



Evaluation of two introductions of Merriam's wild turkey into Montana
by Beverly J Rose

A THESIS Submitted to the Graduate Faculty 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:

Merriam's wild turkeys (*Meleagris gallopavo merriam*), were introduced into the Judith Mountains, in central Montana, in November of 1954. A second liberation was made in the Longpines Area, in southeastern Montana, in January of 1955. Field studies were conducted on both areas from December 21, 1954, to March 25, 1956. Emphasis was placed on securing data on survival, food habits, movements, nesting and reproductive success, use of cover types, and limiting factors. Direct field observations provided most of the data, but laboratory analysis of droppings was utilized primarily for food habits evaluation. A total of 2,192 droppings collected from both study areas, during the summer of 1955, and winter of 1955-1956, were analyzed. The procedure of analysis is described. To facilitate the identification of items in the droppings, extensive insect, plant and seed reference collections were made.

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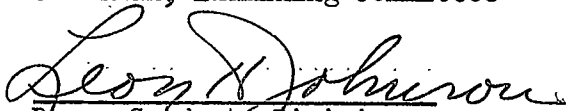
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ABSTRACT

Merriam's wild turkeys (Meleagris gallopavo merriami), were introduced into the Judith Mountains, in central Montana, in November of 1954. A second liberation was made in the Longpines Area, in southeastern Montana, in January of 1955. Field studies were conducted on both areas from December 21, 1954, to March 25, 1956. Emphasis was placed on securing data on survival, food habits, movements, nesting and reproductive success, use of cover types, and limiting factors. Direct field observations provided most of the data, but laboratory analysis of droppings was utilized primarily for food habits evaluation. A total of 2,192 droppings collected from both study areas, during the summer of 1955, and winter of 1955-1956, were analyzed. The procedure of analysis is described. To facilitate the identification of items in the droppings, extensive insect, plant and seed reference collections were made.

INTRODUCTION

The ancestral range of Merriam's wild turkey (*Meleagris gallopavo merriami*) extended through the ponderosa pine - oak forests of central Colorado, southward through New Mexico and Arizona, with the southern limit near the United States - Mexico boundary. By 1925, the northern limit of the occupied range had contracted to the extreme southern edge of Colorado. Restocking, by the game departments of Colorado, New Mexico and Arizona, has restored this bird to portions of its ancestral range (Ligon, 1946).

At least two states, Wyoming and South Dakota, outside the ancestral range have had success with introductions of this subspecies.

In 1935, fifteen Merriam's wild turkeys, obtained from New Mexico, were introduced into Wyoming. By 1940, an estimated population of four hundred occurred in the vicinity of the release area. This population formed the nucleus for additional transplants during 1950-51. Twenty-six turkeys, also obtained from New Mexico, were released in 1951 primarily as brood stock for areas previously planted. The reproductive success of these populations continued at a high rate during the next four years. Wyoming, in 1955, declared Merriam's wild turkey a legal game bird, to be hunted on a permit basis (Anon., 1955).

South Dakota, in 1948, introduced Merriam's wild turkeys into the Black Hills. Twenty-nine, obtained from New Mexico and Colorado, were released during the years 1948-51. From these original transplants, a phenomenal increase in the population resulted. Trapping and trans-

planting from these established populations, distributed wild turkeys throughout the Black Hills. In 1954, only six and one-half years after the first birds were released, hunting on a permit basis, was legalized on Merriam's wild turkey (Anon., 1951; Gage, 1952; Nelson, 1955).

The success of these introductions into Wyoming and South Dakota suggested the possibility of a successful introduction into Montana by the Montana Fish and Game Department, despite the fact that at least three turkey plants, by sportsmen's clubs at Billings and Forsyth, had been unsuccessful (Bergeson, 1954). Two areas were selected as release sites. The first to be stocked was the southern part of the Judith Mountains approximately eight miles northeast of Lewistown, Fergus County, in the central part of the state. The second, was the Longpines Hills, approximately thirty miles southeast of Ekalaka, Carter County, in the southeast corner of Montana.

To evaluate the success of these introductions, the writer conducted field studies during the following periods: December 21 to 30, 1954; March 21 to 25, 1955; June 14 to September 21, 1955; and January 5 to March 25, 1956. Supplementary information was provided by observations of Montana Fish and Game Department employees, and landowners.

Emphasis was placed on securing data on survival, food habits, movements, nesting and reproductive success, use of cover types, and limiting factors. Direct field observations provided most of the data, but laboratory analysis of droppings was utilized primarily for food habits evaluation. To facilitate the identification of items in droppings,

extensive insect, plant, and seed reference collections were made for both study areas.

