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The 1989 Boulder Deer Report
OSMP Studies

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Study



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Boulder Deer
Report



Michael Sisk

Introduction

The residents of Boulder County have a unique opportunity that not very many are aware of. At the present time, Boulder County has stable populations of both species of deer that occur in the United States. The mule deer and the white-tailed deer are both an important part of the ecology of Boulder County. This paper will comparatively discuss the general characteristics, habits and behavior of both species. The remarkable return of the white-tail after near extinction will also be discussed along with a look at the population trends of the Boulder mule deer herd. This paper will also give a brief critique of the Boulder deer survey and the Lincoln-Peterson method of population estimates.

Methods

The study area for this project covered 17 sq. miles of various habitats which included riparian creek bottoms, grasslands, mixed coniferous forests and urban habitats. The study area was located along the front range in Boulder County and included much of the city of Boulder that is adjacent to the front range. (see map pg. 12) The study area was broken down into four districts; the north, the north-central, the south-central and the south. The study was conducted by four University of Colorado interns in conjunction with the Boulder Mtn. Parks and Open Space departments

The data and observations for the first half of this paper was gathered by spending 2-5 hrs. each day/2-3 times per week observing and counting the deer. The interns rotated through each district approximately every three weeks beginning in January of 1989 and ending in April of 1989.

The data for the mule deer population estimate was gathered as follows. Each intern spent one month in his/her assigned district. In this time, the intern recorded all the tagged deer that they saw. In the first week of April, an annual survey of the deer population in the study area was conducted jointly by the Mtn. Parks and Open Space departments. The survey was based on the Lincoln-Peterson method of estimating populations and was begun in 1983. The Open Space surveyed the north and south districts while the Mtn. Parks surveyed

the north-central and the south-central districts. All the districts were divided into several sections and transects or routes were plotted through them. The Open Space conducted their survey by walking these assigned transects with two observers recording all the untagged and tagged deer they saw. The Mtn. Parks did not follow the assigned transects but tried to cover as much ground as possible in order to find the most deer possible. There was only one observer in each section. The data from all the districts was lumped together and an estimation of the population was obtained.

The white-tailed deer do not constitute a major proportion of the deer in the study area. As a consequence, the population examined was expanded to include the eastern half of Colorado over the last 100 years. Since the white-tail is a relatively new species and also because of their small numbers in Boulder County, very little recent documentation is available. Most of the research of the past and present populations of white-tails in Boulder County was obtained by examining road kill data, trapping records, and talking with residents that have been here all their lives. The Division of Wildlife and various books and old journals provided information about white-tails in the eastern half of Colorado in the last century.

Discussion

To most people of Boulder County, "a deer is a deer". Many do not know that there are two species here and even less could probably tell the two apart. From my field work, it has become obvious that they are entirely different deer with different characteristics, habits and behavior.

My first objective was to be able to tell the two apart since I had previously been unexposed to the white-tail. All the white-tails I did see in the study were in the south district. (see map) From my data and observations in this district, the white-tails compose about 7% of all the sightings of both species.

The first thing that caught my eye on the white-tail was the length of the ears and of course the tail. The white-tail has ears that are approximately 4-5 inches long and the tail approximately 12 inches long. The tail is the color of the body on the dorsal side and is completely white on the ventral side. The shape of the tail is like a "V" and has long white hairs around the edges.

Upon closer examination, I noticed a slight difference in shape and size. The white-tail first appear more elegantly built than their cousin. The body size is smaller with an approximate weight averaging 90-110 lbs. The body itself is more streamlined and slender. The neck and back also appear to be slightly longer than the mule deer. When the two species stood side by side, which was observed in the field, I could see a slight difference in winter coat colors. The white-tail has hair that is longer and a more grey color.

Another characteristic noted was the shape and size of the track. The white-tail has hooves that are slender and very pointed. The average length was 1 1/2 inches long. The feces were also examined but I could not find any notable difference between the two species, especially with the variable pellet size and shape associated with a changing diet in the spring.

One more important identifying characteristic of white-tails is the shape and size of the male antlers, although this was not observed due to the season. However, one small dropped antler was found in the study area. The white-tails antlers comprise of a main beam that first grows out and up and then bend forward with single tines branching from this main beam. From picture in books, it appears that the white-tail do not grow antlers as massive as their cousins.

