Management Report

STATUS AND HISTORY OF THE MOUNTAIN LION

IN THE GREAT SMOKY MOUNTAINS NATIONAL PARK

Management Report No. 15

By
Nicole Culbertson

NATIONAL PARK SERVICE

SOUTHEAST REGIONAL

UPLANDS FIELD RESEARCH LABORATORY

GREAT SMOKY MOUNTAINS

NATIONAL PARK

NATIONAL PARK SERVICE

Department of the Interior

D.218

STATUS AND HISTORY OF THE MOUNTAIN LION IN THE GREAT SMOKY MOUNTAINS NATIONAL PARK

Management Report No. 15

By
Nicole Culbertson

National Park Service
Southeast Region
Uplands Field Research Laboratory
Great Smoky Mountains National Park
Twin Creek Area
Gatlinburg, Tennessee 37738

ON MICROFILM

Digitized by the Internet Archive
in 2012 with funding from
LYRASIS Members and Sloan Foundation

http://archive.org/details/statushistoryofm00culb

TABLE OF CONTENTS

		Page
1.	Introduction	1
2.	Acknowledgements	3
3.	Study Area	4
4.	Methods	7
5.	Results and Discussion	11
6.	Discussion	44
7.	Summary	51
8.	Appendix I - Summary of Lion Sightings	52
9.	Appendix II - Summary of Deer Herds in N.C. and Tenn.	57
10.	Persons Cited	68
11.	Literature Cited	69

INTRODUCTION

Historically, the mountain lion (Felis concolor) was found over the entire North and South American continents, and possessed one of the most extensive ranges of any large terrestrial predator (Nowak 1976). Lions preyed upon the livestock of the early white settlers, and so were hunted mercilessly. As a result, their population is now reduced to a small fraction of its original size.

Currently, the western mountain lion (F. c. cougar) is found in 11 western states and western Canada (U.S. Fish and Wildlife 1976). Small populations of the eastern mountain lion (F. c. coryi) are recorded for Louisiana and Florida (Nowak 1976). The last mountain lion in the Great Smoky Mountains region was reportedly killed in 1920 by Mr. W. Orr near Fontana Village. Several years later, lions were pronounced extinct in this area (Linzey and Linzey 1971).

Lion sightings have continued to be reported in the Southern Appalachians, and in recent years these sightings have become quite numerous. In 1971, a mountain lion was killed in eastern Tennessee, just north of Chattanooga, by Mr. W. T. Buckner of Decherd, Tennessee (Herald Chronicle 1971). In addition, two hair samples were recently identified as mountain lion hair by Dr. F. Barkalow of North

Carolina State University. Both samples were found in south central North Carolina, one near Lake Badin, the other near Lake Norman (Nowak 1976).

The present work is an investigation of the available evidence and attempts to determine whether a mountain lion population has reestablished itself in the Great Smoky Mountains National Park region. The study also investigated the possible lion carrying capacity of the region, with respect to prey abundance and availability, possible human disturbances of lions, and potential livestock depredations by lions.

ACKNOWLEDGEMENTS

I wish to thank all those persons who submitted and discussed their lion sightings, County Health Department officials for supplying information on dog populations, county agents for providing livestock densities, the many national forest rangers and biologists who were extremely helpful in supplying information on deer herds around the park, and all other persons who took time to share their knowledge and opinions on the wildlife of the area with me.

Special thanks are due the following persons: Gary Barnett and especially Molly Potter at the Knoxville Zoo for her time-consuming efforts at collecting the lion urine, Bob Duncan and A. E. Ammons for their detailed information on the status of deer herds around the park, David Lee for his help in supplying information on various predators, Carter Davis for analyzing hair samples and scats, Mark Harmon and Robert Guthrie for all their assistance throughout the study, Jill Baron and Boyd Evision for reviewing the final report, Susan Bratton for her suggestions in the statistical analysis of the data and for reviewing the final report, and Francis Singer for his assistance and suggestions throughout the study and in reviewing the final report.

I also wish to thank the Great Smoky Mountains National History Association for providing the funding for this study.

STUDY AREA

The primary area of study was the Great Smoky Mountains National Park, which covers about 800 square miles and straddles the Tennessee and North Carolina border. The park comprises only a small piece of a relatively contiguous region of forested areas, extending from northern Georgia to the Virginia and Kentucky borders (Figure 1). The southern end of the region is composed of the Chattahoochee and Sumter National Forests of Georgia and South Carolina, respectively. These national forests abut the Nantahala and Pisgah National Forests of North Carolina and the Cherokee National Forest of Tennessee. These last three national forests extend in an unbroken chain along the Appalachian Mountains as far as Virginia and Kentucky, and surround the Great Smoky Mountains National Park on all but its northernmost boundary (Figure 1).

The Great Smoky Mountains National Park was extensively logged and farmed prior to the 1930's, at which time the park lands were acquired. By 1940, the park had been established and the land had begun reverting to its original forested condition. At the present time, the park is closed to hunting and logging with only one large tract of private land within its boundaries. There is still much

FIGURE 1

STUDY AREA

virgin timber at the higher elevations and more inaccessible regions of the park, but over half the area was either logged, farmed, or grazed in the past.

The Cades Cove area at the western end of the park is grazed by livestock and contains several large pastures. A few fields are also found in the Cataloochee area at the eastern end of the park. Other than these limited agricultural areas, and a few grassy balds and burn scars, most of the park is covered by eastern hardwood forests at the lower elevations and spruce-fir at the higher elevations (Whittaker 1956).

Elevations in the park range from 259 to 2023 meters. This range of elevation, combined with an annual rainfall that varies from 140 centimeters to 216 centimeters, provides for a great diversity in both the flora and the fauna of the area (Linzey and Linzey 1971; Whittaker 1956).

The various national forests that surround the park are logged, but also contain wilderness areas, game stocking areas, and areas open to hunting. There are extensive private landholdings within their boundaries. In addition, there are numerous logging and jeep roads that provide access to most of these national forest lands.

METHODS

The field work for this study was conducted over a period of 5 months. Data were collected from September 1976 to February 1977. A variety of techniques were employed to ascertain the presence of mountain lions in the park. Additional data were collected concerning deer, livestock, dog and human population densities in and around the park.

Information on 140 different lion or lion track sightings from the park vicinity was gathered. Roughly 100 persons were personally interviewed concerning these sightings. The criteria for evaluating the authenticity of the sightings were:

a. Priority was given to observers who had worked with mountain lions.

b. Priority was given to observations from persons who had hiked, hunted (possibly poached) in the area of the park for many years and knew a great deal of the natural history of the area.

c. Observations from park employees were also assumed to be more "trustworthy" than reports from tourists, since park employees

were generally thought to be more familiar with the wildlife here. However, no sighting was disregarded just because the observer was unfamiliar with, or new to the area.

d. Other criteria were length of the observation, time of day, weather conditions and visibility, and overall description of the animal. Descriptions of "black panthers" were dismissed, but descriptions of dark grey animals were considered if the light was poor and the description was otherwise good. All lion sightings were either accepted or rejected; questionable sightings were always rejected.

Chi-square "goodness of fit" tests (Snedecor and Cochran 1967) were used to investigate correlations between lion sightings and high deer density.

In an attempt to obtain mountain lion tracks, the urine of male and female mountain lions was used to lure animals to specially prepared scent stations. The mountain lion urine was obtained from two animals at the Knoxville Zoological Park. The urine was predominantly male, combined with a small fraction of female urine. The female was not in estrus when the urine was collected.

