DRINKING HABITS OF WHITE-TAILED DEER IN SOUTH TEXAS

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ABSTRACT: Daily and seasonal variations in drinking habits of white-tailed deer (*Odocoileus virginianus*) were observed in the Coastal Bend area of Texas. Data were collected from February, 1961, to February, 1963, on the Welder Wildlife Refuge. Information regarding drinking behavior was collected by observing deer directly from observation towers located near lakes or water tanks and by making track counts on a cleared, 10-foot wide strip surrounding the water tanks. Both direct observations and track counts were made at all hours throughout the 24-hour period and at all seasons of the year. The following inferences regarding drinking activities can be made from my data. (1) Deer use any water available, but prefer that which is not within fenced enclosures. (2) Deer drink more often in hot seasons than in cold. (3) Peaks of drinking activity are at 7 a.m., 11 a.m., and 4-6 p.m. (4) Deer do not have a specific time of drinking in relation to feeding. (5) Some deer obtain water from leaves of vegetation. (6) Does with fawns are more wary than other deer. (7) Pregnant does drink more frequently than non-pregnant deer.

The purpose of this study was to determine daily and seasonal variation of drinking habits of white-tailed deer (*Odocoileus virginianus*). Some information regarding drinking habits of deer in captivity has been reported, but such data for deer in the wild are scarce. The importance of drinking water in the life of deer is emphasized by the fact that watering sites are frequently the centers of home ranges of deer and the presence or absence of water noticeably affects their daily activities.

Data collected by other workers indicate that drinking is affected more by temperature than any other meteorological factor (Welch, 1960; Halloran, 1943; Clark, 1953). These data indicate that consumption of water increased directly with air temperature.

Data for this study were collected from February 1961 to February 1963, on the Rob and Bessie Welder Wildlife Refuge, San Patricio County, Texas.

Surface water was usually abundant over the refuge, especially during wet seasons. Four wet weather lakes were present on the area in addition to 10 small, dirt stock tanks. Moody Creek, which varied from 4 to 15 feet in width, flowed across the western end of the refuge and into the Aransas River, which formed the northern boundary of the refuge. The stock tanks were surrounded by barbed wire fences to keep out cattle, but the lakes, creek and river were not fenced.

Information regarding drinking habits was collected by observing deer from 35 foot high observation towers and by counting deer tracks at earthen tanks. The tracks were counted on a cleared strip, 10 feet wide, which encircled the water. Tracks were removed from the cleared strip by means of a drag pulled by a vehicle. Track counts were made at all hours throughout the 24-hour period but counts were made most easily and probably most accurately at night. A Coleman lantern was used and shadows cast by the lantern light caused the tracks to be more noticeable.

GENERAL BEHAVIOR

The behavior of deer is worth mentioning due to the effects it may have on frequency and time spent drinking. Deer ceased feeding as far as 220 yards away and walked directly to the water. Most deer entered the tank area on the same side from which they approached. Once at the water's edge they drank and quickly left the area. Although vegetation was present inside the fences and around the tanks deer almost never fed around the periphery of the tank. Thus, this factor could be discounted when evaluating track counts.

All deer were nervous when drinking and continually raised their heads and looked about. Does raised their heads an average of 2.3 times per minute while drinking as compared to 1.6 times per minute while feeding. Bucks raised their heads an average of 1.7 times per minute while drinking and 1.1 times per minute while feeding. The data for feeding and drinking by does were significantly different but not so for bucks. The number of deer present in a group did not significantly affect the number of times an individual deer raised its head, thus indicating that deer do not rely on each other for warnings of danger. Deer heed the danger signals of other deer, but they do not seem to depend on them.

The presence of other large vertebrates, especially cattle, coyotes (*Canis latrans*), and vultures (*Cathartes aura*), at watering places seemed to be upsetting to deer coming to drink (Michael, 1967a and 1967b). Usually the deer circled the water tank and did not go in to drink when these animals were present.