For the mule deer, the word is "big". Almost everything on this species is bigger except the tail. Probably the most distinguishing field mark is of course the ears which appear to be at least 8-9 inches long. The tail is quite different also. It grows to be a little shorter and much more slender. The color is all white with a black tip.

The mule deer is built differently in that it is more chunkier and shorter in the back and neck. The average field weight of an adult was estimated at 110-130 lbs., but I have personally known them to get much bigger. As noted before, there is only a slight difference in winter coat color with the muleys being slate grey, but having a little more red.

Both the track and antlers of the mule deer are longer than his cousins'. The track is about 1 3/4 inches long for an adult and is much rounder and blunter at the tip. The antlers initially grow out in one main beam and then branch upward into two separate branches in the adult. Some mule deer observed during the study had massive racks that spanned at least 28 inches.

The habits of the two species are relatively the same since they are both "deer",

but there were some differences noted. The first was ^here I found them. The white-tails that I observed in the study area were most often seen around creek bottoms where brush was thick and also on mixed poderosa pine/grasslands habitat. No white-tails were observed in an urban setting or up in the coniferous forests under the flatirons. They seem to go right up to that boundry of grasslands and coniferous forest and stop. (There was an exception to this which will be discussed later). The mule deer can be called the generalist since it utilized almost all of the habitat offered in the study area except some of the very busiest sections of town. They could be found deep in the coniferous forests under the flatirons to my apartment complex in the middle of the city of Boulder. From the data collected from the interns that had been in the north district, the following percentages of time the deer spent in the city (urban setting) was calculated. (Thirty eight percent of the deer observed spent 0% of their time in the city. Forty six percent spent 50% of their time in the city and 15% spent all their time in the city.)

While in the city, it was observed that the eating hasbits^vof the mule deer had obviously changed. The deer helped themselves or at least sampled almost everything in their path. I wondered if these deer were getting a more "balanced" diet than their back country friends and if living in the city would be reflected in the doe-fawn ratio in that the does living in the city would be more successful in producing healthy offspring. Since there is so much movement in and out of the city, I find this a hard hypothesis to prove. The mule and white-tail deer observed feeding out of the city, however, both appeared to be utilizing the same types of grass, brush and trees.

As far as group size, I noticed a considerable difference. The white-tails were never observed in family groups of more than six. They seemed very content to be off by themselves or with a few others. This observation could possibly be caused by the relativley small size of the white-tail population in the study area, but there were several days when many single or very small groups of white-tail^vwere observed over an area of a square mile at the same time, which shows that if they wanted to be together in a herd then they could have and chose not to.

*could be
the ratio
overall number*

The case is obviously different with the mule deer. One evening in the north end of the south district, I counted 46 mule deer in one bunch. Although you can find them alone, I often found them in groups ranging from 4-12 animals.

However, this gregarious behavior may be a consequence of the season. From personal experience in the area where I grew up, I find that the mule deer become more scattered in the summer months when the does are off giving birth and raising their fawns, and again form groups when the mating season begins in the fall.

The daily life cycle of both deer in terms of sleeping and eating appeared to be the same. Both species were most active after sunup and before sundown, although the activity at night is unknown. Both species preferred to eat and drink in the early and late hours and spent the rest of the day resting and chewing their cud in the shade.

The most interesting observation made in the study area, however, was the difference in behavior of the two species. The white-tails, in general, are very intense and wary as to all that is happening in the surroundings. When approached, the white-tails are immediately aware and concerned. Usually, if I am visible to the white-tails, they will become concerned if I approach within a 1/4 mile. The average flight distance for all my encounters with these deer was approximately 60 yards. A few times I did come closer but these instances occurred in habitats where there was some cover and, therefore, security. The usual behavior would be that if they were bedded down, they would first get up and never take their eyes off of me. They would stand until that distance closed to within 60-70 yards. Some of the older does were observed "stomping" their front feet as if agitated. Once they had decided to run, their tails come completely up and expose their white flag of retreat. The way in which these deer retreat is very graceful compared to the mule deer. They utilize a lope very similar to a horse. The distance traveled after being approached varied according to the habitat. They usually fled into some sort of cover where they felt more secure. This behavior expressed by the white-tails towards man is probably the reason why the white-tails are not found in the urban areas. The noise, smell and movement of humans is too much for their nerves.

