

## WILD TURKEYS IN CENTRAL COASTAL CALIFORNIA

By GEORGE V. BURGER

The Wild Turkey (*Meleagris gallopavo*) did not exist in California at the time of discovery and settlement. In an attempt to establish these game birds for hunting purposes in California, the State Division of Fish and Game undertook a series of introductions of turkeys, beginning about 1910 and continuing until 1951.

In 1951 the writer conducted a study of these introductions under the guidance of Dr. A. S. Leopold. The investigation consisted of two parts—a statewide survey of all introductions, and an intensive local study of an established population on the Castro Valley Ranch, situated approximately six miles southwest of Gilroy, Santa Clara County. The results of the statewide survey have been published separately (Burger, 1954). The present report deals with details of the life history and ecology of the Castro Valley population.

*The population.*—A total of 49 turkeys was released at the Castro Valley Ranch, 31 in 1939 and 18 in 1946. The birds were brought in as poults from the Yountville State Game Farm and were raised in pens at the ranch until old enough for release. The exact genetic makeup of these birds, like most game farm turkeys, is not known. They evidently originated from a hybrid strain obtained by crossing the wild Merriam subspecies (*M. g. merriami*) with various semi-domesticated stocks.

The turkeys did well from their first release, increasing rapidly and spreading farther to the west each year. The actual range occupied by the population has fluctuated, and the present distribution (1951) is not as extensive as it has been in the past. At their peak of dispersion the turkeys ranged over an area of about 14 square miles. By 1951, however, their range had been reduced to about 6 square miles, with the bulk of the population concentrated on the Castro Valley Ranch proper.

The population was censused by the writer. A complete census was attempted rather than a sample count. Detailed notes were kept on all flocks seen, including the number of birds, the age and sex composition, and the exact location. On the basis of such material, a minimum of 187 different birds was observed during the spring, summer, and fall of 1951. In addition to the turkeys which were actually seen, signs and reports of other flocks indicate that the total population in 1951 was perhaps 250 to 300 birds.

Population density is thus extremely high, being about 40 birds per square mile. This is considerably greater than the maximum densities for Wild Turkeys reported from other states.

*Habitat relationships.*—The region occupied by this turkey population lies in the Transition and Upper Sonoran life zones and consists of rolling mountain terrain reaching an elevation of 1400 feet on the northwest and sloping gradually down to the Santa Clara Valley on the southeast. Rainfall is moderate and is confined to late fall, winter, and early spring.

The principal upland cover consists of the coast live oak (*Quercus agrifolia*) interspersed with grassland in varying proportions. Mixed stands of redwood (*Sequoia sempervirens*) and madrone (*Arbutus menziesii*) occur commonly in the canyons and on the moister upland soils. At lower elevations typical riparian trees and shrubs are found along the stream beds. Chaparral occurs in scattered but dense stands. Several small streams on the ranch furnish a water supply which has been artificially controlled by pipelines and by the creation of several ponds so as to furnish a year-round supply of fresh water over most of the area.

The various cover types, the principal plant species of which they are composed,

and the relative use made of them by the turkeys, as observed by the writer, are shown in table 1.

The dense redwood-madrone stands were used for purposes of concealment and escape throughout the entire period of study. Canyons containing such heavy cover border most of the upland feeding areas, and turkeys were often observed flying or running the short distance down to the canyon bottoms when alarmed.

Table 1  
Important Cover Types and Their Uses at the Castro Valley Ranch

Cover types	Feeding	Principal use Escape	by turkeys Nesting	Loafing	Important constituent species
Oak woodland	xxx	x	xxx	xxx	White oak, coast live oak, toyon, bay tree.
Redwood-Madrone		xxx	x	x	Coast redwood, madrone, oak spp.
Chaparral		x		x	<i>Baccharis</i> spp., <i>Rubus</i> spp., <i>Diplacus aurantiacus</i> .
Riparian woodland	x	xx	x	x	Western sycamore, alder, willow spp., box elder.
Grassland	xxx		x		Many species of perennial forbs and grasses.

Key: xxx—heavy use; xx—moderate use; x—light use.

There is some use of chaparral during the early summer, primarily on the part of hens with broods of half-grown young. Such broods frequently seek shelter in the dense brush stands, especially where cattle or deer have opened narrow trails making the brush more accessible. This was the only use made of chaparral by Wild Turkeys noted during eight months of my observations.