Single does and does with fawns were more cautious prior to entering tank areas than bucks or groups of does. These cautious does stopped outside the fence and spent several minutes surveying the area. Occasionally they moved around the tank prior to entering. In almost all cases, single deer seemed to be more cautious than several deer together. This may have been an illusion due to the observer's attention being centered on one animal.

During the first month of the fawning period, does came to water alone or occasionally accompanied by their fawns. Barren does were usually with one or two other does. If the added caution of the does with fawns enhanced their chances of survival, then selection would favor those does that produced fawns over those that did not. Thus, predation might select against barren does and indirectly result in more food being available to predators the following year.

Track counts were used to determine if there was a seasonal difference in drinking activity. During the first 8 months of the study period, available surface water was abundant, but during the last 8 months surface water was completely absent on large areas of the refuge. This erratic rainfall offered opportunities to observe reactions of deer to excess and scarcity of available water.

Drying up of stock tanks exposed a circle of mud around the water which prevented deer from getting to the remaining water. They would sink in above their knees in the mud and turn around and leave before getting to the water to drink. Deer began drinking in the Aransas River more frequently than they did prior to the drying of the lakes and tanks.

The lack of precipitation caused the drying up of the major lakes on the study area. The exposed lake beds soon produced abundant vegetation, which was attractive to deer. The growth of abundant, green vegetation occurred at the same time the tanks dried up thus no track-count data were collected for that period. It seemed, however, that deer drank less when they were feeding on the green vegetation of the lake beds.

Large amounts of precipitation also caused variation in drinking frequency. Immediately after a hard rain the tracking area was too muddy to be cleared and counts could not be made until it dried out. Immediately after a rain, deer preferred to drink at ditches or at temporary pools. Thus, during periods following rains, track counts were quite low.

Regression analyses were used to determine if the number of counts increased significantly after a rain as time elapsed and water in natural catchments failed. During three of the four periods tested the longer the time elapsed since a 1-inch rain, the greater was the number of deer drinking. However, only during the period May-August, 1961, was the regression line significantly different from the horizontal.

SEASONAL DRINKING HABITS

Track counts were also used to determine if there were seasonal differences in drinking frequency. Comparisons between the number of

deer tracks and the maximum number of deer seen in the area surrounding the tank were made. Most deer drank twice a day during summer (May-September) and only once a day during the winter (Fig. 1). It seemed that pregnant does and does with fawns drank more often during May-September than at other times. Several authors have written that pregnant does drink more frequently than non-pregnant deer. (Clark, 1953; Leopold et al., 1951; Welch, 1960.)