The mule deer react to man in two ways. My observations have caused a firm opinion that wild deer and city deer really exist. The mule deer that spend most of their time out in their natural habitat are fairly wary. These deer were only found in the extreme southern portion of the south district and the extreme north end of the north district. These deer usually would allow me to approach them

within 30-40 yards before they would bound off a short distance and look back. They usually retreat in an awkward pogo-stick fashion or in a trot. They never go very far before stopping and hardly ever appear to be very alarmed. The city deer are completely opposite. Their close association with man and the non-existence of a hunting season in the study area has caused some of these deer to become almost tame. One of the interns was actually licked by a deer in the north district. These deer will often tolerate humans to approach within ten or so feet before becoming concerned and retreat. (These city deer have consequently created many problems, but will not be discussed here.)

The most interesting observation made during my study was the interactions between the mule and white-tailed deer. One aspect observed was the complete absorption of a white-tail into a group of mule deer. It was observed many times that a full white-tail or hybrid deer would be seen spending its time in a group of mule deer. These white-tails had been completely changed. They could be approached just like the other mule deer. They usually would look at you, and then look at the others. If the others did not seem to care, then this individual didn't either. As long as this deer was among the other mule deer, he was completely at home. When the others did become frightened and ran, the white-tail did not stick up his tail like his real brothers and sisters would do. They seem to just copy or imitate what the others are doing. They even followed the mule deer deep into the coniferous forests where they had previously never been seen. The reason why a white-tail would desert his own species and prefer the other is unknown. The sex of these individuals was undetermined except in one case where the individual was a female hybrid that had been tagged as a fawn.

This brings up another interesting question about interspecific gene flow. Recent experiments dealing with mitochondrial DNA in the two species has suggested that interspecific gene flow was not clear. (The DNA was shown to be distinct in the two species which led researchers to believe that inbreeding was not possible in the population studied in Montana.) This was clearly not the case in the study area. I observed at least two obvious hybrids residing in the area. These hybrids were often characterized by having either the wrong tail, ears or both. One hybrid that I had a good look at had medium to long ears that were very similar to mule deer and a long tail like a white-tail. The tail was shaped and colored like a

white-tail but also had black on the end. I would be very interested to know if these hybrids are capable of reproducing and I do believe this could be determined. The one hybrid that is marked could be observed in the early summer to see if she has a fawn. She is easily recognized and is fairly easy to approach. A long time resident of Boulder County also made an interesting observation. He said he has observed six hybrids in the Boulder area and all of these have been does. This would seem to indicate perhaps a selection only for female hybrid animals. ²

Another extremely fascinating aspect of this white-tail population is its mere existence in Boulder County. From fossil records and letters from early settlers, it is obvious that white-tails used to inhabit most of the eastern plains of Colorado. Due to exploitation and destruction of habitat by the settlers, this species was essentially exterminated from Colorado. In fact, it was officially scratched from the D.O.W. list of Colorado mammals in 1940. It wasn't until 1953 that the white-tail was officially known to be in Colorado as reported by the following article. ³

A recent highway accident involving an automobile and a western white-tailed deer, *Odocoileus virgianus*, has added a new species to the present day check list of mammals of Colorado. The accident in which a deer was killed occurred on February 28, 1953, about one-half mile south of Merino, Logan County, in the South Platte River Valley. Although early day travelers reported large numbers of these animals along the river bottoms east of the Rockies, the western white-tail had reached the point of extirpation in Colorado by the mid-1920's. So far as is known, there is no verified record of resident white-tails in Colorado more recent than this. ⁴

This unfortunate deer was the beginning of a new influx of white-tails for Colorado and the Boulder area. A long time resident of the area recalls never seeing a white-tail until about 15 years ago when he began to see a few. Since then, he reports that he has observed an ever increasing number of white-tails in the area. ¹ After examination of the Colorado Bowhunting Records published in 1982, it was evident that before the 1970's, these animals were not hunted extensively and no record bucks had been taken. This, however, has changed with time. This record book acknowledges six trophy bucks that have been taken since 1974. ³ Also in a conversation with the author of the new Colorado Bowhunting Records

to be published this summer, it was reported that since the last publication there will be 40-50 new trophy bucks listed! This clearly shows that these deer are making a remarkable comeback into the area.

