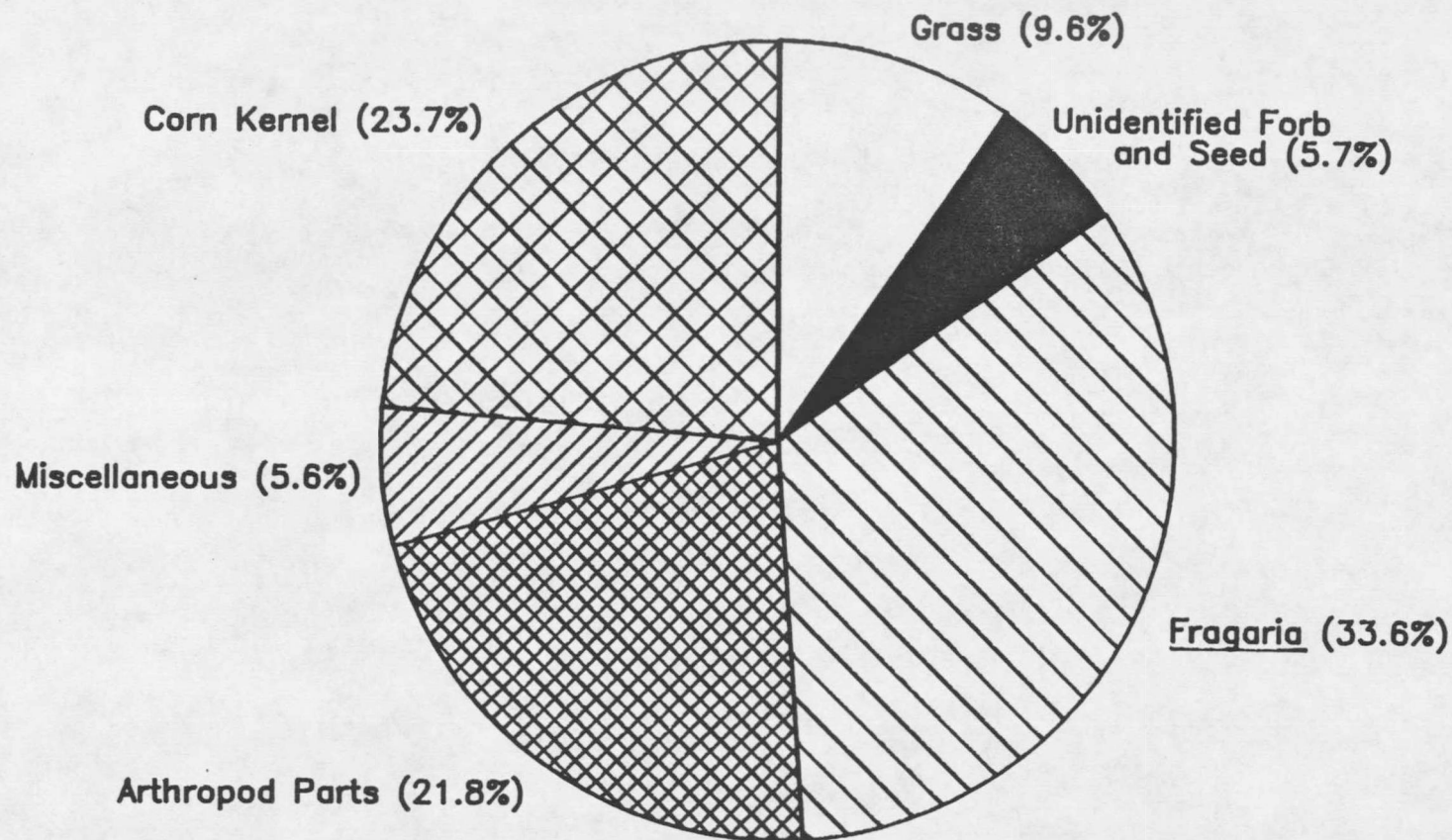


Figure 5. April 1987 food habits for Merriam's turkey in Helena National Forest.