Sand, and occasionally snow, was used to record the tracks of any animal lured to the scent station. All scent stations were placed in the Cades Cove area at aproximately 8-kilometer intervals around the Loop Road. The lures ranged from 14 meters to 914 meters distance away from the road. Six snow-lures were used for a total of 18 lure/days (one lure for 1 day). Fourteen sand-lures were used for a total of 57 lure/days.

One deer kill and two reports of livestock depredation were investigated to determine if lions could have been responsible.

Information on livestock concentrations in the eight counties surrounding the park; Blount, Cocke, Sevier, Monroe, (Tennessee); Graham, Haywood, Jackson, Swain, (North Carolina) was obtained through interviews with county agents. Information on dog populations was collected for the same eight counties through interviews with Health Department officials.

Past and present deer population levels in the Great Smoky Mountains National Park were evaluated through interviews with all sub-district rangers as well as with former park naturalists. In addition, all persons who reported seeing lions were asked if they noticed any deer sign near where the sighting occurred.

Approximately 15 miles of backcountry trails in the park were walked when there was snow on the ground, and all deer tracks on the path noted. Vegetation type and elevation was recorded for every deer track located in this way. Possible correlations between deer occurrence and vegetation types and elevation were determined through chi-square tests of independence.

Estimates of deer populations in the Cherokee, Nantahala and Pisgah National Forests were obtained through interviews with district rangers. This information was supplemented with data obtained from the North Carolina and Tennessee Wildlife Resources Commissions on deer harvest, weights, buck/doe ratios, fawn/doe ratios, and browse utilization in counties surrounding the park.

Human population densities in the eight-county area around the park were obtained from the 1975 revision of the 1970 U.S. Census Report. Visitation rates to the park were obtained from the monthly summaries compiled by the park itself. Maps showing human settlements before the park was formed were obtained from the Great Smoky Mountains National Park files, and were used to establish historical areas of high human disturbance.

RESULTS AND DISCUSSION

Lion Sightings

Of 100 interviews conducted, a total of 48 lion or lion track observations were judged to be reliable. Forty-three were within, or close to the park boundary (Figure 2). The five sightings of lions outside the park were within or immediately adjacent to national forest lands and are not considered in this present work.

A total number of sightings has increased over the years, but this may only reflect the difficulty in obtaining and verifying the older reports. Thirty-one sightings were recorded for the past 11 years (1966-1976), and 12 sightings were found for the years 1908-1965.

Fifty-eight reports of lions in the park were obtained in the last 7 years (1970-1976), but only 29 of them were accepted--50 percent of the total. During these 7 years, the total number of lion reports increased an average of 70 percent a year, while the verified sightings increased at a rate of 11 percent. The increase in total sightings may reflect an increased public and park staff awareness of wildlife. An increase in park visitation at an average rate of 6 percent in the past 7 years (Great Smoky Mountains National Park monthly summaries), could account for part of the increase.

LION SIGHTINGS IN THE
GREAT SMOKY MOUNTAINS NATIONAL PARK

More lions were sighted in the summer, which could be related to seasonal variations in visitation rates. In the last 5 years (1972-1976), an average of 8,254.7 thousand persons visited the park each year, and an average of 4.6 lions were sighted each year. An average of 1,794.5 thousand persons enter the park for every lion spotted. Using this as a rough probability of seeing a lion, the "expected" number of lions sighted at each season can be computed from the average number of visitors each season (Table 1). Due to the small sample size, a chi-square test would not be valid. However, there does seem to be a positive correlation between the number of visitors using the park and the number of lions sighted. This indicates that seasonal variations in lion sightings may be attributable to the seasonal variation in visitation rates and park staffing.

Only a single lion was noted in most observations. However, in one of the five observations outside the park vicinity, a mother and two kittens were observed. In 5 of the 43 sightings in or near the park, more than one animal was seen. In the fall of 1941, two "20-pound" kittens were killed near the Greenbrier section of the park by local hunters. In the fall of 1970, two lions were seen together, just south of Soco Gap, outside the park. One of these animals was smaller than the other, but both had adult coloration. Eight months

later, two similar animals were seen near the same location by the same person. In 1975, the tracks of an adult lion and two kittens were seen over a period of months in the Three Forks section of the park. In December 1975, a female lion and two kittens were observed near the Chimneys picnic area by several groups of tourists. These animals were trailed through the woods for several thousand meters by one person. Other than these incidents, no one interviewed was definitely able to tell the sex of any mountain lion they observed.

Lion sightings tend to be clustered in space as well as time (Figure 3). The 1970's sightings tend to be clustered in certain areas. The locations of lions with kittens are marked in the diagram. Although both observations of females with kittens were in 1975, it is unlikely that they represent the same animals. Seidensticker et al., (1973) noted that female lions with kittens restricted their movements, apparently because the kittens were unable to travel very far. The distance between the two sightings of females in 1975 is great enough to indicate that there were probably two breeding females in the park at that time.

TABLE 1. Summary of lions sightings, 1972-1976

	Spring	Summer	Fall	Winter
Average number of visitors by season (in thousands)	1477.7	4158.8	2132.6	485.6
Actual number of lions observed	2.0	12.0	7.0	2.0
Average number of lions observed per year	.4	2.4	1.4	.4
Average number of lions expected (on the basis of visitors) per year	.82	2.31	1.19	.27

FIGURE 3

Numbers on maps indicate location and year (when known) for each lion observation.

Lions with kittens, or two lions seen together are circled on map.