To determine the relative use made by turkeys of the main types of feeding cover on the ranch, the cover utilized by each flock observed from April to November was noted. Percentages of use were then determined and charted for this seven-month period, and the results are illustrated in figure 1. The data upon which this figure is based were obtained during 18 days of observation over the seven-month period. During this time 69 separate observations of turkeys were recorded by the writer. In addition, approximately 20 accurate reports were made throughout the year by Mr. Harold S. Chase, owner of the ranch, and his foremen.

A definite seasonal pattern appears in figure 1, indicating a shift in feeding habits. In the spring most foraging occurs along the borders of grassland-live oak areas or in small parklike grass patches in the centers of rather dense oak stands. Observations of feeding and the examination of droppings indicate a preponderance of green plant material and a few small insects in the diet. At this time of year water is still fairly abundant in the upland areas where this type of cover occurs, and grasses and forbs are still green.

In midsummer a marked shift was noted and most feeding activities centered on open grassy slopes. These afforded only a small amount of escape cover, usually in narrow, brushy draws and ravines. Three changes probably contribute to this shift. First, the upland water supply is then scant and rainfall practically nonexistent, so that the green parts of plants have dried beyond use. Second, range grasses and annuals are in seed, and large numbers of short-horned grasshoppers are present, both furnishing turkey food. Finally, the broods of young are large enough to venture safely into more open terrain. As a result, most of the birds are feeding upon various seeds and grasshoppers, as was noted again from droppings and by actual observations. Stream bottom areas now come into greater use, both for feeding and for their water supplies. Oak-grassland

borders are still frequented, but with much less regularity than earlier in the year.

By late August, after the prolonged summer dry spell, most of the upland water sources are dry, herb seeds and grasshoppers are few, and the winter mast crop has not yet fallen. At this time a second shift in habitat occurs among most of the turkeys. Large numbers of birds move out of the upland areas, probably because of food and water shortages, and begin to appear near ranch headquarters in the lower portions of the range. Here the birds concentrate in large numbers in the well-watered permanent

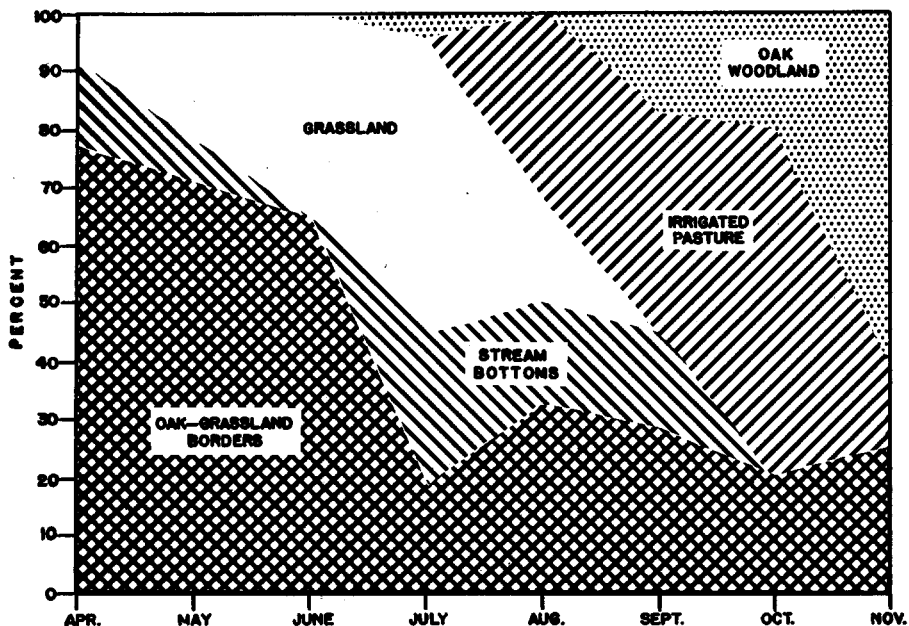


Fig. 1. Seasonal use of feeding cover by Wild Turkeys, Castro Valley Ranch, 1951.

pastures and orchards, and around hay piles, wherever seeds and grasses are still available and water plentiful. This movement has occurred regularly each fall since 1939 and is a striking characteristic of the population. Not all of the birds participate in this shift, about one-third of the population remaining in the upland areas. It seems apparent from these facts that during the late summer the upland habitat cannot support the high population maintained there during the rest of the year due to the pronounced shortages of food and water.