The writer is indebted to Dr. Don C. Quimby, Montana State College, for direction of the study and aid in preparing the manuscript; to Robert Eng, of the Montana Fish and Game Department, for assisting in setting up the study and for giving aid in the field; to Wesley Woodgerd, Warren Linville, and "Swede" Lindgren, also of the Montana Fish and Game Department, for field assistance; to Doctors John C. Wright and W. E. Booth, and the Montana State Seed Laboratory, Montana State College, for aid in identification of plants and food materials; to Dr. Richard Froeschner, Montana State College, for aid in identification of insect materials; and to the landowners of both study areas for their cooperation and assistance. The writer was employed by the Wildlife Restoration Division of the Montana Fish and Game Department, under Project W-74-R-1, during the investigation.

GENERAL DESCRIPTION OF MERRIAM'S WILD TURKEY

Merriam's wild turkey resembles its domestic relative, since both possess white markings on the wings and tail, but other characteristics differentiate the two. Merriam's is lighter in weight, more stream-lined in body form, and presents a less clumsy appearance than the domestic turkey (Fig. 1). The wattle of the latter is much larger and the head region possesses fewer hair-like feathers. The general appearance of the wild bird is darker and the brilliant iridescence, seen in the domestic



Fig. 1. A mature Merriam's wild turkey gobbler.

turkey, is slightly subdued (Anon., 1955).

Many wild turkeys were weighed in Wyoming during trapping and transplanting programs. "Mature" gobblers averaged sixteen pounds and one ounce, and "immature" gobblers twelve pounds and five ounces. The heaviest gobbler weighed nineteen pounds and eleven ounces, and the lightest eleven pounds and twelve ounces. The mature hens averaged nine pounds and five ounces, whereas, immature hens averaged eight pounds and six ounces. Maximum hen weight was eleven pounds and eight ounces and the minimum eight pounds (Crump and Sanderson, 1951). Two white turkeys removed from the Longpines area were weighed. A juvenile hen (Fig. 2) collected February 14, 1956, weighed six and one-half pounds. The second, a juvenile tom collected on March 20, 1956, weighed eleven and one-fourth pounds.

JUDITH MOUNTAINS RELEASE SITE

The Judith Mountains, located in central Montana, extend generally in a northeast-southwest direction for approximately twenty-five miles and have a width of about twelve miles. The relief of the area is approximately 2,500 feet and the highest point has an elevation of 6,428 feet.

The release site was Limekiln Gulch, located on the southwest edge of the mountains. This area is typical of the southern half of the Judith range. The topography is rolling to broken, with broad canyon bottoms which provide cultivated crop stringers that penetrate the



Fig. 2. The white juvenile hen which was removed from the Long-pines population on February 16, 1956. The weight was six and one-half pounds.

forested areas at higher elevations. These agricultural lands are usually planted to alfalfa and cereal grains, such as oats, barley and wheat.

The cover types of the mountain slopes are mixed ponderosa pine - grassland and Douglas fir - lodgepole pine. Dense to open stands of immature ponderosa pine (Pinus ponderosa) predominate the area. Only a few stands of mature trees are found and these are on isolated ridge tops. Douglas fir (Pseudotsuga taxifolia) - lodgepole pine (Pinus contorta) is the next most abundant timber type with scattered tracts found throughout the area mostly on north and east facing slopes.

The principal understory plants of the timber types are western snowberry (Symphoricarpus occidentalis), common snowberry (Symphoricarpus albus), bearberry (Arctostaphylos uva-ursi), common juniper (Juniperus communis), and Oregon grape (Mahonia repens).

The grassland type is composed principally of Idaho fescue (Festuca idahoensis), crested wheatgrass (Agropyron desertorum), bearded bluebunch wheatgrass (Agropyron spicatum), prairie junegrass (Koeleria cristata), needle-and-thread (Stipa comata), cheatgrass brome (Bromus tectorum), smooth brome (Bromus inermis), Kentucky bluegrass (Poa pratensis), timothy (Phleum pratense), and carex (Carex spp.). Principal forbs of this type are red clover (Trifolium pratense), white clover (Trifolium repens), silvery lupine (Lupinus argenteus), lodgepole lupine (Lupinus parviflorus), Missouri milkvetch (Astragalus missouriensis), looseflower milkvetch (Astragalus tenellus), prairie milkvetch (Astraga-

lus striatus), wayside gromwell (Lithospermum ruderale), arrowleaf balsamroot (Balsamorhiza sagittata), bush cinquefoil (Potentilla fruticosa), gland cinquefoil (Potentilla glandulosa), northwest cinquefoil (Potentilla gracilis), Pennsylvania cinquefoil (Potentilla pennsylvanica), stiffleaf vetch (Vicia sparsifolia), little larkspur (Delphinium bicolor), prairie thermopsis (Thermopsis rhombifolia), black medic (Medicago lupulina), and woolly groundsel (Senecio canus).

Quaking aspen (Populus tremuloides), hawthorn (Crataegus spp.) common chokecherry (Prunus virginiana), skunkbush sumac (Rhus trilobata), rose (Rosa spp.), and mallow ninebark (Physocarpus malvaceus) are found along the edges of the forest types and the creek bottoms.