More information on the Boulder white-tails was found in the road kill data for the Boulder area. The records show no road kills in 1985, but at least a couple every year since then. All this clearly shows that the white-tails are here to stay. The reason for such a dramatic increase is not fully understood but proper game management and public education is surely been a tremendous help. In 1965, the D.O.W. traded some mule deer for some Oklahoma white-tails and successfully started small populations that have expanded rapidly. The D.O.W. has since began to seriously recognize the white-tail as an important asset for Colorado and has closely watched and protected these animals. Currently these animals number somewhere in the 8,000-12000 range. With proper management, these beautiful animals will remain a part of Colorado.

The mule deer population here in Boulder has recently become of interest to many for many reasons.. The mule deer population in the study area for 1989 was computed as follows using the Lincoln-Peterson method.

$$N = \frac{(n_1+1)(n_2+1)}{(m_2+1)} - 1$$

For 1989, $\bar{N} = 1007$

with 95% confidence interval of standard error

$$1007 \pm 81$$

$$\text{or} \\ 926 - 1088$$

standard error \nearrow

$$S.E. (\hat{N}) = \sqrt{\frac{1}{k(k-1)} \sum_{i=1}^k (\hat{N}_i - \hat{N})^2}$$
$$= \sqrt{\frac{1}{4(4-1)} (20,574)}$$
$$= 41.4$$

show color variations

This estimation is down 10% from the estimated population of 1988. (See graph pg. 13). To an ecologist, this would indicate to him that the population had reached its carrying capacity and the decline is only a natural response. This may be true, but I doubt it very much. I did not see any indication that the habitat was being abused in the study area. I personally believe that the way in which the estimation of the population was derived is at fault. The Lincoln-Peterson method may work efficiently in other populations, but I feel it is inaccurate in this study.

not necessarily

The first problem with the survey, I feel, is the way the data is gathered. As mentioned earlier, the Open Space and Mountain Parks Department conducted their surveys in different manners. This data was then all lumped together to get an estimation of numbers. I believe this is a critical mistake. In collecting the data

*M1 = 2??
M2 = 2??
M3 = 2??
M4 = 2??*

in two different ways, the ratio of unmarked to marked and the total deer per area is different. In not following a transect, an observer in the Mtn. Parks can concentrate on known haunts of the deer. For instance, I counted the section on N.C.A.R. one day and was allowed to count any deer behind echo rock. As a result, I counted those deer which are largely unmarked and included that in the data. On other count days, any other observer not familiar with the area would miss these deer. Now with the previous discussion on 'city' deer and 'wild' deer in mind, it is clear that the ratio of marked and unmarked deer will not be the same each day because a different sample of deer was counted each day. The Open Space counts, in contrast, stuck to their transects which usually include the normal haunts of deer that are accustomed to people and usually hold a significant number of marked deer. These people, however, are missing those wild, untagged deer not on the transect. It is clear that in order to correct this problem, the method of gathering data must be uniform. If the data is gathered uniformly each year, then trends may be evident in the counts.

The second problem I see in the survey is that over the years, the count has become more efficient. Bugs have been worked out and policy revised. As a result of these improvements, the data has not been collected and processed the same every year. Again, inconsistency is the culprit. Because of this, the trends indicated by the data may be invalid. One example of this is in the number of deer that have been included in the n value. It was recognized that some of these deer previously acknowledged as being alive were really dead and therefore the time period allotted for finding marked deer in the study area was reduced. This however significantly alters the results as compared to last year. If the data is processed like it has been in the past, the estimation becomes 1057 which would indicate a more stable population rather than a declining one.

Another problem exists in the ratio of deer that a good observer sees in any given area. Lets say that according to the Lincoln-Peterson ratio, you saw only 60% of that population. You say to yourself that there is no way that you missed 40% of the deer in your section and you are reasonably sure you saw 90% or more of the deer. This would grossly affect the data in that overestimation is likely. If an observer is knowledgeable about the area and ambitious, I feel he could effectively count 90% or better of that population.

The final suggestion I will offer is that the whole Lincoln-Peterson method

should be dropped. I think there are too many variables in this area to get an effective estimation using this method. The most accurate and least costly way to get at least an accurate indication of a trend would be to just forget about ratios and go out and count all the deer you see, in the same way every year. Since this year was a record as far as sheer number of deer seen, this method would indicate a rapidly increasing deer herd. The name of the game is consistent data. This is the only way to feel confident with your findings.