Distribution of Lion Sightings

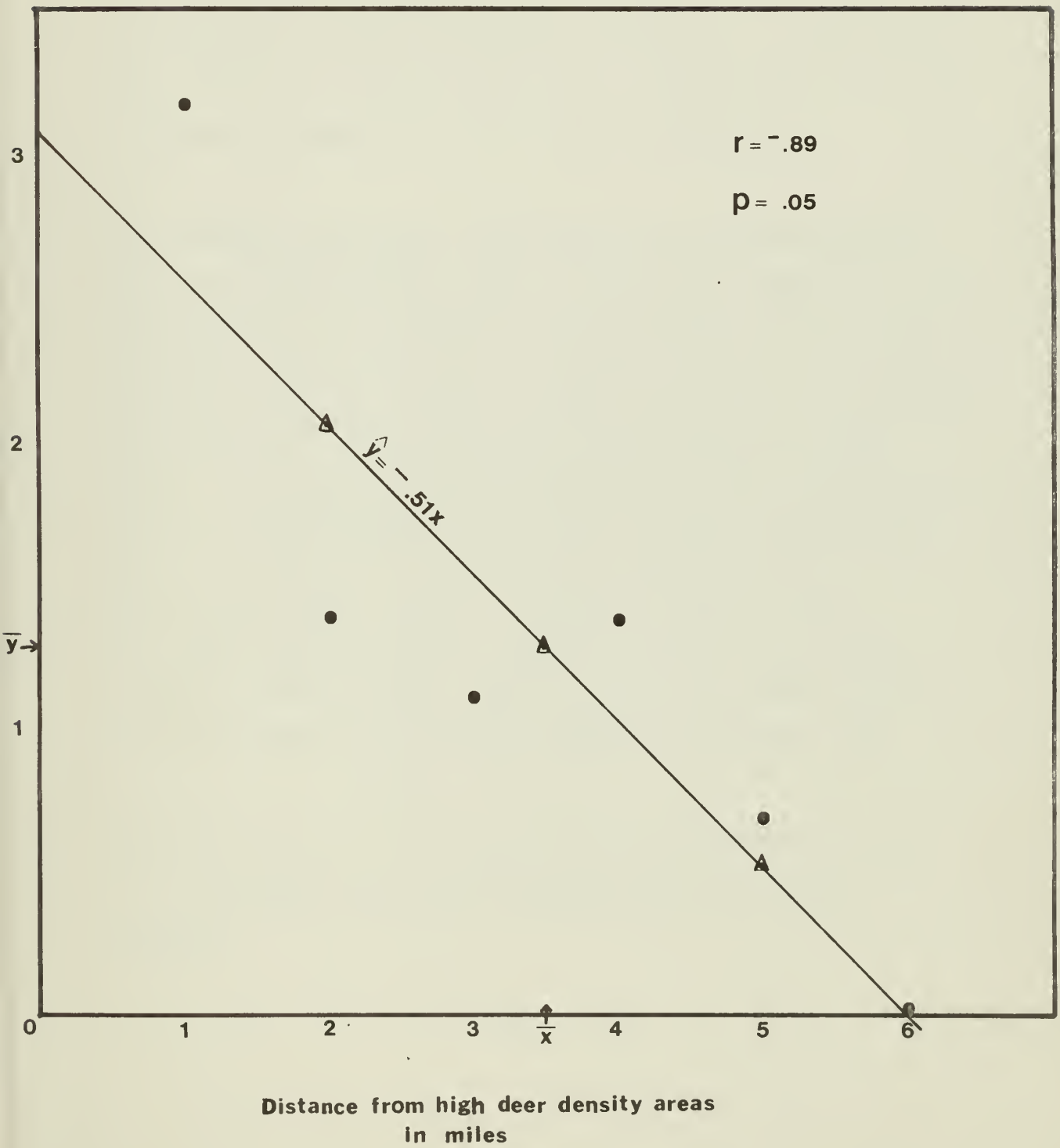
Deer and human density may be factors affecting the distribution of lions in the park. Areas of estimated high white-tailed deer (*Odocoileus virginianus*) density in the park were plotted against lion sightings. High deer density areas were derived from interviews with persons familiar with the region, the investigator's knowledge of the area, and from park maps that show old homesites and settlements within the park. Deer seem to prefer areas with the early successional vegetation that is now characteristic of former homesites (evidence for this will be discussed later). These areas were found to agree closely with Linzey and Linzey's (1971) description of areas in the park that contained deer.

The nearest straight line distance in miles from a high deer density area was computed for each lion sighting within park boundaries. A linear regression of log lion sightings on deer density was calculated (Figure 4). A significant negative correlation exists between distance from high deer density areas and the numbers of lions sighted ($r = 0.89$, $P = .05$).

FIGURE 4

Regression of Lion Sightings on Deer Density

circles indicate lion sightings
triangles indicate values on regression line



To ascertain that this was not a random effect, 38 random points were selected within the park. The distance from each point to a high deer density area was computed. A chi-square "goodness of fit" test on the distance of lions from high deer densities was used (Table 2) which showed that lion observations were not distributed in the park at random with respect to areas of high deer density.

The hypothesis that visitors spend more time in high deer density areas, which would bias the number of lions seen in these areas, was investigated. The road system in the park seems to eliminate this possibility. The most frequently traveled road is U.S. 441 (Newfound Gap Road), and it does not pass close by most high deer density areas. The second most heavily traveled route leads to Cades Cove, a high deer density area. Four lions were recorded in the Cades Cove area. An even greater number of lions was observed in the Cataloochee section of the park (another high deer density area), although far fewer visitors actually drive to Cataloochee (United States Department of the Interior, National Park Service, 1975).

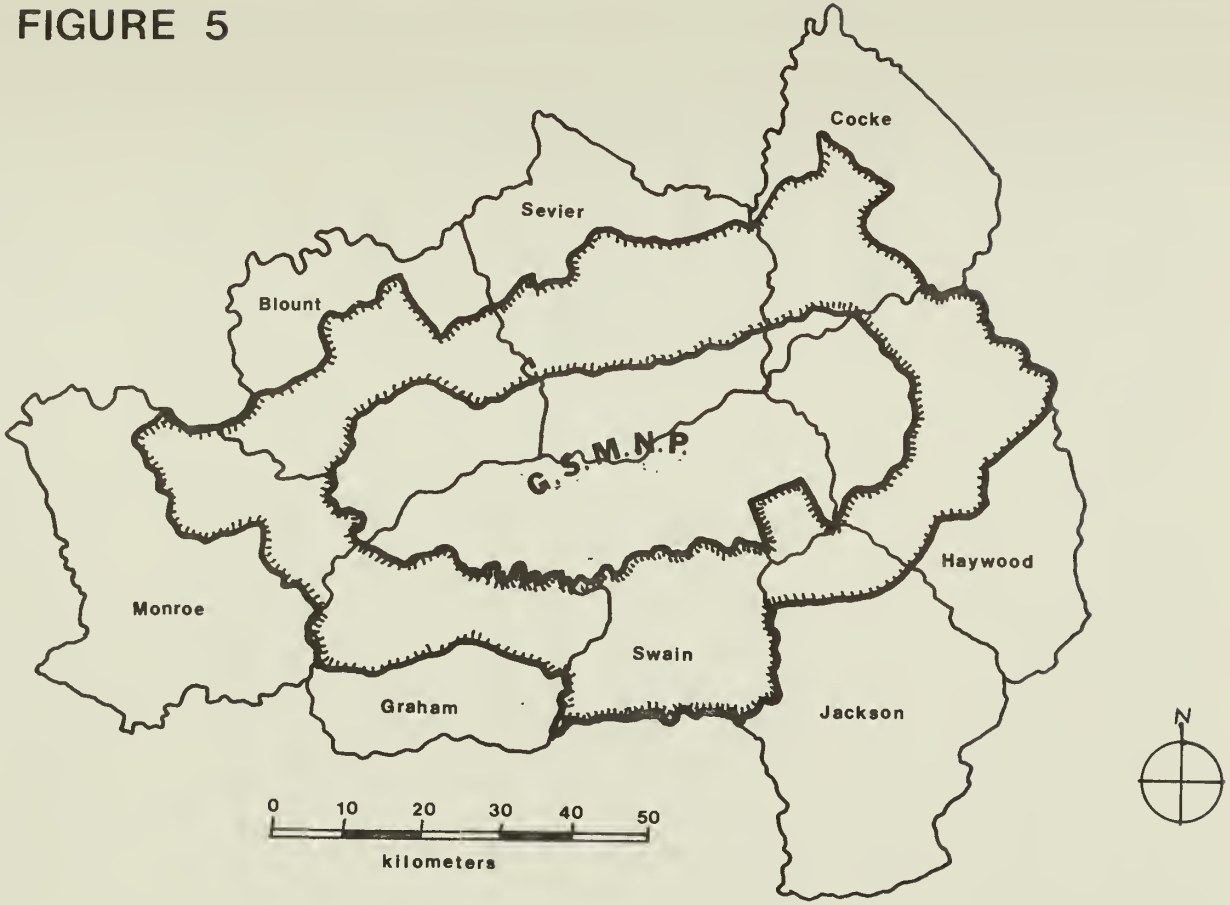
The most heavily used trails and backcountry campsites in the park are at the higher elevations, the areas with the lowest deer densities.