Limber pine (Pinus flexilis) is found near the tops of the higher mountains.

Creeks are generally found at two to three mile intervals throughout the area. Most are spring fed and the larger ones continue to flow during the dry season.

The mean average annual temperature for Lewistown is 42.7°F with extremes of 66.3°F (July) and 20.7°F (January). The extremes for the latter month are 66°F and -33°F, but -42°F has been recorded in February. The average annual precipitation is 16.79 inches, and the mean annual snowfall is 54.2 inches (Climatic Summary of the United States - Supplement for 1931 Through 1952 - Montana). During winters of deep snows, the canyon bottoms collect and hold the snow, but the south exposures usually remain clear during the hardest winters.

Thirteen Merriam's wild turkeys from southern Colorado were released in Limekiln Gulch on November 13, 1954. The sex and age composition was one adult male, four immature males, five adult females, and three immature females. All birds were banded with aluminum leg bands.

LONGPINES AREA RELEASE SITE

The Longpines Division of the Custer National Forest, located in southeastern Montana, is an area of approximately 60,000 acres. Although no prominent mountain ranges occur here, the area is characterized by a rolling to broken topography with all elevations over 3,000 feet and a relief of less than 1,000 feet. The release site was in the southeastern part of the Longpines, in the vicinity of Capitol Rock.

The principal cover type is mixed ponderosa pine and grasslands. There appears to be a slightly greater percentage of mature trees in this area than found in the Judiths. The understory is primarily grassland although western snowberry and bearberry are quite common in the open stands.

The grass cover is primarily Idaho fescue, crested wheatgrass, bearded bluebunch wheatgrass, needle-and-thread, junegrass, red threeawn (Aristida longiseta), and little bluestem (Andropogon scoparius). Carex is common throughout the area and Kentucky bluegrass is found in the more moist sites. Blue grama (Bouteloua gracilis) is common to the lower range areas.

Boxelder (Acer negundo), green ash (Fraxinus pennsylvanica), and

quaking aspen are found along the canyon bottoms. Currant (Ribes spp.), skunkbush sumac, common chokecherry, rose, American plum (Prunus americana), and hawthorn are the principal shrubs found along creek bottoms and edges of the forested areas. Silver buffaloberry (Shepherdia argentea), and silver sagebrush (Artemesia cana) are common to the lower canyon bottoms.

There are no cultivated canyon bottom stringers penetrating the forested areas as found in the Judith Mountains. Cultivated fields are located generally around the mountains at the lower elevations, and are usually planted to cereal grains, such as wheat and oats.

Water, in the form of seeps and springs, is found at about two to three mile intervals, and the larger springs continue flowing during the dry season.

The mean average annual temperature for Ekalaka is 44.1° F with extremes of 71.8°F (July), and 17.6°F (January). The extremes for the latter month are 57°F and -40°F, but -43°F has been recorded in February. The average annual precipitation is 12.99 inches, and the mean annual snowfall is 22.3 inches (Climatic Summary of the United States - Supplement for 1931 Through 1952 - Montana). The heaviest snowfall occurs at the higher elevation, but the south exposures remain relatively snowfree through the winter.

Eighteen turkeys, from the Black Hills of northeastern Wyoming, were released on January 27, 1955. The sex composition of the flock was five toms and thirteen hens. All birds were banded with aluminum leg bands.

NESTING

Only one nest was located. This was discovered on August 16, 1955, in the Judith Mountains. It contained ten eggs (Fig. 3). The location was on an east-facing slope in lodgepole pine timber, and was concealed in a pile of pine slash. Oregon grape was the most abundant understory plant. Mosby and Handley (1943) state that wild turkeys "show a decided preference for locating their nests near openings in the forest, usually choosing sites near trails, roads, or small abandoned fields". This location was five feet from a trail, and approximately twenty yards from a cultivated field.

The hen was still incubating, but the eggs were infertile. The smoothly worn eggs and the appearance of the egg contents, a uniformly brownish liquid, suggested that the hen had been incubating for a considerable length of time. A search around the nesting area revealed no black caecal droppings, characteristic of nesting hens (Mosby and Handley, 1943). Approximately fifty yards from the nest, several large "clocker droppings" were found in a field, which the nesting hen was observed to use regularly.

Leopold (1933), gives reference to "clocker droppings" being used in Scotland as indicators of nesting red grouse. Patterson (1952) determined that the "clocker dropping" is a good indicator of sage grouse nesting activity and quite often can be used as an aid in locating the actual nest site.

On August 8 and 9, 1955, eight "clockers" were located on a knoll



Fig. 3. A Merriam's wild turkey nest found in the Judith Mountains.
The ten eggs were infertile.

approximately three miles northeast of the located nest. A search was made on both dates for a nest, but none was found. Perhaps "the nest" was terminated by this late date.