If this assumption is correct, the high population density on the Castro Valley Ranch probably could not be maintained without the presence of irrigation systems and their attendant sources of water and food, so essential to the turkeys in the fall. It seems clear that the period from late August to mid-September is the critical time for the population. The lack of water and shortage of certain foods during this season may be the factors limiting the size and expansion of this population and, in addition, may well be responsible for the failure of the vast majority of attempted introductions of Wild Turkeys throughout the central and southern coastal regions of California.

Beginning in mid-September an increasing utilization of open oak stands becomes evident. Such cover is used to some extent throughout the year, but serves primarily for loafing grounds during the spring and summer. In the fall the acorn crop begins to appear and the first rains commence. At this time the birds begin to move back into the

uplands. At first a few small bands move out on short foraging trips of one or two days' duration. Later all the birds leave the valley. In 1951 the main flock left ranch headquarters about November 28; in 1952, November 15; and in 1953, December 1. At this point the critical water and food shortages are at an end and once more the uplands seem capable of supporting a large turkey population.

Since no observations were made by the writer from December to April, the percentages of use of vegetation types for this period were not determined. From the trends indicated, however, it would seem that open oak groves, with their acorn supplies, would constitute the main feeding cover until the appearance of green grass, annual shoots, and insects permitted an early spring shift to oak-grassland borders.

A cover type utilized throughout the year and not appearing in figure 1 consists of roosting trees. Reports and observations indicate a preference for redwoods and large oaks in this area, both occurring in canyon sites. The writer observed a group of 15 turkeys, all males, going to roost in a clump of three large valley oaks (*Quercus lobata*) in a lowland area, and under other stands of these trees accumulations of droppings indicated frequent roosting use.

No stomach analyses were made during the survey; hence no exact food preferences could be determined. Fairly accurate clues were obtained, however, from examinations of droppings, a technique developed by Dalke *et al.* (1946) in Missouri, and from actual observations of feeding birds. The general trends revealed by these methods were indicated in the foregoing discussion. As was pointed out, spring foods consist mainly of green plants and insects; summer feeding is mainly on grasshoppers and various herbaceous seeds; winter choices include acorns and other mast crops. This is fairly typical among all populations of Wild Turkeys.

*Seasonal events.*—The general sequence of events in the annual cycle of turkeys at the Castro Valley Ranch is shown in figure 2. This figure and the discussion which follows are based upon 69 separate observations by the writer on 18 days of observation from April through November. The material from December through March is derived from reliable reports by Mr. Chase and his foremen.

During the observations in mid-April gobbling was heard often during the early morning and evening. Courtship displays were frequently observed during this period, and an elaborate duel between two gobblers was recorded on April 21. All of these activities occurred in upland, oak-bordered clearings. The first gobbling and courtship were noted during the last week in February by Mr. Chase and his foremen. Gobbling was noted at each observation period until the last week in July, and an actual mating was observed on July 13. After early May, however, all indications of mating diminished steadily. The mating season in 1951 thus lasted from February until late in July, but the peak was reached in the month of April.

Pure strain Wild Turkeys do not breed as yearlings, but as Leopold (1944:60) points out, domestic year-old males will breed readily. The breeding tendencies of males in this population should thus offer some indication of the "wildness" of this game farm stock. It is interesting, therefore, to note that all mating and courtship activities and associations with females observed by the writer were carried out by the large adult gobblers. None of the yearlings observed took part in breeding activities.

Figure 2 indicates that nesting commences in the latter part of March and reaches a peak shortly after the first of April. The duration and intensity indicated are derived from the times of the appearance of the young, since no nests were found by the writer in the course of the observations. The smaller, second peak in incubation activity which appears in figure 2 is derived in the same fashion from the appearance of a few late

broods, about which more will be said later. One late nest containing seven fertile eggs was reported by the owner of an adjoining ranch, being discovered on June 29. This nest was located at the boundary of an open hay field and an oak woods, placed a few feet out into the field. Nesting sites of previous years were pointed out to the writer and were generally located near the edges of fields or paths. All were near fresh water. Such sites are typical of those chosen by most Wild Turkeys in other regions (Mosby and Handley, 1943:114).