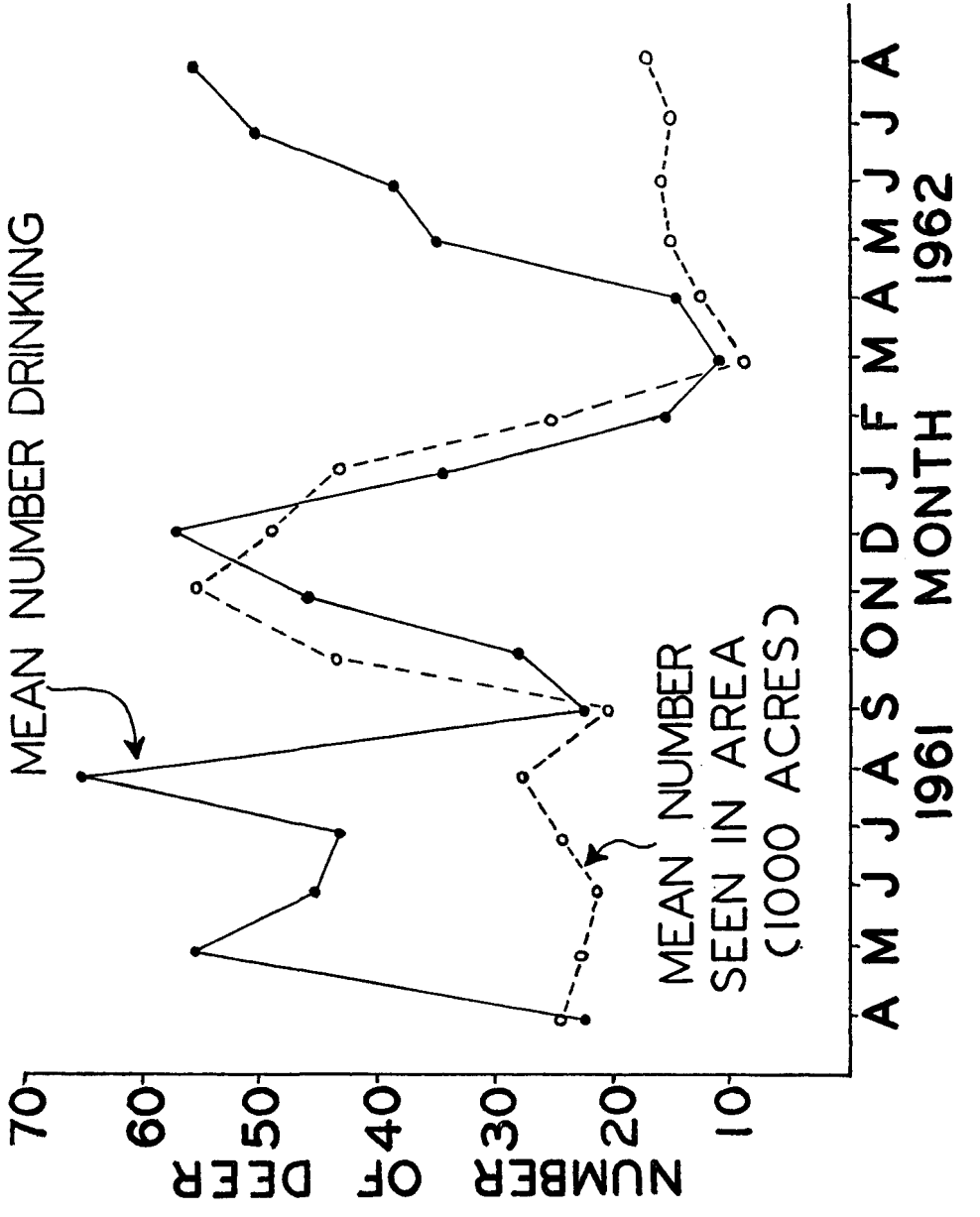

Fig. 1. Monthly occurrence of drinking by white-tailed deer.

Deer did not seem to have a definite pattern of drinking before or after feeding. Some deer drank before feeding, some after, and some did not appear to drink at all. I observed marked deer drinking as many as five times during the daylight period and some never drinking at all throughout the daylight period. This brings up the possibility that some deer may not drink from surface water but instead may obtain water from dew on plants or by consuming green vegetation. On eight occasions deer were seen licking water off leaves of yucca plants (*Yucca treculeana*). All these deer went from one plant to another but never licked all the leaves of any individual plant. Due to the proximity of the Welder Refuge to the coast, relative humidity is high, especially during the night and early morning hours. This results in considerable water forming on vegetation as a result of fog and dew. Deer could obtain considerable water from the surface of vegetation either by licking or by eating the vegetation.

I had hoped to indirectly determine water requirements by utilizing data for length of time spent drinking per visit. I assumed that deer take in water at the same rate during all seasons of the year (Elder, 1954). Because of the nervous state of deer at water tanks, I hypothesized that they would increase their drinking time per visit rather than increasing the number of visits when additional water was needed. Drinking times were not statistically different, when compared within different seasons, times-of-day, temperatures, wind speeds or cloud covers. Drinking time may not be a good indicator of water requirements, because deer did drink more in summer than in winter but drinking times were not different for the two seasons.