The presence of "clocker droppings", near the nest, suggests that this type of dropping may be used as an indicator of wild turkey nesting activity.

REPRODUCTION AND SURVIVAL

The reproductive success for the Judith Mountain transplant was apparently low. One brood was observed. It contained only three young. This brood was observed in October 1955, by a landowner in Ruby Gulch, approximately two and one-half miles northeast of the release site. During the winter of 1955-56, a flock composed of one adult tom, three adult hens, and three juveniles was observed in this same general area. The location suggests that the juveniles were the same ones observed in October.

A report was received in mid-September, 1955, of a hen and six to ten young near Fort Maginnis, on the east side of the Judiths, approximately fifteen miles from the release site. A check was made with landowners of this area, but this brood was never observed. The evidence indicates a net loss of six birds (46%) for the first year.

The Longpines, in contrast to the Judith Mountains, had a high reproductive success. Sixty-one young were observed during the summer of 1955 as follows: one hen with nine young, two hens with twenty-two young, and three hens with thirty young. Apparently there were six broods with an

average of about ten young each. Two of the poults were white suggesting a domestic strain in the original stock. February and March counts gave a total of at least sixty-five young, indicating that all broods were not observed during the summer. Total counts for the area indicate eighty-two birds, an increase of 355% for the first year.

MOVEMENTS

After release, the turkeys in the Judith Mountains remained in the general vicinity for about ten days. The next sight record was in Ruby Gulch, approximately two and one-half miles northeast of the release site, on November 27. At least eleven of the original thirteen birds remained in this area until February 1, 1955. They were next observed near the release site on February 20, 1955. The number of birds in the flock was then nine. On March 24, eight birds were observed near the release site. During April, a general break-up and dispersal of the flock occurred. Three birds were reported, during April and May, approximately four miles east of the release site, two were observed on April 10, two and one-half miles east of the release site, and one was observed about May 1, three miles southeast of the release site. The birds remained dispersed after the spring break-up until late fall, when flocking occurred. A flock of eleven, was observed about December 1, 1955, in Ruby Gulch. A flock of seven, remained in this area until March 25, 1956. The summer and winter ranges for the Judith Mountains flock were essentially the same.

The Longpines flock utilized different summer and winter ranges.

The summer range was the forested areas, at the higher elevations. During the summer, most of the observations were within six miles of the release site, but one brood was observed regularly, nine miles northwest of the release site. The shift to the lower elevations occurred after October 1, 1955. On October 10, a flock of about twenty-four were observed on a ranch near Belltower Butte, on the southwest corner of the Longpines. The numbers in this flock varied between eighteen and twenty-eight until December, when the number remained near twenty-four. Eighty-two turkeys were counted in February and March, 1956, wintering near ranches around the periphery, of the forested areas, of the southern half of the Longpines. Distances from the release site were seven miles northwest, to two miles east, to nine miles west, with flocks scattered between these points. The birds left the lower ranges and returned to the forested areas between March 15 and 30, 1956.

Daily cruising ranges during the summer months were determined, by continuous observations, to be about two to three miles. By back-tracking in the snow, the winter daily cruising range was determined to be about the same, however, during periods of deep snow, this distance was decreased to about one-fourth of a mile from the roost areas.

ROOST TREES

Roost trees are easily identified by the numerous droppings beneath the trees. Small flocks of turkeys may use a single tree, however, large flocks will utilize a group of adjacent trees as the roost area.

Trees selected, generally have a trunk diameter of ten to twenty inches, and are bare of foliated branches for at least the first twenty feet (Fig. 4). The roost trees are usually located in a stand of trees at the base of a cliff or at the head of a basin (Fig. 5).

Sometimes, other types of roost areas are utilized. In November, in the Longpines area, observations were made, for several nights by a rancher, on a flock of wild turkeys which used a buffaloberry thicket as a roosting area. During a blizzard in December, another flock of over twenty birds were observed to roost on and under a fallen tree near a stock-feeding area, for three nights.

Wild turkeys usually go to roost about one-half hour before sunset. On September 2 and 5, 1955, in the Longpines, flights to the roost trees were completed at 6:35 and 6:29 P. M., respectively. At 4:25 P. M., on February 16, 1956, a roost tree was located in the Longpines. A minimum of six birds were already roosting in the tree at the time of discovery. Normally the birds leave the roost trees at daybreak. The mornings after the above roost flights, the birds were observed to leave the trees at 5:01 and 5:07 A. M., respectively. When going to roost, the birds took off from a hillside and flew upward into the roost trees. When leaving the roost trees, the point of landing was approximately the same as the take-off point.

During the summer, the birds did not appear to have regular nightly roost trees, but in some cases, the same trees were used irregularly.

In the winter, regular nightly roost trees were utilized by flocks.



Fig. 4. The trunk section of a typical winter roost tree.



Fig. 5. A turkey winter roost area. Tree in Fig. 4 is in the center background.