The incubation period lasts 28 days in the Wild Turkey, and at the Castro Valley Ranch the first young birds began to appear in May in 1951. Downy young less than a week old were first noticed on May 10 by the ranch foreman. During the period June

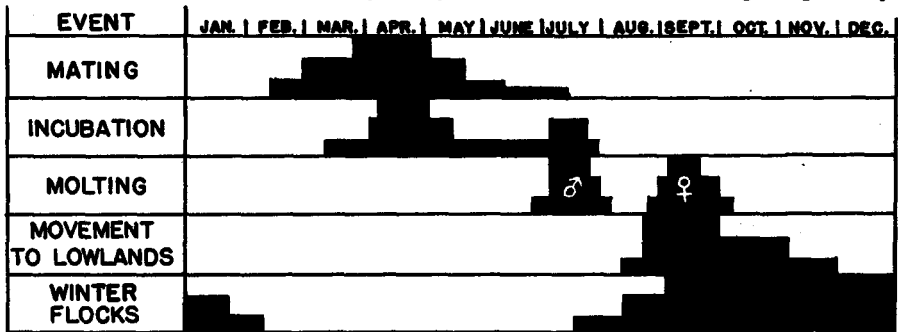


Fig. 2. Seasonal events in the annual cycle of the Castro Valley Ranch turkey population, 1951.

20 to June 25 the writer observed over 60 different young poults, ranging in age from about 2 weeks (only two birds this young were seen at this time) to 6 to 8 weeks of age. The majority were about 5 to 6 weeks old, which indicated that hatching reached a peak in the middle of May.

For the first few weeks after hatching, before the young are able to fly capably, each hen and her brood remain apart from other turkeys. During this critical period the hens were particularly cautious and attentive. The following quotations from the writer's field notes illustrate the care given the young and the control by the hens of their broods.

June 20, 4:20 p.m.: "Surprised a hen and her two small downy poults feeding in a grassy clearing within 10 yards of live oaks. On sighting me, the young froze into the tall grass while the hen walked back and forth at the edge of the oaks, clucking loudly every few seconds. I stopped and sat motionless just within sight. The hen kept pacing about under the trees, just far enough downhill so that I could only see her head now and then. She continued clucking and pacing and the young remained motionless for about 10 minutes. At this time the hen calmed down, stopped clucking, and walked rapidly into the oaks toward denser shelter, her young immediately appearing from their place of concealment and following silently."

Another observation points out the excellent protection given the young at this age by their color and behavior. June 25, 6:20 p.m.: "While I was walking along the upper road, the head of a turkey popped up suddenly about 6 inches above the grass in a clearing about 30 yards ahead, and was as quickly withdrawn. I approached cautiously until a large hen flushed, flew a few yards, and then ran rapidly into oak cover a short distance away. She remained in these oaks and it was obvious from her behavior that her young were concealed nearby. I walked back and forth over the area where she had lain (drying grass about a foot high) but saw nothing. The hen finally flew downhill into a large redwood and I left the clearing. Returning 10 minutes later I again searched

the area to no avail. I concealed myself at some distance and after about 5 minutes more could hear the hen calling. At this call two downy poults moved rapidly out of the grass where I had twice searched for them and joined their mother in the oaks." In this case it seems probable that the hen was preparing to spend the night on the ground, sheltering her two poults which were too young to fly. These young birds remained motionless for a total of 25 minutes until "released" by the command of the hen, although the writer must have passed within a yard of them several times. Their obedience and concealment were perfect.

At the age of about 3 to 4 weeks the young birds can fly well enough to roost in low trees during the night. At the end of six weeks, when the juvenal feathers have appeared, members of several broods begin to associate in larger flocks. The first such unit was noted June 21 in 1951 and consisted of 4 hens and 20 poults. Groups of this type, ranging in size from 2 hens and 3 young to 5 hens and 30 young, were seen frequently during the summer. At this time feeding, as mentioned, shifts to grassy slopes where the flocks spread out abreast in a long line foraging for grasshoppers.

While the young are developing under the care of the hens, the males form small summer associations, with adults and yearlings often mixed, and frequently joined by hens without broods. As indicated in figure 2, the males are now in molt, a process which apparently takes place in July, since one band was observed in molt July 13 and its members were still in the process July 26. Most of the hens molt during September. Both gobblers and hens are cautious and secretive during molting.