Observations indicated that bucks and does spent equal amounts of time drinking during each trip as determined by use of a stop watch. Does averaged 1.28 minutes drinking on each visit to a watering place; bucks, 1.15 minutes. These differences were not significant as determined by an analysis of variance test.

DAILY DRINKING HABITS

The number of deer drinking, as well as the amount of time spent drinking, varied with time of day. Fig. 2 and 3 show that deer drank during three main periods—7 a.m., 11 a.m. and 4-6 p.m. These peaks correlate closely with peaks of feeding activity. Observations at night were made with the aid of a spotlight but it was turned on only once every half-hour. It was left on only long enough (about 10 minutes) to count all deer visible in the beam. Thus, the number of deer observed drinking at night represent only those seen during a 20-minute period of each hour. To compare daytime and nighttime counts, each nighttime count was adjusted by multiplying by three. To check these adjusted values, I utilized track count information collected at various times throughout the night. Track counts were made at 7 p.m., 10 p.m., midnight, 3 a.m., and 6 a.m. The two methods, direct observations multiplied by three and regular track counts throughout the night gave almost identical results, thus indicating that the light had no effect and that either method could be used.

Although I gained the impression that wind and cloud cover, as individual factors, did have some effect on deer drinking, I was never able to note any consistency in the relationships. Wind and cloud cover seemed to be most important in their association with temperature, which did noticeably affect deer drinking.

White-tailed deer seem to be rather sedentary and reluctant to leave an area even when food or water becomes scarce. During dry seasons when surface water becomes scarce deer may be somewhat concentrated near sources of water. The presence of a concentrated source of preferred vegetation may also result in the concentration of deer. During the study period, the lack of precipitation caused the drying up of the major lakes on the study area. The exposed lake beds produced abundant, green vegetation, which was attractive to deer and they came from all surrounding areas to feed. They usually bedded in cover close by and did not travel long distances each day. The Aransas River was located within 300