The birds returned to the stand of trees each evening, but seldom selected exactly the same trees in which to roost.

During periods of very severe weather, turkeys have been known to spend a day or more in the roost trees. It has also been observed that during rainy weather, wild turkeys may spend a considerable portion of the day in trees (Mosby and Handley, 1943).

FOOD HABITS

Food habits were determined by analysis of droppings. The method used was similar to the methods of Dalke, Clark and Korschgen (1942). The dried droppings were soaked in water for approximately twenty-four hours, then strained, under running tap water, through a medium-mesh household tea sieve. The dropping materials were then blotted and air-dried. Identification of items was made with the aid of a binocular microscope.

Items identified in each dropping, and the most abundant item in each dropping were recorded (Tables I and II). Insects were identified to order, and, if possible, to family. Plants were identified, in most cases, to genera, but unidentifiable grass parts were recorded as Gramineae, and grains, greens, buds, twigs, and mosses were treated as separate items.

The most abundant items identified in 933 summer droppings from the Longpines area were insects of the order Orthoptera (89.3% of droppings), the seeds of bearberry (86.0%), seeds of snowberry (54.9%), grass leaves and stems (26.4%), seeds of skunkbush sumac (23.6%), and

seeds of a species of *Carex* (20.7%). A total of thirteen families of insects and twenty-six genera and groups of plants were identified (Table I). Grasshoppers, of the family Acrididae, were found to be the most abundant items in 791 (84.8%) Longpines summer droppings (Table II). For twenty-one summer droppings from the Judiths, all items except grain (14.3%) occurred in the Longpines sample. Proportions differed, but the small sample does not justify comparisons.

The most abundant items identified in 671 winter droppings from the Longpines area, were as follows: grain (96.4% of droppings), seeds of snowberry (31.1%), and heads of brome (21.9%). A total of two families of insects and nineteen genera and groups of plants were identified (Table I). Grain was found to be the most abundant item in 646 (96.3%) Longpines winter droppings (Table II). For 567 winter droppings from the Judiths, the most abundant items identified were hawthorn seeds (56.4% of droppings), grain (49.2%), grass leaves and stems (32.5%), snowberry (30.3%), and grass heads (20.6%). A total of three families of insects and fifteen genera and groups of plants were identified (Table I). Hawthorn seeds were the most abundant items in 214 (37.7%) Judith winter droppings and grain was the most abundant in 266 (46.9%) (Table II).

The crops and gizzards of the two white specimens collected were analyzed. The crop of the February specimen contained six rose hips, thirteen snowberries, and one unidentified grasshead; the gizzard 10 cc grit, 1 cc rose hips, 1 cc of unknown plant No. 7 seeds, and traces of snowberries, grassheads, chokecherries, and seeds of unknown plant No. 18.

Analysis of the March specimen revealed - crop: 139.5 cc oats, .5 cc grassheads, and grit and snowberries trace; gizzard: 20 cc grit, 20.5 cc oats, and traces of bearberries, hawthorn fruits, snowberries; common chokecherries, and seeds of unknown plant No. 7.

The most striking difference between summer and winter droppings, was the small amount of animal matter found in the latter. For the Long-pines area, domestic grain appeared to be the most important item in the diet. Grain was also important as a winter food for the turkeys in the Judith Mountains, but was secondary to the seeds of hawthorn in frequency of occurrence.

In most areas of Merriam's Wild Turkey range, acorns are considered an essential food item. Ligon, (1946), states the principal mast foods on which Merriam's turkey is largely dependent in winter and early spring, listed in the order of their usually accepted importance, are: acorns, Pinon nuts, alligator-bark juniper berries, and other nuts.

In central Wyoming, where oak trees are absent, ponderosa pine seeds are a staple food. Weed, grass and grain seeds contribute to the turkeys diet, as do grasshoppers and other insects. Chokecherries, rose hips and other wild berries are also important food items (Anon., 1955). The food habits of Montana birds, appear to be similar to those of Wyoming birds, with the exception that ponderosa pine seeds are not a staple food for the former.

Table I. Number of times various items were identified in 2,192 summer and winter droppings from the Judith Mountains and Longpines Areas. (F.O. = Frequency of Occurrence)