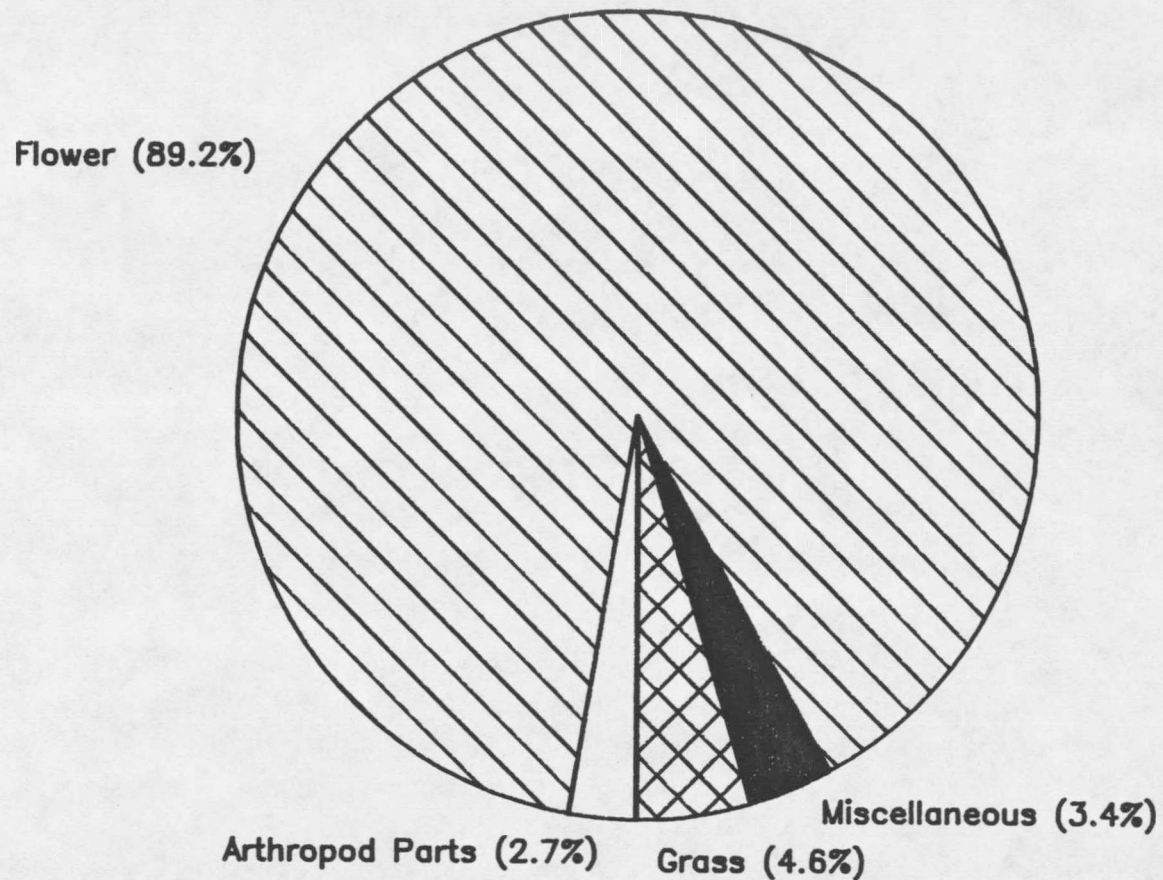


Figure 6. May 1987 food habits for Merriam's turkey in Helena National Forest.