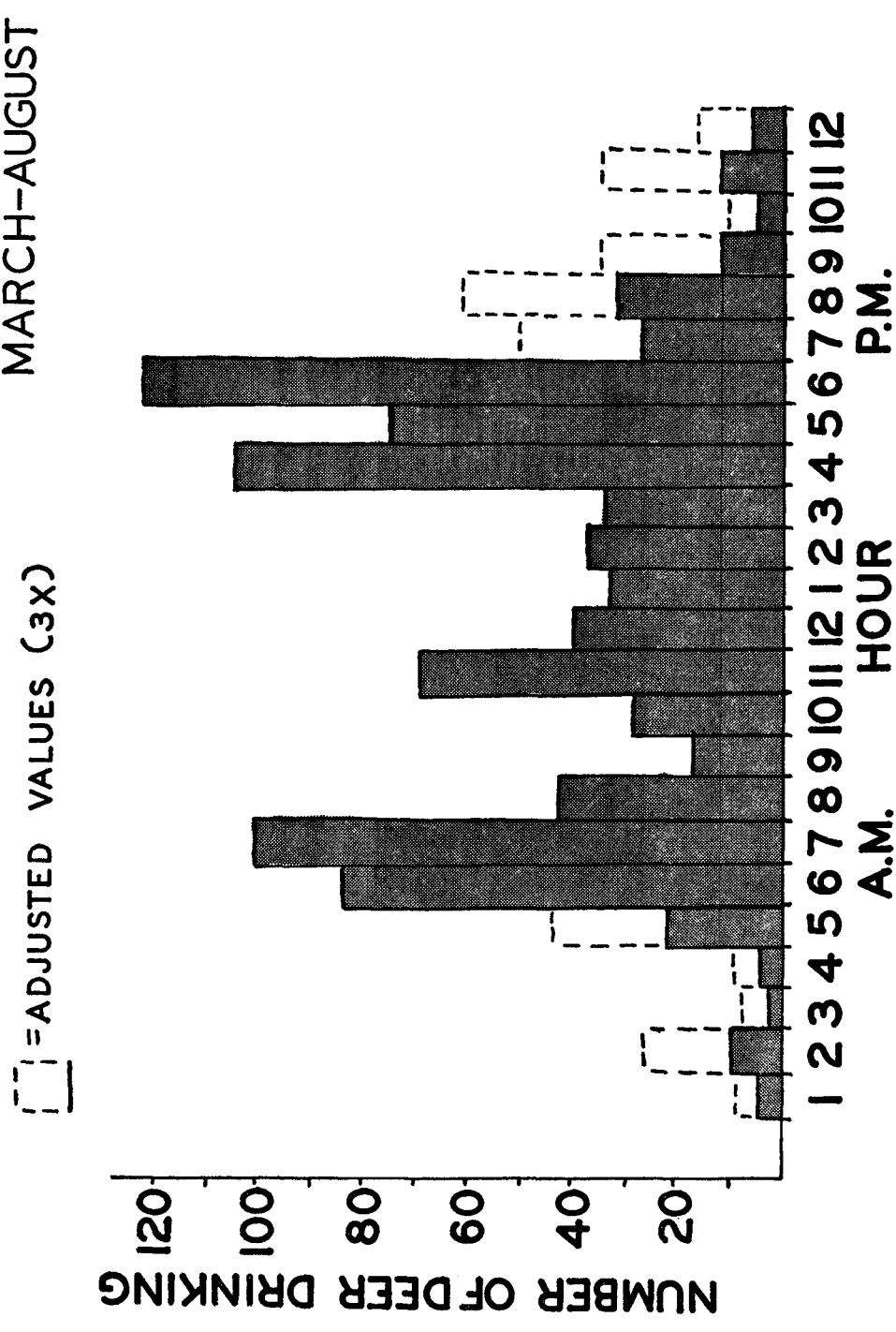

Fig. 2. Hourly occurrence of deer drinking during March through August.