TABLE 2

Distance in miles from high deer density areas	Number of lions observed in the park	Number of random points (expected lions)	X^2
0 - 1	24	13	9.3
>1 - 2	4	10	3.6
>2 - 4	7	12	2.1
>4	3	3	0
TOTAL	38	38	15.0

p = .005
d.f. = 2

FIGURE 5



EIGHT COUNTY AREA

SURROUNDING THE G.S.M.N.P.

THICK LINE ENCLOSES THE TEN-MILE STRIP OUTSIDE PARK BOUNDARY

Scent Stations

The scent stations were operative a total of 75 lure-days. In this time period, 21 animal tracks were recorded (Table 3). Foxes and bobcats were by far the most common visitors to scent stations, but skunks and opossum were also attracted to the urine lures.

Other Evidence

A freshly killed deer, found in the Tremont area of the park, was inspected. The deer was a spike buck. The carcass was still warm when discovered at 8:30 a.m. on December 13, 1976, (G. Whitehead, personal communication). The deer had apparently been strangled, and the method of killing suggested a feline predator. Puncture wounds on the neck were a maximum of 50 milimeters apart and were 10 milimeters in diameter. A comparison with the intercanine distances of bobcat (30 milimeters) suggests that a bobcat was not the predator. Claw marks on shoulders and hips of the deer matched the locations that a mountain lion would have clawed.

The fact that the deer was killed in mid-December reduced the probability that the predator was a bear. Bears are usually denning at that time of year, and even if they are not, they rarely eat (Dr. Michael Pelton, personal communication).

TABLE 3

Tracks recorded at scent stations

Species	Occurrence	% Occurrence
Fox	8	38%
Bobcat	4	19%
Skunk	2	10%
Opossum	1	5%
Hog	1	5%
Large cat ?	1	5%
Deer	1	5%
Squirrel	1	5%
Birds	1	5%
Cow	1	5%
TOTAL	21	102% (due to rounding off)

* One bobcat track was located on a snow drift, all other tracks were located on sand.

Deer in Great Smoky Mountains National Park

There has never been a parkwide deer census conducted in the Great Smoky Mountains National Park, and no estimates of the total deer population in the area are available. The only partial deer census taken in the park was done by Fox and Pelton (1973). Their study documents the deer population fluctuations between February 1971 and September 1973 in Cades Cove region. According to Fox and Pelton (1973), 723 deer were estimated to be using the fields in February 1971. After an outbreak of what appeared to be epizootic hemorrhagic disease (EHD), the population dropped to an estimated 33 deer in November 1971 (ibid.). Since that time, the population has recovered somewhat, and was estimated at 152 deer in September 1973 (ibid.).

Other areas of the park are known to have high deer densities. These include the Greenbrier area, the Cataloochee area, and the region of the park that borders on Lake Fontana. All of these areas are subject to deer poaching, but the number of deer taken illegally is not known.

The number of deer found in various vegetation types was compared with relative frequency of occurrence of these types (Table 4). The sample size was not large enough to determine precisely which results were significant.

TABLE 4

Deer occurrence vs. vegetation type

	Veg. Occur	% Veg. Occur	Deer Tracks	% Deer Tracks	X^2
Mixed Northern Hardwood	7	(12)	1	(3)	2.46
Mixed Cove Hardwood	8	(14)	4	(11)	.14
Hemlock/Hardwood	12	(21)	4	(11)	3.16
Successional Cove	9	(15)	13	(37)	10.55
Very Early Successional (Mostly tulip tree)	6	(10)	7	(20)	1.45
Mix Sub-Xeric Hardwood	7	(12)	3	(9)	.35
Mix Oak	3	(5)	0	(0)	1.81
Mix Oak/Pine	6	(10)	3	(9)	.11
TOTAL	58	(99%)	35	(100%)	20.03

$p = .005$

FIGURE 7

COUNTIES AND WILDLIFE MANAGEMENT AREAS

0 10 20 30 40 50
kilometers

N

Key to W.M.A.'s

1 Ocoee
2 Tellico
3 Andrew Johnson
4 Unicai
5 Laurel Fork
6 Flat Top
7 Mount Mitchell
8 Rich–Laurel
9 Harman Den
10 Pisgah
11 Sherwood–Shining Rock
12 Wayah
13 Standing Indian
14 Fires Creek
15 Santeetlah

The deer population in Tennessee was estimated at 1,000 in 1940, but had increased to 170,000 by 1975 (Tennessee Wildlife Resources estimate). The deer population is still thought to be increasing in Tennessee. In the counties under consideration in Tennessee, this rate of increase was estimated at 12 percent from 1974 to 1975, and 12-14 percent from 1975-1976 (Tennessee Wildlife Resources estimates). The status of the North Carolina deer population is not definitely known at the present time. The extremely conservative figure of 30 percent harvest rate was used to estimate deer population in North Carolina which probably underestimates the actual population (Table 5).

Table 6 is a summary of the various indicators of herd health in Tennessee. Deer are thought to be overstocked in the Tellico, Unicoi, and Ocoee wildlife management areas in Tennessee. Similar information is unavailable for the North Carolina deer herds. The most densely populated area in North Carolina is the Shining Rock-Sherwood area, but the deer are not thought to be overpopulated there at present (Ammons, personal communication).

In Table 6, one can see that the reproduction rates in the overstocked herds in Tennessee are quite low. Estimates of reproductive rates were sometimes based on small sample sizes, so this statistic is not

TABLE 5

County	Buck Deer Harvest	Deer Pop. (estimate)	Acres	Acres/ One Deer	Density
Polk	0*			----	L
Ocoee WMA	63	630-420	44000	70-105	H
Monroe	9	90-60			L
Tellico WMA	283	2380-15	80000	34-50	H
Blount	0			----	L
Sevier	0*			----	L
Cocke	0*			----	L
Greene	19	190-126			L
Andrew Johnson WMA	51	510-350	20000	39-59	H
Unicoi	46	460-306			H
Unicoi WMA	43	430-286	40000	93-140	H
Carter	40	400-266			?
Laurel Forks WMA	25	250-166	15000	60-90	H
Cherokee	9	>30	290000	9600	L
Clay	52*	>173	115000	600	M
Fires Creek WMA	68+	>226	15000	66	H
Graham	?		150000	?	L
Santeetlah WMA	47+	>157	30000	190	H
Macan	38*	>127			M-L
Wayah WMA	41+	>137	14000	102	H
Standing Indian WMA	48+	>160	30000	187	H
Swain	7	>23			L
Jackson	173	>527	250000	433	M

Table 5 Continued

Pisgah (includes, Transylvania, Henderson, Buncombe Co's)	201+	>670	90000	134	H
Haywood	161*	>537	300000	558	M
Sherwood WMA	145+	>483	35000	72	H
Harmon Den WMA	25+	>83	14000	169	H
Madison	208*	>693			M-H
Rich Laurel WMA	29+	>97	23000	237	M
Yancey	?				M
Flat Top WMA	52+	>173			M
Mt. Mitchell WMA	50+	>167	2600	156	H