Possibility

Literature and People Cited

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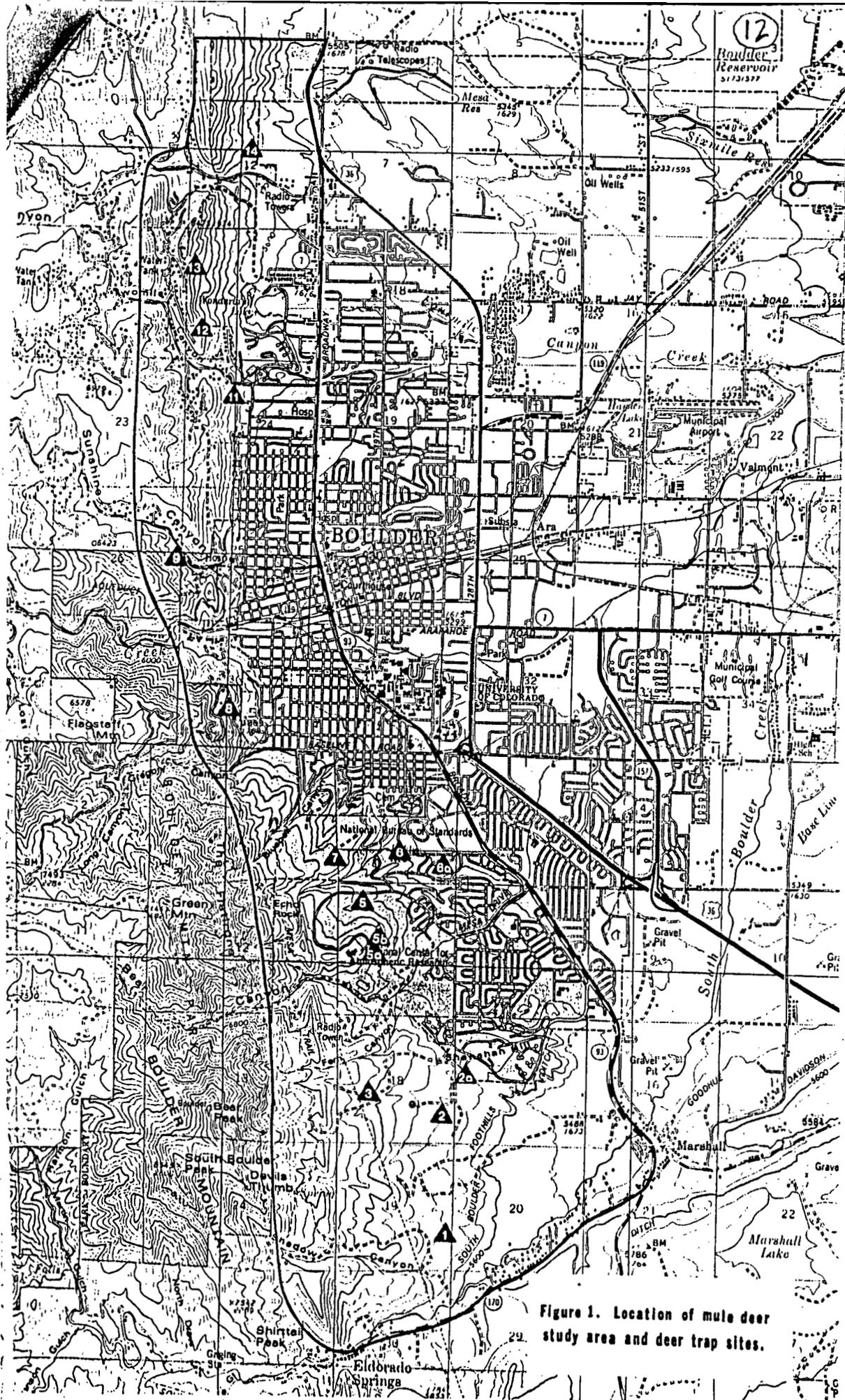


Figure 1. Location of mule deer study area and deer trap sites.