Items	Summer				Winter			
	Longpines		Judiths		Longpines		Judiths	
	(933)	(21)	(671)	(567)	F.O.	%	F.O.	%
Animal								
Orthoptera	833	89.3	8	38.1	12	1.8	15	2.6
Acrididae (locusts)	833	89.3	8	38.1	12	1.8	15	2.6
Lepidoptera	35	3.8	3	14.3				
Noctuidae (owlet moths - cocoons)	32	3.4	3	14.3				
Unclassified	3	.3						
Coleoptera	186	19.9	15	71.4	11	1.6	26	4.6
Carabidae (ground beetles)	26	2.8	10	47.6	9	1.3	8	1.4
Cicindelidae (tiger beetles)	25	2.7					1	.2
Cerambycidae (long-horned beetles)	1	.1						
Chrysomelidae (leaf beetles)	1	.1						
Cleridae (checkered beetles)	3	.3						
Buprestidae (buprestids)	14	1.5						
Tenebrionidae (darkling beetles)	23	2.5	1	4.8				
Unclassified	84	9.0	4	19.0	2	.3	17	3.0
Hemiptera	17	1.8						
Pentatomidae (stink bugs)	8	.9						
Unclassified	9	1.0						
Hymenoptera	4	.4						
Vespidae (typical wasps)	1	.1						
Formicidae (ants)	1	.1						
Ichneumonidae (ichneumon flies)	2	.2						
Odonata			1	4.8				
Coenagrionidae (stalked-winged damsel-flies)			1	4.8				
Bones (birds and small mammals)	28	3.0						
Plant								
Grain (wheat and oats)			3	14.3	647	96.4	279	49.2
Symphoricarpus (snowberry-seeds)	512	54.9	4	19.0	209	31.1	172	30.3
Arctostaphylos (bearberry-seeds)	802	86.0	12	57.1	3	.4	1	.2
Gramineae (grass leaves and stems)	246	26.4	9	42.9	66	9.8	184	32.5

Table I (Continued). Number of times various items were identified in 2,192 summer and winter droppings from the Judith Mountains and Longpines Areas. (F.O. = Frequency of Occurrence)

Items	Summer				Winter			
	Longpines		Judiths		Longpines		Judiths	
	F.O.	%	F.O.	%	F.O.	%	F.O.	%
Gramineae (grass-heads)	184	19.7	19	90.5	109	16.2	117	20.6
Crataegus (hawthorn-seeds)	30	3.2			109	16.2	320	56.4
Rhus (skunkbush-seeds)	220	23.6	5	23.8				
Prunus virginiana (chokecherry-seeds)	174	18.6			7	1.0	2	.4
Carex sp. (sedge-seeds)	132	14.1					11	1.9
Carex sp. (sedge-seeds)	193	20.7	4	19.0	24	3.6		
Rosa (rose-seeds)	80	8.6			75	11.2	14	2.5
Bromus (brome-heads)					147	21.9		
Polygonum (knotweed-seeds)	17	1.8	1	4.8	90	13.4		
Ribes (currant-seeds)	91	9.8						
Prunus americana (wild plum-seeds)	48	5.1			9	1.3		
Vicia (vetch-seeds)	45	4.8			6	.9		
Mahonia (Oregon grape-seeds)	43	4.6						
Greens	3	.3					39	6.9
Shepherdia (buffaloberry-seeds)	5	.5			25	3.7		
Alfalfa hay (leaves)							28	4.9
Pinus (ponderosa pine-seeds)	3	.3	1	4.8	10	1.5	14	2.5
Rubus (thimbleberry-seeds)	23	2.5						
Lupinus (lupine-seeds)	11	1.2						
Sporobolus (dropseed-seeds)	10	1.1						
Juniperus (common juniper-seeds)							4	.7
Lithospermum (gromwell-seeds)	23	2.5	4	19.0				
Conringia (haresear mustard-seeds)							3	.5
Unidentified buds	2	.2						
Unidentified twigs								
Thlaspi (pennycress-seeds)					1	.1		
Unidentified moss							2	.4
Unknown plant No. 7 (seeds)	16	1.7	1	4.8	2	.3		
Unknown plant No. 18 (seeds)	71	7.6			26	3.9		
Unknown plant No. 23 (seeds)	6	.6			3	.4		

Table II. The most abundant item in each of 2,192 summer and winter droppings collected from the Judith Mountains and Longpines Areas.

Items	Summer				Winter			
	Longpines (933)		Judiths (21)		Longpines (671)		Judiths (567)	
	No.	%	No.	%	No.	%	No.	%
Animal								
Orthoptera								
Acrididae (locusts)	791	84.8	1	4.8				
Plant								
Grain (wheat and oats)			1	4.8	646	96.3	266	46.9
Gramineae (grass stems and leaves)	70	7.5	4	19.0	23	3.4	67	11.8
Gramineae (heads)			15	71.4			5	.9
Arctostaphylos (bearberry)	70	7.5						
Symphoricarpus (snowberry)					1	.1		
Crataegus (hawthorn)							214	37.7
Ribes (currant)	1	.1						
Greens							15	2.6
Unidentified twigs					1	.1		

USE OF COVER TYPES

During the summer and fall months, the most widely used cover type, in the Longpines, was open stands of ponderosa pine - grassland. Grasshoppers and other insects, grasses, snow-berry and other berry-producing shrubs were abundant. The birds were observed to utilize these types as feeding areas.