* 1975 figures

\+ 1970 figures

Incomplete 1976 Hunter Harvest

H=1-200 acres/deer

M=201-1000 acres/deer

L= 1000 acres/deer

TABLE 6

WMA	Preferred-Browse 1975	Preferred-Browse 1976	1975	1976	% of Spike	Average Dressed Buck Weights 1.5 yrs.	2.5 yrs.	3.5 yrs.	5.5 yrs.
* Tellico	50%	52%	____	No fawns noted out of 6 does observed.	High	90 lbs.	120	131	160
*Unicoi	47%	66%	23% fawns/ doe	____	High	weights declining			
*Ocoee	32%	31%	Unknown but reproductive success thought to be low 28% of deer harvested were 4.5 yrs. old or more.		74% of yearly bucks	73.5	103.4	97.5	117.1 (all deer over 4.5 years)
+Andrew Johnson	34%	49%	____	.60 fawns/ doe	High	____			
Laurel Forks	No browse survey		____	.33 fawns/ doe (based on very small sample n=6 does)	Low	118.5	137	94	158

* Overstocked areas
\+ Nearing upper limit of supportable population

always reliable. A study by Hawkins and Klimstra (1966) stated that fall doe/fawn ratios in their healthy Texas deer herd ranged from 1:1.4 to 1:1.06. The doe/fawn survey in Tennessee was also conducted in the fall, after the 60-day post-partum period during which most fawn mortality occurs (Cook et al., 1971). Poor food supply predisposes young deer to predation and disease (Cook et al.), and also lowers the overall reproductive rate of does (Verne 1969). The poor food supply in overstocked areas of Tennessee is probably related to the low reproductive success of these herds.

From the information collected on deer population densities, Figure 8 was drawn to show areas of high, medium, and low deer density.

Other Prey Species

A number of prey species other than deer are available to mountain lions in the park. These include: turkey (*Meleagris gallopavo*), European wild boar (*Sus scrofa*), opossum (*Didelphis marsupialis*), rabbit (*Sylvilagus* sp.), woodchuck (*Marmota monax*), raccoon (*Procyon lotor*), skunk (*Spilogale putorius* and *Mephitis mephitis*), mink (*Mustela vison*), weasel (*Mustela frenata*), bobcat (*Lynx rufus*), fox (*Vulpes fulva* and *Urocyon cinereoargenteus*), feral dog (*Canis familiaris*), and a variety of chipmunks and squirrels (family Sciuridae) (Linzey and Linzey 1971).

The deer seem to have a definite preference for the successional cove-type habitats which include tulip tree (Liriodendron tulipifera), silverbell (Halesia carolina), red maple (Acer rubrum), and for the very early successional areas dominated by tulip tree. The understories in these areas were similar in that greenbrier (Smilax sp.), Galax sp., strawberry bush (Euonyomus sp.), rhododendron (Rhododendron sp.), laurel (Kalmia latifolia), and/or blueberry (Vaccinium sp.) were usually present. At least one of these species was present in the understory in all successional areas where deer were noted. The deer seemed less common than expected in the northern hardwood areas which inlcude sugar maple (Acer saccharum), beech (Fagus grandifolia), buckeye (Aesculus octandora), yellow birch (Betula lutea), and serviceberry (Amelanchier sp.). The early successional vegetation that deer seem to prefer is characteristic of the many lower elevation old homesites, settlements, and cleared areas in the park. All areas with high deer densities were at former settlements.

In the 1930's, before park lands were acquired by the Federal Government, very few deer were reported in the area. So few, in fact, that the situation prompted the Park Naturalist, Mr. A. Stupka to state in a 1938 letter that no lions could possibly live in the park because deer were so scarce (A. Stupka, personal communication).

Since that time deer have been increasing. The map in Figure 6 shows roughly where the relatively high, medium and low deer densities in the park may be found. These are only rough approximations, since the data is insufficient to compute the actual number of acres/deer.

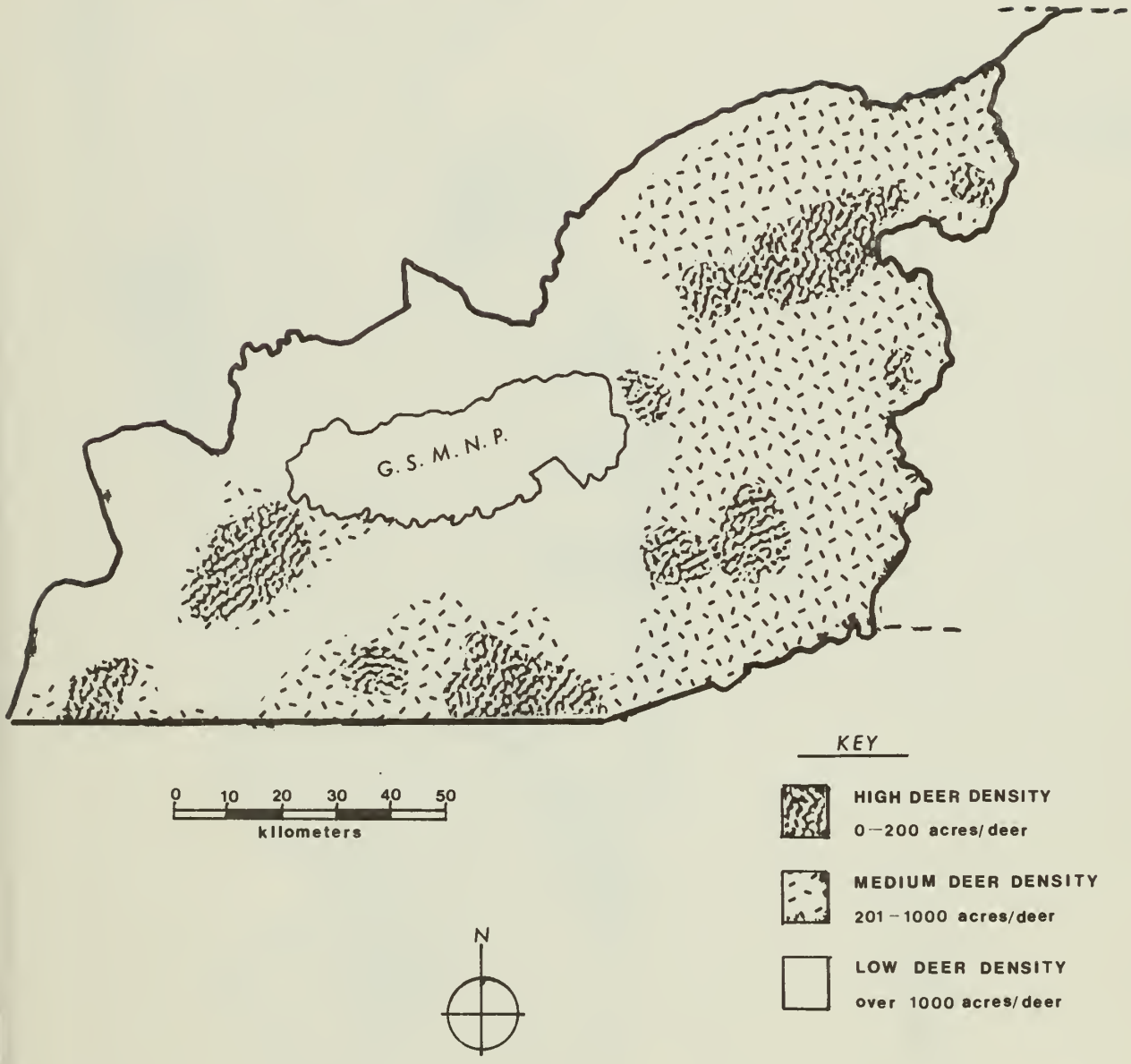
Deer Outside of the Great Smoky Mountains National Park