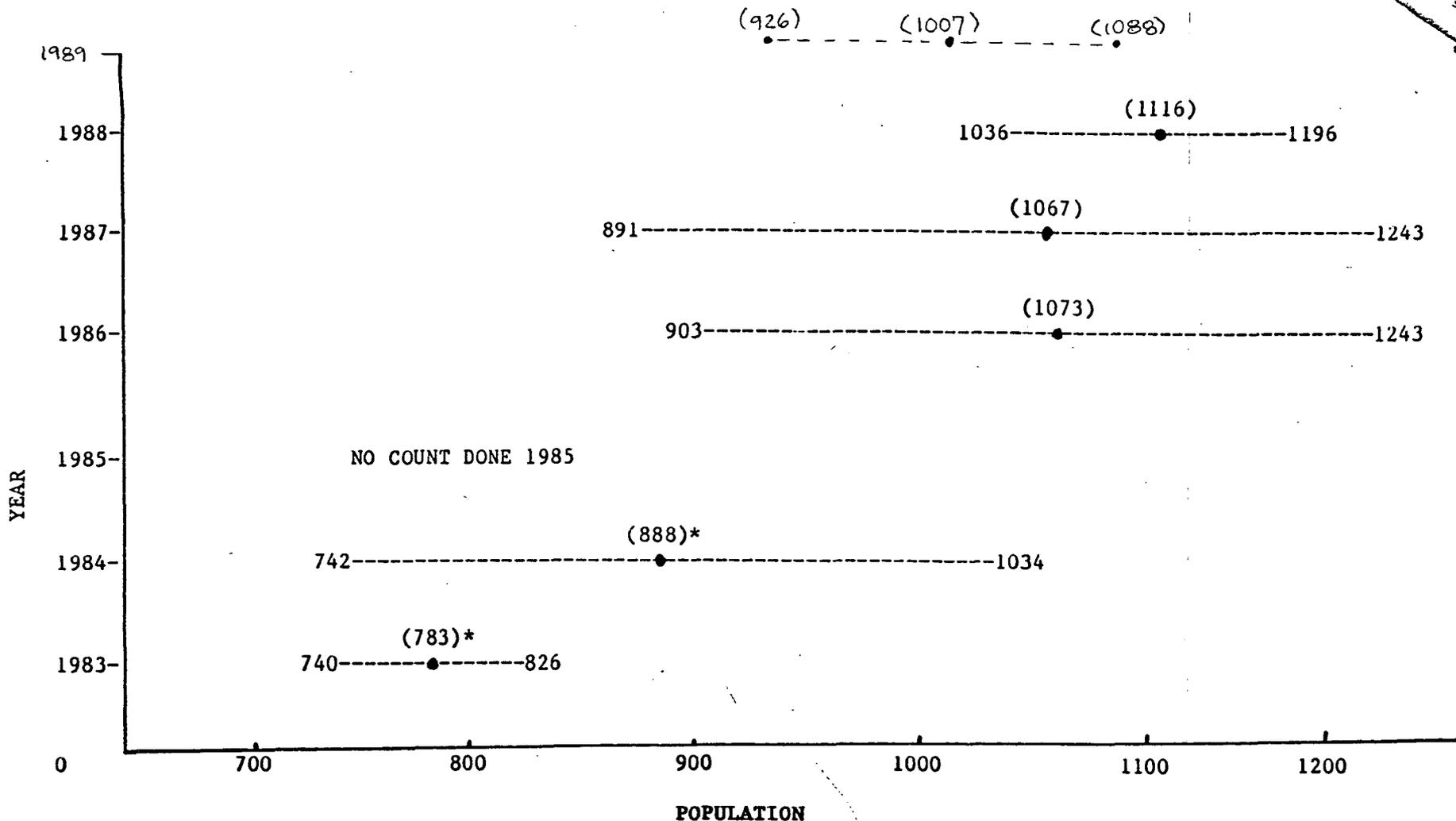


FIGURE 1

Note: 1. Figures in parenthesis are each year's estimated mean population. Outer 2 figures on each line represent the 95 percent confidence limits.

*2. Population counts in 1983 and 1984 did not sample north of Lee Hill Road. Counts from 1986-88 include this additional area and approximately 80 deer. Population figures reported by Western Resource Development for 1983 and 1984 were incorrect since they used 98 percent and 99 percent Confidence Intervals (CI). These have been corrected to the 95 percent CI in this document.