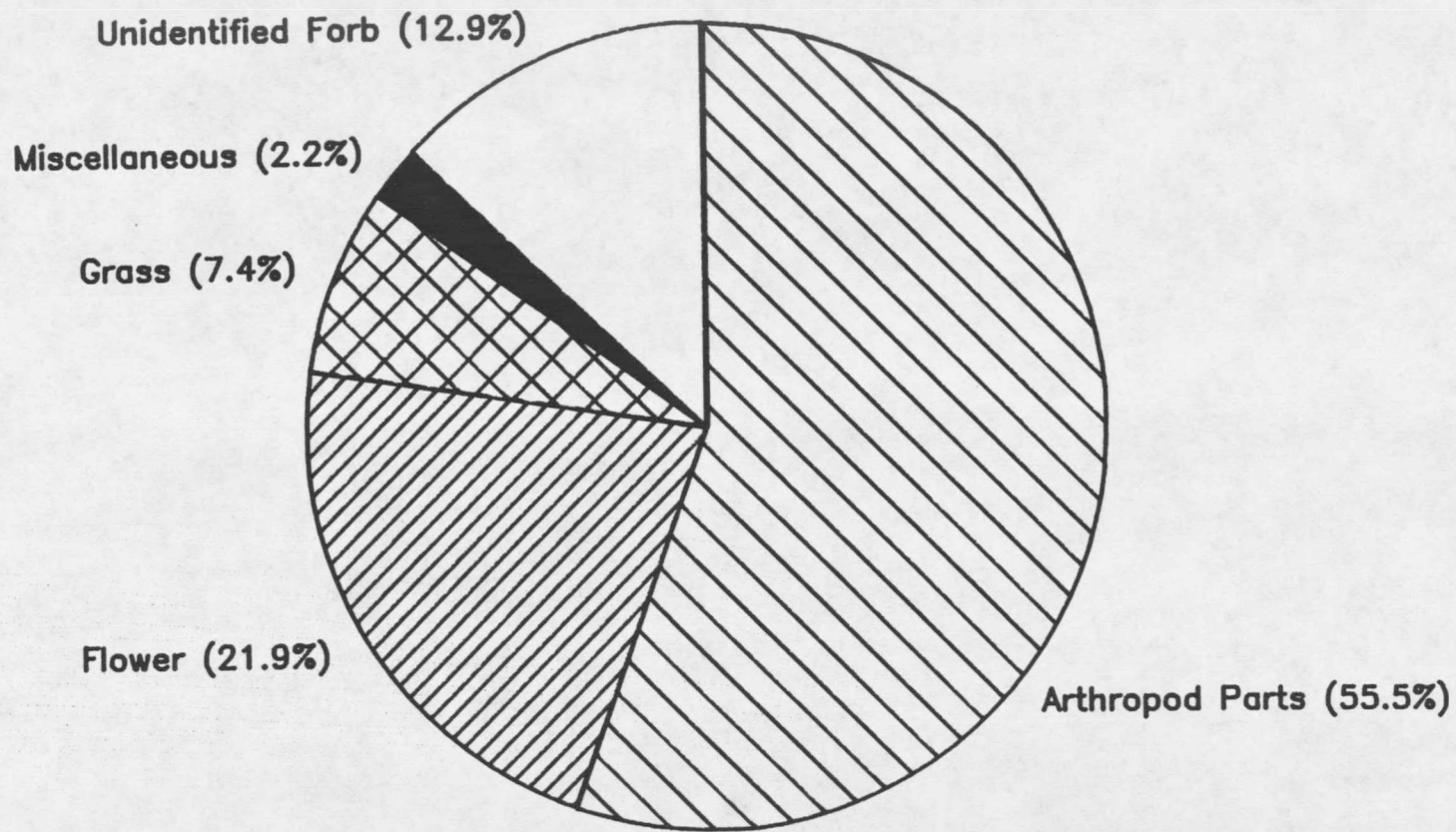


Figure 7. June 1987 food habits for Merriam's turkey in Helena National Forest.