During the periods of hot weather, in late July and August, the denser stands of ponderosa pine, which contained an understory of grasses and shrubs, provided the most observations. On August 16, 1955, a fire occurred in this type of timber and destroyed .7 acre of pine reproduction and understory, before being suppressed. On August 29, 153 droppings were collected from this burned area. Because of the high number of droppings found here, two .7 acre check plots were set up in like, unburned habitat adjacent to the burn. One plot was located on the east side of the burn, and the other on the west. These areas were searched thoroughly, and all droppings found recorded. The plot on the east side of the burn contained thirty-two droppings, and the plot on the west side twenty-two. On September 4, the three plots were again visited. No droppings were found on the two .7 acre plots, but the burn contained 68 new droppings. The total droppings collected in the burn was 215, and these had accumulated in nineteen days. The total droppings for the two .7 acre check plots were twenty-two and thirty-two, and these had accumulated over an unknown period of time. This indicates that the burn was utilized more frequently than the plots of

like size in unburned habitat. Scratching was evident in most of the burn. The cause for this preference of habitat is unknown.

In the Longpines, after the movement to the lower elevations in the fall, hawthorn and buffaloberry, which are found in the lower canyon bottoms, were used more frequently.

After the first of October, cultivated fields were utilized. These fields were primarily planted to wheat and oats. The birds appeared to use these fields daily throughout the winter. Livestock-feeding areas were utilized in the Longpines from November 1, 1955 to March 30, 1956. Foods utilized at these feeding areas were oat heads from oat hay, seeds from grass and alfalfa hay, and corn. After the first of February, 1956, turkey flocks were concentrated at feeding lots near ranch houses (Fig. 6). The majority of these flocks continued to utilize this source of food, until March 15 to 30, when they returned to the forests. At one feeding area, a flock of six birds moved from the timber, across approximately a three-fourths mile stretch of open grassland, to gain access to a stock-feeding area, where corn was being fed. The birds appeared about every two or three days from November 1, 1955, until March 16, 1956.

In the Judiths, deep snows covered the cultivated fields during the winter of 1955-56, and the birds were unable to scratch down to waste grain. On February 24, 1956, the turkeys moved into a livestock feeding area in Ruby Gulch. They remained in this vicinity, feeding daily in the feed area, until March 17, 1956. The foods con-



Fig. 6. Three wild turkeys utilizing a livestock feeding area in the Judith Mountains, March 4, 1956.

sumed by the turkeys here, were chiefly oats, and leaves from alfalfa hay.

Observations were made on the use of escape cover. Generally, when alarmed, the birds moved to the nearest thicket or wooded area. On September 5, 1955, in the Longpines, a flock of turkeys was observed three times to utilize hawthorn and wild plum thickets, as escape cover, to elude a low-flying golden eagle. If a timber type was sought, the birds usually ran uphill. Upon being pressed by a pursuer, they usually took wing, when the crest was reached, and glided to another hillside, where the procedure could be repeated again, if necessary.

LIMITING FACTORS

Ligon, (1946), listed the limiting factors which must be taken into account in management of Merriam's turkeys. They include habitat deficiencies and human influences, predation, hunting, and fire.

Habitat deficiencies and human influences are difficult to evaluate at this time. It appears that winter is the critical season for the birds. Since domestic grains were found to occur as abundant items in the droppings analysis, there is a strong indication that grains are essential winter foods in the two areas studied. Survival through winter will apparently be greatly influenced by the ability of the birds to acquire grain through waste grain in cultivated fields, livestock feeding areas, or supplemental feeding.

Predation does not appear to be an important limiting factor in either of the two study areas. Control of coyotes with 1080 poison has virtually eliminated this animal from both areas. During the study, no

coyotes were observed. Bobcats are relatively abundant in both study areas, but predation by this species was not observed. Golden eagles are numerous in both areas. The only act of predation on turkeys to be observed, was made by this species. About January 1, 1956, a rancher in the Judiths observed two golden eagles devouring a wild turkey. Upon approaching the birds, they took flight, and one eagle carried the remains into the woods. An inspection around the area was made, and tracks, feathers and blood, indicated that the eagles had made the kill. Five turkeys had been feeding in a clearing about ten yards from the edge of a forested area, when attacked. One dead turkey hen was found in the Judiths on August 20, 1955, but the cause of death was not determined. Feathers were scattered around the carcass, but the bird had not been devoured. One bird was found dead in December, in the Longpines, but the cause of death was unknown.

There was some evidence that illegal hunting was a limiting factor in the Judith Mountains. The Judith Mountains were closed to the carrying of firearms, except during deer hunting season. The removal of only a few birds, at such a low population level, by illegal hunting, could have serious effect on future success. Illegal hunting was not known to have occurred in the Longpines.

Forest or grass fires could be severe in their effect on turkeys, if large tracts of land are destroyed. The only fire known to have occurred in either of the areas during the period of study, was the .7 acre fire in the Longpines.

Severe winter weather accompanied by deep snows sufficient to cover stubble fields may prove to be the limiting factor.