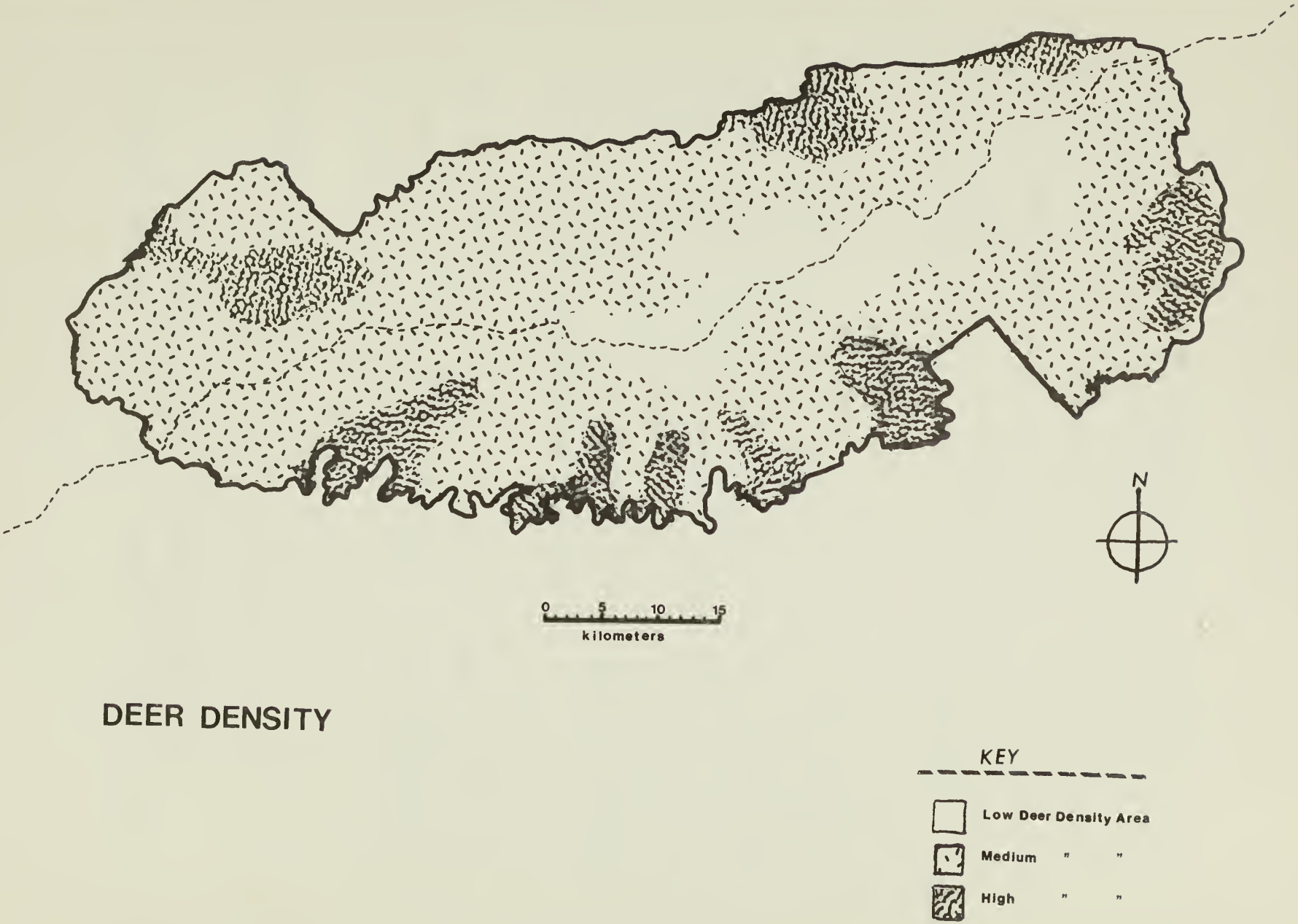
Information was gathered on the status of deer herds in both Tennessee and North Carolina. Figure 7 shows the various counties under consideration. Most of these counties are within or adjoining national forest boundaries. In this region, most deer are found on national forest lands, and relatively few deer are found in the adjacent private landholdings. Within the national forests, the highest deer densities are usually found in the designated wildlife management areas (WMA). This is because wildlife management areas are more intensively patrolled to reduce poaching.

The policy of managing only wildlife management areas has resulted in a very patchy distribution of deer in both North Carolina and Tennessee. To correct this, North Carolina abandoned its wildlife management area policy in 1971 (Ammons, personal communication), and began to manage deer on a regional basis. Efforts at deer restoration outside of wildlife management areas are still in the early stages.

FIGURE 8

DEER DENSITY OUTSIDE THE G.S.M.N.P.





DEER DENSITY

Mountain lions, being large predators, tend to concentrate on larger prey, such as deer and possibly wild boar. It is not known if lions do prey upon boar. There is no other natural situation where lions and boar occur sympatrically, and no information is available on lion-boar interactions. Mr. J. R. Buchanon, park employee, has noticed lion tracks several times in the same area while tracking hogs.

The wild boar was first released in Graham County, North Carolina, and began to invade the southwestern portion of the park in the 1940's (Linzey and Linzey 1971). Since that time, they have extended their range to include all but the northeasternmost region of the park (Singer 1976). The hog population in the park in 1974 was guessed to be about 1,800-2,400 animals, if densities were similar to the nearby Tellico Wildlife Management Area (Bratton 1974).

Wild boar are common in the Tellico Wildlife Management Area and in Graham County, North Carolina (A. E. Ammons, personal communication, B. Duncan, personal communication).

Livestock

Table 7 shows livestock populations in the eight-county area surrounding the park. Cattle, horses, and pigs are the most common

TABLE 7

LIVESTOCK IN THE EIGHT-COUNTY AREA SURROUNDING PARK

County	Cattle Dairy & Beef	Hogs & Pigs	Horses, Ponies Mules, Donkeys	Sheep	Goats
Blount	54300	5400	1704	10-15	100
Cocke	26405	>1783	>811	>73	>100
Monroe	46400	2000	~2000	50	~100
Sevier	>24020	>5837	>886	>83	>11
Graham	25000	300	>350	0	30-40
Haywood	20000	3500	>1700	600	?
Jackson	4150	2450	1200	140	75
Swain	3500-4000	2-2500	650	25-50	?

types of livestock in the area. Most counties also report small numbers of sheep and goats as well. Rabbits and chickens are also raised in small numbers, but population estimates for these animals are not available.