In late August, two or more of the large bands of hens and young may unite. Later in the fall these groups are joined by many of the old males, some of the yearling males, and most of the unsuccessful hens. In this fashion the large winter mixed flocks build up. Winter flock formation coincides with the shift from upland areas to well-watered lowland pasture sites mentioned earlier. The main winter flock first appeared at ranch headquarters on August 22 in 1951 and was observed on several occasions from late August to mid-November. In this period the number of birds seen varied from 40 to 101, some units apparently detaching and foraging in nearby areas for brief periods. One typical count of this flock, made September 30, revealed a total of 73 birds, made up of 7 old gobblers, an undetermined but smaller number of yearling males, and a group of 9 apparently unsuccessful hens, with successful hens and their young of the year constituting the remainder.

Between the middle of November and early December, as mentioned, the birds desert the immediate vicinity of the ranch headquarters and move back toward the uplands. By February, according to reliable reports, the large flocks have broken up.

*Daily activities.*—Feeding was observed mainly during the early morning and late afternoon over most of the April-November period. This was especially true on hot sunny days, when activity almost ceased from about 10:30 a.m. until nearly 4:30 p.m. Heavy dews and fog restricted the early activities of hens with young on some mornings, but old gobblers were observed feeding in a heavy low fog by 7:00 a.m. one morning.

During mid-day in summer the birds sheltered under open oaks, with occasional brief foraging trips along the borders. On cool or cloudy days, and in the early summer and late fall, the demarcation between feeding and loafing periods was less pronounced, and the birds foraged most of the day. Feeding activity was always high in the twilight hours, until the fall of darkness sent the birds to roost.

*Losses of young.*—Since broods of young were observed at regular intervals during the summer, it was possible to determine rather accurately the rate of loss during this period. Figure 3 shows these data, the graph being based upon the average number of

poults per successful hen seen on various dates. Observations from which these data were derived were made June 20–21 (11 hens and 54 young), June 25–26 (10 hens and 43 young), July 12–13 (12 hens and 36 young), and July 26–27 (5 hens and 16 young). The starting point of ten eggs is the average clutch size as determined by a number of investigations on eastern and southwestern races of the Wild Turkey. Losses of a portion of the eggs due to infertility and accidents are thus automatically included. Figure 3 does not measure total mortality, of course, since it does not include broods which were completely destroyed. Such a complete determination is impossible since there is no

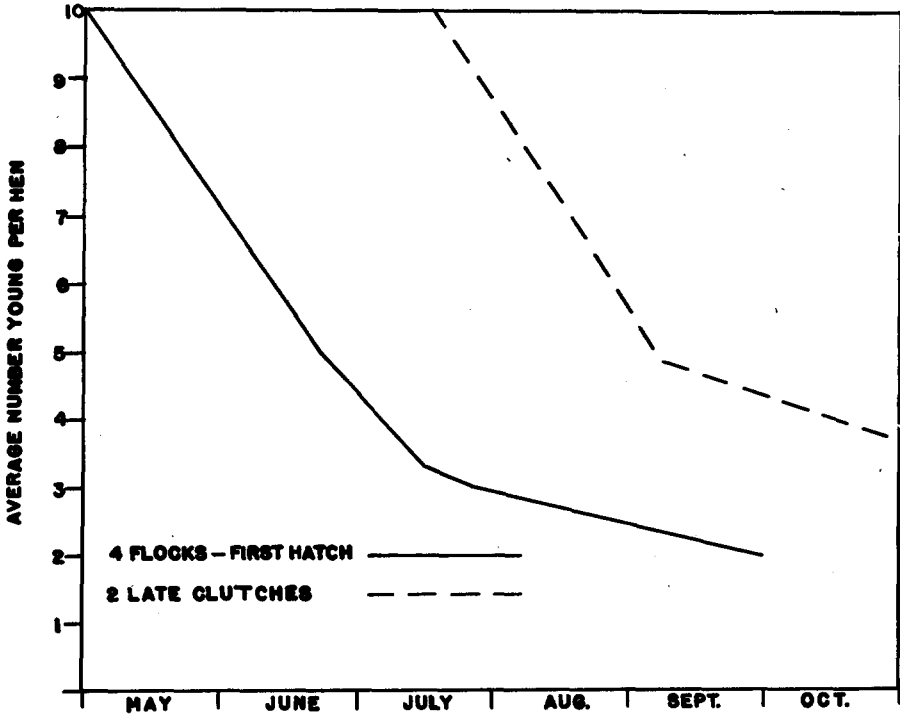


Fig. 3. Decrease in brood size after hatching, Castro Valley Ranch, 1951.

known method for distinguishing unsuccessful hens from those which did not attempt to breed.