SUMMARY

1. In November 1954, thirteen Merriam's wild turkeys were released in the Judith Mountains, in central Montana. In January 1955, eighteen were released in the Longpines Area, in southeastern Montana.

2. Field studies were conducted in both transplant areas from December 21, 1954, to March 25, 1956. Emphasis was placed on securing data on survival, food habits, movements, nesting and reproductive success, use of cover types, and limiting factors.

3. One nest was found in the Judith Mountains on August 16, 1955. The ten eggs were infertile.

4. Reproductive success for the Judith Mountains transplant was apparently low. One brood of only three birds was observed. During the summer of 1955, six broods, totaling sixty-one poults, were observed in the Longpines Area. February and March counts gave a total of at least sixty-five young, indicating that all broods were not observed during the previous summer.

5. Observations were made on three types of movements; movements after release, movements between summer and winter ranges, and daily cruising ranges. After release, the Judith Mountains birds moved approximately two and one-half miles from the release site. The birds in the Judiths utilized the summer range as their winter range. The birds

in the Longpines exhibited a shift from summer to winter ranges. Daily cruising ranges during summer and winter were determined to be two to three miles. During periods of deep snow, the cruising range was decreased to about one-fourth mile.

6. Roost trees are easily identified by the numerous droppings beneath the trees. Regular nightly roost areas are utilized during the winter. During the summer, individual roost areas are used irregularly.

7. Plant, seed, and insect collections were made for both study areas, and used as reference specimens to identify the plants, seeds, and insects concerned in the food habits evaluation by droppings analysis.

8. A total of 2,192 droppings, collected from both study areas during the summer of 1955 and winter of 1955-56, were analyzed. The procedure of analysis is described.

9. The results of the droppings analysis indicates that insects (primarily grasshoppers), bearberry, snowberry and skunkbush sumac fruits, grass leaves and stems, and seeds of a species of *Carex* were the principal summer foods. Grains, hawthorn and snowberry fruits, heads of brome, and grass leaves, stems and heads were the principal winter food items.

10. Open stands of ponderosa pine - grassland cover types are the most widely used types during the summer and early fall months, in the Longpines area. Canyon bottoms at the lower elevations, grain fields and livestock feeding areas are utilized in late fall and winter.

11. The only predation observed, was one turkey killed by two golden eagles in the Judith Mountains.

12. Illegal hunting may be the limiting factor to the establishment of turkeys in the Judith Mountains.

MANAGEMENT SUGGESTIONS

It is generally accepted that first-year wild gobblers of the eastern wild turkey (Meleagris gallopavo silvestris) rarely are permitted by the older males to breed, even if they are capable of doing so (Mosby and Handley, 1943; Leopold, 1944; Dalke, Leopold and Spencer, 1946). Young hens, however, nest freely. Dalke, Leopold and Spencer (1946), concluded that old gobblers are probably necessary in a population for successful reproduction, and this point must be considered in transplanting wild-trapped birds for restocking purposes.

Ligon (1946), stated that the true wild Merriam's turkey does not mature until the second year. Neither hens nor gobblers, as a general rule, display breeding inclination until practically two years old. If this is true, then both mature toms and hens should be considered in transplanting wild-trapped Merriam's turkeys for restocking purposes. In the Judith transplant, only one mature tom was released with five mature hens and ~~four~~^{three} immature hens. It is possible, that the hen, which was incubating the ten infertile eggs, was unable to locate the single tom during the breeding season. This may have been a factor in the low reproductive rate for the Judiths.

The accepted planting ratio for wild turkeys is one tom to two or three hens. Mosby and Handley (1946), determined that best results are

obtained by releasing fifteen to twenty birds at each point of liberation. If future transplants are conducted in Montana, a more rigid adherence to these stocking procedures is advised. It does not seem advisable to contemplate transplanting from either the Longpines or Judiths, until verification of the establishment of these birds as a wild population. Leopold (1933), discusses the various types of stocking failures including instances, where breeding and survival occurred the first year.

Supplemental winter feeding may be necessary during severe winters, to help establish a breeding population. In the two study areas during the winter of 1955-56, the landowners did not object to turkeys utilizing live-stock feeding areas, however, if the populations build up, the landowners cannot be expected to endure these feedings without complaint. One complaint was received during the winter of 1955-56, in the Longpines, on a flock of twenty-four birds damaging an oat hay stack. The birds, by scratching, had scattered hay, from the top of the stack, over a large area. Complaints by landowners may be diverted, if the birds can be induced to feed on waste grain in cultivated fields, or to remain in the forested areas during severe winters through supplemental feeding.

It is advisable to continue the exclusion of firearms from both areas, until the future of the transplants has been determined, except during deer hunting season. The use of firearms in either area, would not only invite illegal killing of turkeys, but may disturb nesting

birds or broods. The hunting of deer should be allowed in both areas, because of the high deer populations. Strict law enforcement would be advisable.

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