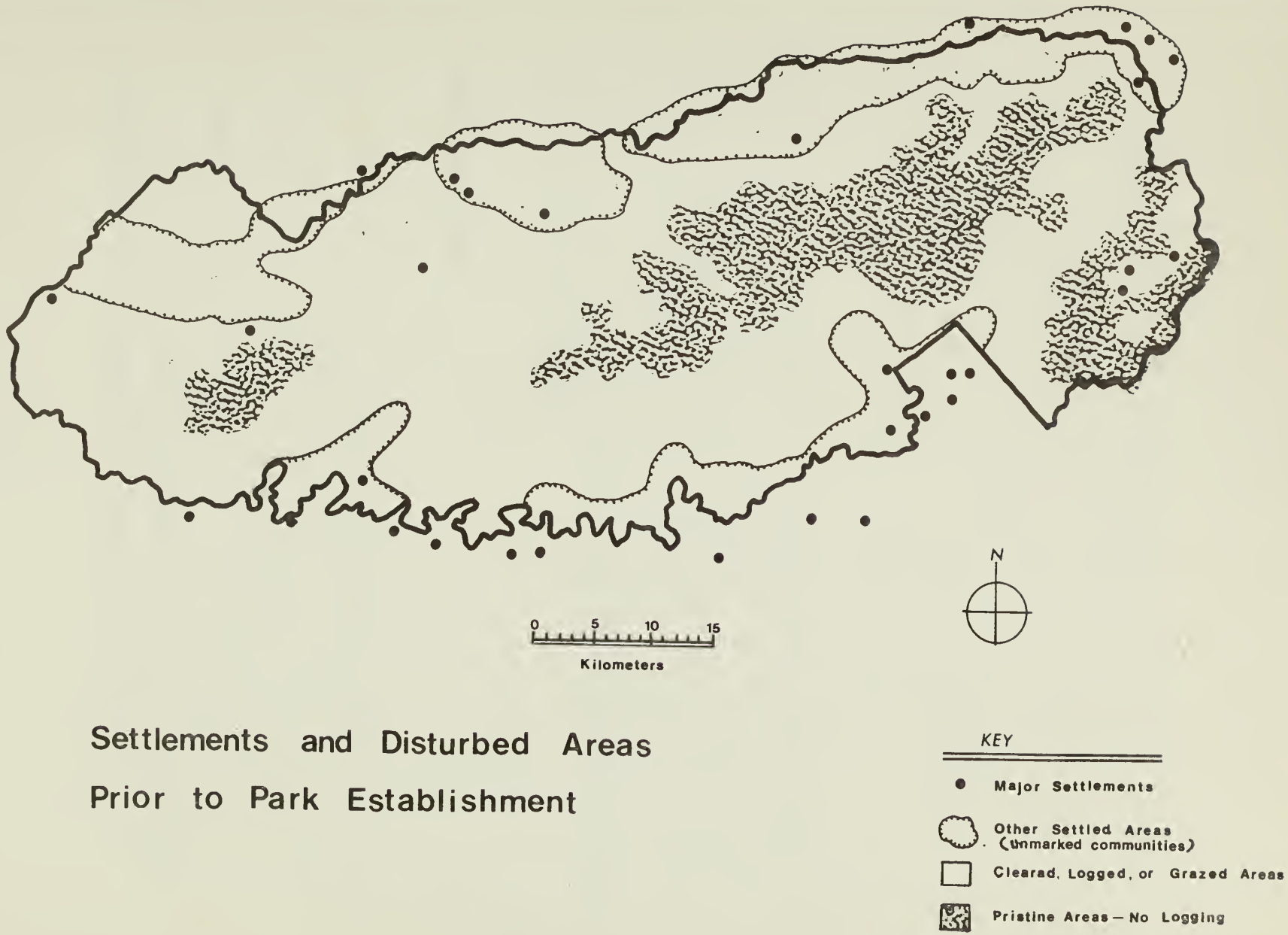
No livestock are permitted to graze on national forest lands. As a result, Graham and Swain Counties, which contain large tracts of national forest or national park lands have higher densities of livestock, although the total livestock populations may be lower than in other counties. Livestock are permitted in the Cades Cove area of the park, and in 1976, there were 150 cows and 42 horses grazing there. No conclusive evidence was found that lions kill livestock in the eight-county area.

Dogs

Information on the dog population in the eight-county area is speculative at best. Only two counties (Haywood and Blount) have active dog control programs, where strays and livestock killers are dealt with continuously. No other counties pick up strays, and most reported large feral dog populations.

Although persons in the area own large numbers of dogs (up to 30 dogs or more), most County Health Department officials reported that these

FIGURE 9



Settlements and Disturbed Areas
Prior to Park Establishment

are generally kept contained. The greatest free-running dog problem comes from stray hunting dogs and feral animals. Counties with high wild dog populations include Monroe County, Cocke County, Jackson County (especially in the Cullowhee area), and Swain County (especially in the Cherokee area). All other counties without dog control programs mentioned populations of wild dogs.

The effect of large numbers of free-running dogs on deer and other prey species is not known. A healthy deer can usually outrun a dog, but may sustain some injuries if running in steep, difficult terrain (Sweeney et al., 1971). In areas where the deer population is low, feral dogs may be a serious mortality factor and may hinder restocking efforts (Perry and Giles 1970).

Human Distrubances

Settlers first arrived in the Great Smoky Mountains region in the late 1700's, and by the mid-1800's most major valley bottoms in the park were settled (Lafollette 1974). Small logging companies began operations in the area in the late 1800's but most logged areas were high-graded for cherry (*Prunus serotina*), yellow poplar (*Liriodendron tulipifera*), and ash (*Fraxinus* sp.), which left considerable cover

intact (ibid.). Large-scale logging began about 1900. Figure 9 shows major human concentrations and logged areas before the park was established. By the early 1900's the human impact on the wildlife of the region, through hunting and the destruction of habitat, was probably at its greatest. In 1930, hunting was restricted in the park area, and by 1934, complete protection of widllife in the Great Smoky Mountains National Park area was instituted (ibid.). Logging was finally stopped in 1939, and by that time at least 65 percent of the park area had been cut (ibid.).

At the time the park was established, about 7,300 people were living in the Great Smoky Mountains region. Four thousand, two hundred and fifty-two of these people were moved from the actual park lands, and about 630 remained in the park vicinity (Whittle 1934). Of all the people moved from the park, about 41 percent were not content with the move (Whittle 1934). In many areas around the park, people are resentful of the park, and still consider the park "their" land.

Lafollette (1974) mentions that the majority of poachers in the park were hostile towards the park. Some of this hostility was due, in part, to the fact that some of these people were forcibly moved from park land when it was first established. Most poachers in the Great

Smoky Mountains area also were found to be in the lower economic classes, and lived in rural areas only a short distance from where they did their poaching (ibid.).

Poachers and non-poaching locals do not believe that illegal hunting actually hurts the deer in the area. In fact, many think that poaching helps keep the deer in the park from being overstocked. When questioned about mountain lions, these same persons often felt that the lions would compete with them for the available deer, and would deplete the deer population. A few persons even volunteered to help the park get rid of its mountain lion "problem." It seems that the attitude of the public will play a large role in the success or failure of any lion population in the area.

In Table 8, all eight counties surrounding the park are ranked according to total rural population within 10 miles of the park, per capita income of this rural population, and unemployment rate of rural persons. A county with high rural population, low per capita income, and high unemployment rate was assumed to have the greatest potential for anti-predator sentiment.

TABLE 8

SUMMARY OF POPULATION STATISTICS

County	Population within 10 miles of park	Per Capita income of rural persons	% of Rural persons below poverty level	% of Rural persons unemployed
Cocke	7,222	$1472	36.55%	10.34%
Swain	9,151	1706	30.85	4.59
Monroe	2,891	1571	30.64	8.48
Sevier	23,206	2018	23.35	5.32
Graham	1,515	1811	25.40	8.86
Jackson	3,102	2104	25.58	4.46
Haywood	4,167	2205	18.35	5.79
Blount	38,630	2287	19.27	3.93

In addition to the local human population, disturbances to mountain lions may arise from the great numbers of visitors coming to the park each year. The vast majority of visitors to the park (local and non-local) spend most of their time driving and looking at the scenery. The effect these people have on any lions in the park is probably minimal, since they rarely ever leave their cars and enter the woods (U.S. Department of the Interior, National Park Service, 1975).