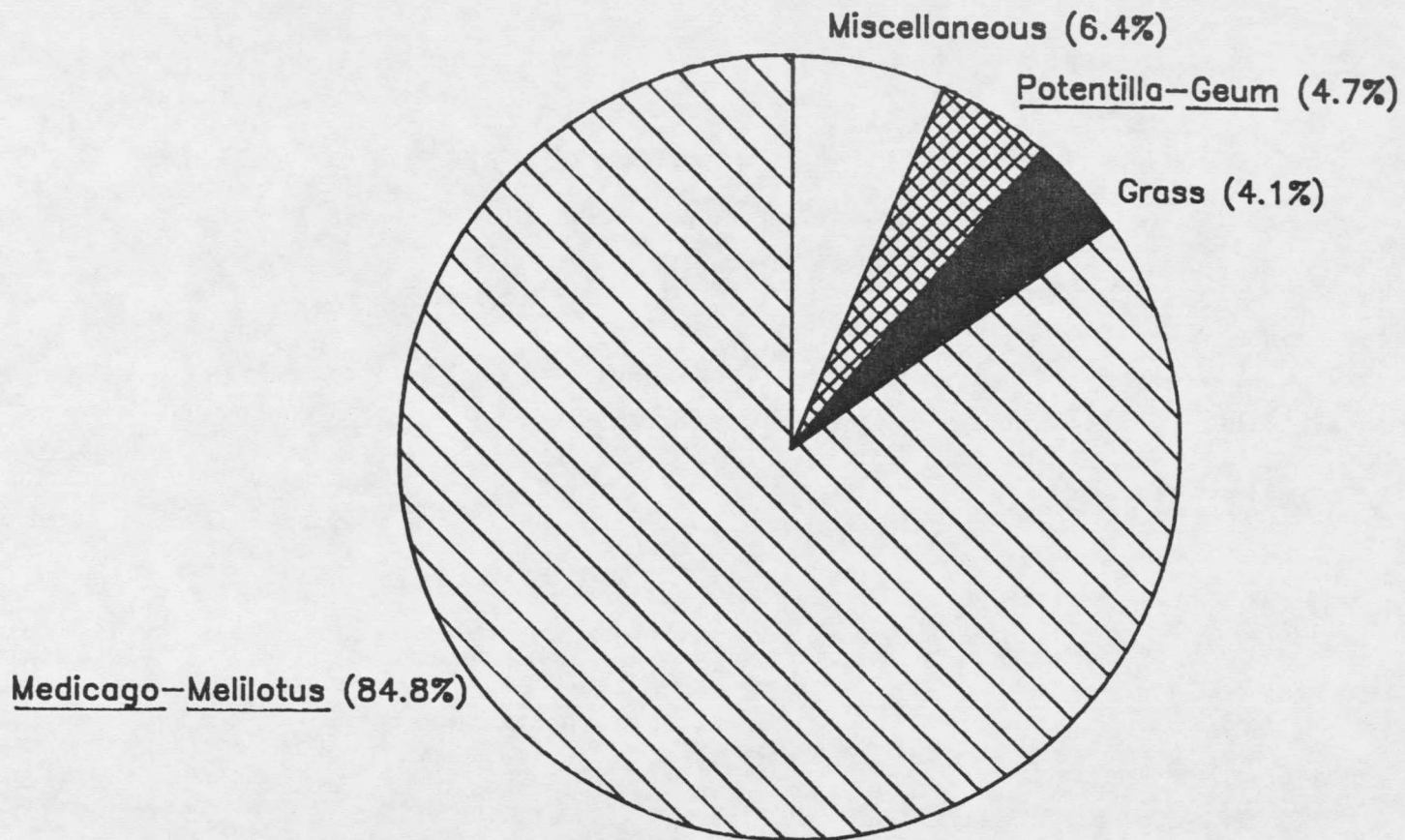


Figure 8. Food habits for an incubating female Merriam's turkey in Helena National Forest in 1987.