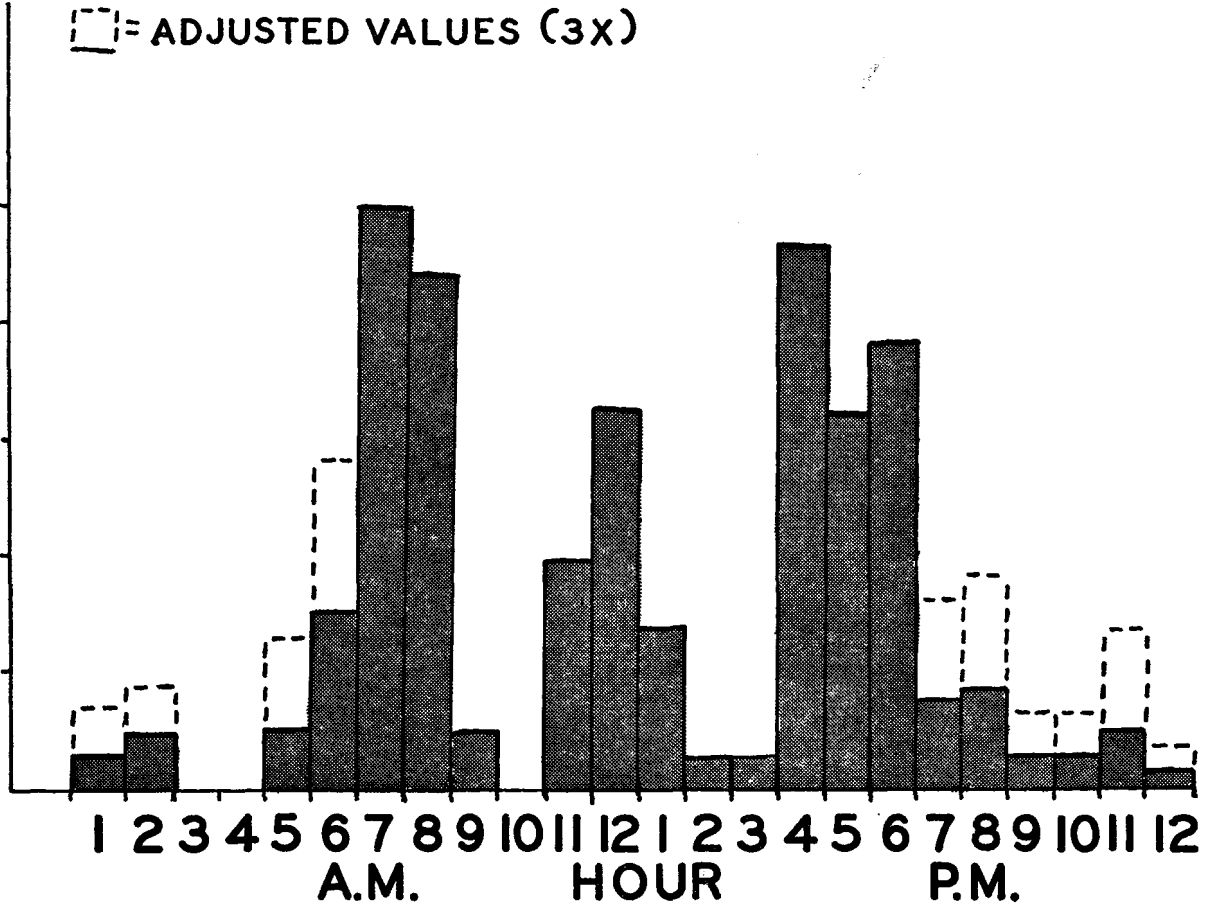

Fig. 3. Hourly occurrence of deer drinking during September through February.

yards of these lakes, so deer did not have far to travel to reach water. Deer feeding on the green vegetation continued to drink water, possibly due more to the proximity of the river than to their need for free water.

The concentrating of deer due to attraction of surface water, green vegetation, etc., could have a significant effect on deer censuses. Any factor resulting in unequal distribution of deer throughout the area to be censused could adversely affect census results.

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GROWTH AND FORAGE QUALITY OF FOUR SOUTHERN BROWSE SPECIES

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Rusty blackhaw (*Viburnum rufidulum*), yaupon (*Ilex vomitoria*), common greenbrier (*Smilax rotundifolia*), and yellow jessamine (*Gelsemium sempervirens*) are major sources of deer food in upland pine-hardwood forests of the South. In the study reported here, the quality of forage on these plants was related to their rate of growth.

Rusty blackhaw is a deciduous shrub; yaupon, an evergreen shrub; greenbrier, a deciduous vine; and yellow jessamine, an evergreen vine. The plants studied were growing near Nacogdoches in east-central Texas in a well-stocked pine-hardwood timber stand. Shortleaf and loblolly pines dominated the overstory. The understory contained a multilayered assortment of hardwoods and shrubs.

The study area had not been burned or grazed by livestock for at least 10 years. The soil is fine sandy loam with good surface and internal drainage.

PROCEDURES

Plant growth and forage quality were studied simultaneously for one year beginning in March 1964. Prior to the initiation of spring growth, the terminal branches on three vigorous medium-sized unbrowsed plants of each species were selected. A narrow band of paint was placed at the base of the terminal bud on each as a reference for measurement. Only terminal branches were measured because a previous growth study (Halls and Alcaniz, 1965) showed that their growth patterns were similar to those of lateral branches.

From the onset of spring growth, twig lengths were recorded at weekly intervals until July, and at monthly intervals thereafter through December.

[1] The authors are on the staff of the Wildlife Habitat and Silviculture Laboratory which is maintained at Nacogdoches, Texas, by the Southern Forest Experiment Station, Forest Service, U.S.D.A., in cooperation with Stephen F. Austin State College.