Wild Turkeys do not raise two broods of young in one season. Hens having their first clutch destroyed may make a second nesting attempt, however. Two such late broods were observed at the ranch, the first August 24, consisting of a hen and 7 poults about 6 weeks old, and the second August 26, consisting of a hen with 12 young about 3 weeks old. Losses among these late broods followed the trend of earlier groups. Thus the brood of 12 diminished to 9 on September 6 and was reduced to 4 by October 19.

As can be seen, most brood losses occur during the first two months after hatching, when the poults are small and most susceptible to predation and exposure. After about the eighth week only a few young are lost and few deaths may be expected normally beyond the age of 5 months.

The population as a whole apparently had slightly better success than the flocks upon which figure 3 was based, since the composition of the large winter flocks (when

the young were about 5 months old) revealed approximately 3.7 young per successful hen.

Since no remains of young birds were found during the investigation the actual causes of mortality could not be fixed. Chilling and exposure to moisture result in fatalities among young turkeys elsewhere and presumably operate here as well. Trapping records kept by Mr. Chase and sign observed by the writer indicate that coyotes, bobcats, skunks, foxes, and feral cats and dogs are to be found on the ranch. Such predators are known enemies of young turkeys, and may account for many of the losses.

Table 2

## Sex and Age Composition of the Castro Valley Ranch Population in 1951

Sex and age groups	Actual number	Per cent of adult population	Per cent of fall population	Number per 100 females
Old males	14	20	7.4	32.5
Yearling males	13	18	6.9	30.2
Total—males	27	38	14.3	62.7
Females with young	31	44	16.5	.....
Females without young	12	17	6.4	.....
Total—females	43	61	22.9	100
Total—adults	70	100	37.2	.....
5-month young	117	....	62.8	272
Total population	187	....	.....	.....

*Sex and age composition.*—Table 2 indicates the sex and age composition of the population, insofar as these factors could be determined. The data are based upon 187 birds classified during the course of the study. Since this number includes about 75 per cent of the minimum number of turkeys estimated to be present on the ranch, it is believed to be representative of the entire population.

Among the adults a sex ratio of 62.7 males per 100 females was found, gobblers thus making up about 38 per cent of the adult population in 1951. However, nearly half of the males were yearlings which showed little or no tendency to breed. Therefore there were only 32.5 breeding gobblers for every hundred hens, or a ratio of approximately 3 to 1. These estimates are comparable to sex ratios reported for Wild Turkey populations in other states.

About 17 per cent of the adult population consisted of females which produced no young during 1951, being either barren or unsuccessful.

In the fall there were about 272 young per 100 females. This figure represents the estimated productivity of the Castro Valley Ranch population. This means there were about 3.7 young raised per successful hen.

*"Wildness."*—One further aspect of this population deserves mention. This is the matter of wildness, or the effect of the hybrid nature of game farm stock on their subsequent behavior and success. Aside from the tameness of certain individual birds and the close approach to the ranch buildings in the fall, these turkeys show other indications of their hybrid origin. The most noticeable of these is their tendency to form large flocks, reaching 101 birds in one case. Groups of this size are rarely reported among Wild Turkeys and may be taken as an indication of mixed blood wherever they occur (Leopold, 1944). On the other hand, the care and control demonstrated by the hens over their broods, and the lack of any evidence that yearling males participate in breeding activities, indicate a considerable degree of wildness in this population.



## LITERATURE CITED

Burger, G. V.

1954. The status of introduced wild turkeys in California. *Calif. Fish and Game*, 40:123-145.

Dalke, P. D., Leopold, A. S., and Spencer, D. L.

1946. The ecology and management of the wild turkey in Missouri. *Missouri Cons. Comm. Tech. Bull. no. 1*, 86 pp.

Leopold, A. S.

1944. The nature of heritable wildness in turkeys. *Condor*, 46:133-197.

Mosby, H. S., and Handley, C. O.

1943. The wild turkey in Virginia. *Comm. Game and Inland Fisheries*, Richmond, Virginia, 281 pp.

Wheeler, R. J., Jr.

1948. The wild turkey in Alabama. *Ala. Dept. Cons., Montgomery, Alabama*. 92 pp.

*Museum of Vertebrate Zoology, Berkeley, California, February 1, 1954.*