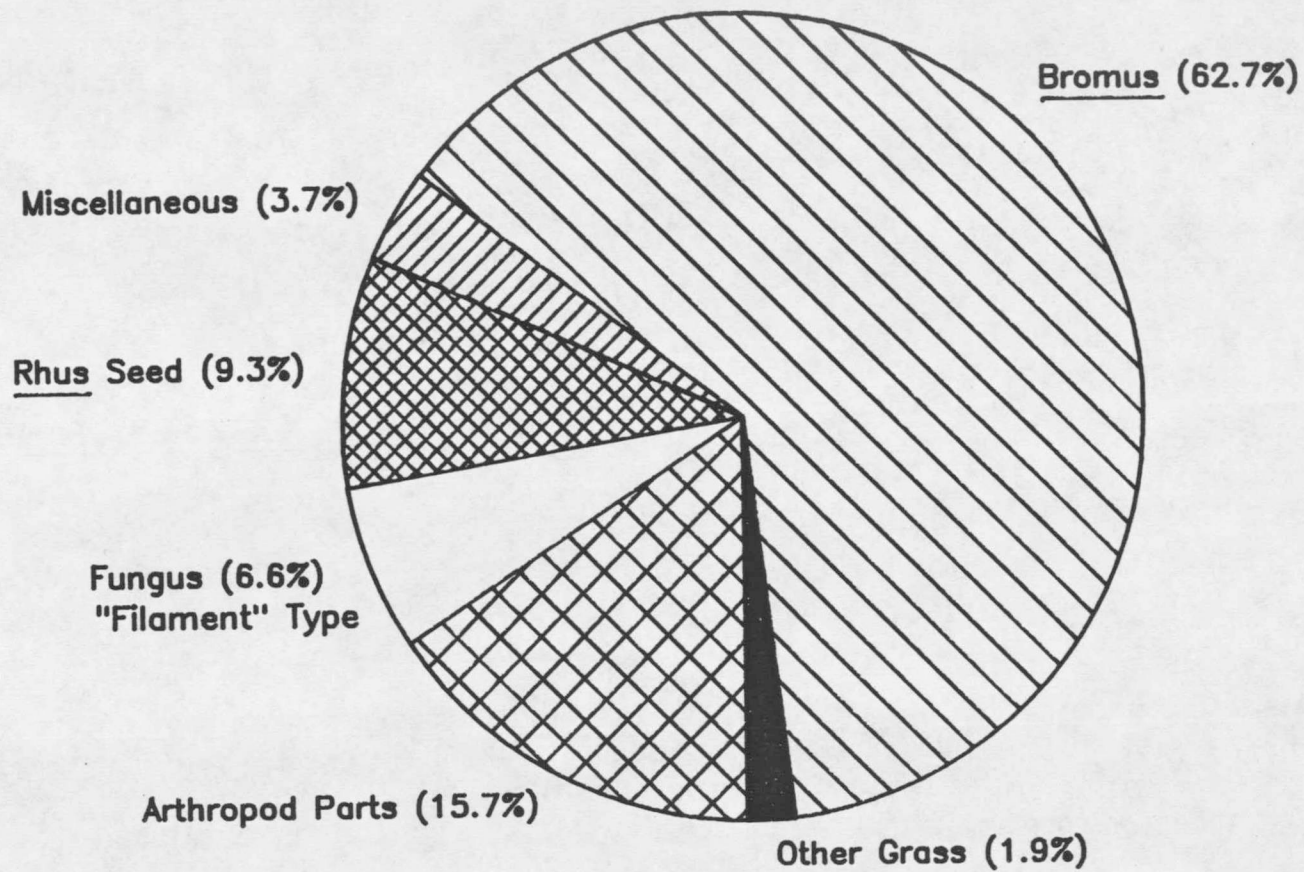


Figure 9. July 1987 food habits for Merriam's turkey in Helena National Forest.