The number of day hikers in the park in 1975 was over 220,000 people. By 1976, it had risen to 250,000 people. The number of overnight backcountry campers has also increased from 130,000 in 1975, to 140,000 in 1976 (Great Smoky Mountains National Park, monthly summary).

DISCUSSION

The number of lion sightings through the years suggest that the mountain lion may never have actually been extinct in the Great Smoky Mountains area. The lion may have been able to maintain itself in small numbers in the more inaccessible mountainous regions in or around the park. The present lion population could be derived in part from this small reservoir.

Lion sightings indicate that there were at least two breeding females in the park vicinity as well. If the lions in this area have home ranges that are as strongly defined as those studied in Idaho (Seidensticker et al., 1973), each of the clusters of sightings in the 1970's might indicate the home range of a given lion. Therefore, while a conservation population estimate for 1975 would be three animals, the estimate could be as high as five or six.

In predicting the future movements of lions in the area, many factors must be taken into consideration. Prey availability is, of course, a factor in determining suitable habitat, but the presence of other lions in the area is another factor that is likely to strongly affect the attachment of a transient lion to a given site (Seidensticker, et al., 1973).

Since lions have already been seen to the northeast and southeast of the park, further expansion in these directions is possible. Also a good-sized block of national forest lands with a good deer population is available to the southeast of the park.

Human disturbances of lions must also be taken into any consideration of future lion movements. The human population density is quite high to the north of the park. In addition, there are no national

forests and very few deer in that area. These two factors should discourage any extensive lion movements in that direction. Human population densities to the south of the park are moderately high, but there are large tracts of national forest lands, and good deer populations in parts of that area. Lions could eventually spread in that direction as well.

Hunters may also pose a threat to the lions in that area, especially those that hunt with dogs. Even if they are not actually killing the lions, their dogs may chase and disturb the animals.

It is presently impossible to assess the lion carrying capacity of a region on the basis of prey abundance. In the proceedings of the Mountain Lion Workshop (U.S. Fish and Wildlife 1976), several persons expressed the difficulty in evaluating lion habitat. Areas with high deer densities were found to have no lions, while other areas with fewer deer had resident lion populations (Op. Cit., pp. 106, 113). In addition, some lion populations increased, while deer populations decreased. The general opinion was that the lion was too generalized a predator to predict on the basis of a single prey species. When a preferred prey species was low in number, the lions switched to other food sources.

There are seasonal variations in the prey species used by lions. In the Idaho study by Hornocker (1970), lions preyed upon mule, deer and elk in the winter (September-May), but ate many small mammals such as ground squirrels in the summer. In fact, Hornocker could find no evidence that lions ate any deer or elk in the summer (U.S. Fish and Wildlife 1976:47).

There are about 800 square miles of high deer density areas in the Great Smoky Mountains region. These areas are generally located in large tracts of national forest lands, and contain many potential prey species other than deer. If mountain lions were to fully inhabitat this region at densities similar to those in Idaho (Hornocker 1970) a theoretical population of 60 lions would exist. Fracturing of the habitat and high human populations will probably prevent lions from reaching this level. However, recent increases in lion observations and the recent spread and increase in deer populations does suggest lion populations will increase.

Lions were not able to regulate prey numbers in the Idaho primitive area (Hornocker 1970), but they did "dampen" population fluctuation of the herds there. Deer populations near the Pisgah Wildlife Management Area fluctuate periodically due to disease, as do the deer herds in Cades Cove. In 1975, an outbreak of epizotic hemorrhagic disease

reduced the Pisgah herd somewhat, but the effect was not so devastating as in the case of Cades Cove (A. E. Ammons, personal communication). By dampening any population increases, lions could help to minimize the effects of outbreaks of contagious diseases.

The presence of a lion in an area generally causes deer to temporarily leave that area (Seidensticker et al., 1973). This may have a beneficial effect on deer in heavily stocked areas, since it would tend to disperse deer and possibly fracture the larger deer groups that are more likely to transmit diseases and cause vegetation damage.

If the number of lions in the park vicinity does increase, human-lion interactions will also increase. In British Columbia, the number of lion attacks on humans has increased dramatically in recent years, and much of the problem is thought to stem from increased lion-human interactions. Lions are found in subdivisions, summer home areas, and in other areas of high human density. The lion seems to be losing its fear of humans in that area. There have been 30 reported attacks on humans (16 of which occurred since 1967) resulting in three deaths and nine hospitalizations (U.S. Fish and Wildlife 1976). New Mexico also has reported a sudden increase in lion attacks on humans in the past 2 years, with one fatality recorded out of four incidents (Op. Cit., pp. 26). These incidents did not seem to be related to shortages in

food supply, but may be related to the age and sex of the lion involved. A higher percentage of incidents involved juvenile females without kittens.

Arizona and New Mexico have the highest rates of mountain lion depredations upon cattle. Phelps (U.S. Fish and Wildlife 1976) gives two reasons for this. First, the lions in these states are in constant contact with cattle, and secondly, calves are produced throughout the year.

In North Carolina and Tennessee, cattle operations are usually small, and the livestock are not on open range as in the western states. This affords better protection to livestock, and will probably keep depredations to a minimum in this area. Some depredations may occur, since suitable lion habitat is interspersed with private lands throughout the national forests. However, most high deer density areas (old wildlife management areas) are located in continuous blocks of national forest lands. If the lions are attracted to these areas because of the numerous deer, they will be effectively isolated from livestock operations.

The most important factor in determining the future of lions in the Great Smoky Mountains area will be the public's attitude towards the

animal. Lion management programs should emphasize to the public the possible beneficial effect lions will have on deer. There is also a great aesthetic value to maintaining a lion population in this area. The lion is a native animal, and has evolved to fill a niche in the ecosystem.

SUMMARY

1. Forty-three reliable lion sightings were gathered for the park vicinity. It is believed that there were three to six mountain lions living in the park in 1975, and other lions were reported to the southeast and northeast of the park as well. Lions were seen most frequently near areas of high deer density. There are probably enough high deer density areas in the park vicinity to support as many as 60 lions, but it is doubtful that the population will ever reach this level.

2. The greatest risk to the present lion population will be the public's attitude towards the animal. Any management programs should emphasize that a few lions will not harm deer or other game species in this area and may benefit the herd and range through dispersal of herds.

3. Visitors to the park should be encouraged to report any lions or lion sign they see, and all such reports should be investigated.

4. Future studies should try to provide more accurate population count of lions in the park, and should try to assess the reproductive success of these lions.

APPENDIX I

Summary of Lion Sightings

Before 1950

1. 1908-1909 - Reported by Rev. Conard, who was born and raised in Cataloochee before the park was established. A friend saw the lion by Tines Creek in the Big Cataloochee area. Later, they went out to hunt it with dogs. They tracked it and killed it and the two kittens that were found with it. He saw the body, and later the skin.

2. 1920 - Reported in Linzey and Linzey (1971) - W. Orr killed a lion near Fontana Village.

3. 1935 - Reported by James Sutton, who was born and raised in Cataloochee before the park was established. He saw a lion near the head of Indian Creek in Cataloochee.

4. 1941 - (Fall) Reported by Glen Branam, Park Dispatcher, who has lived in the area all his life. While hunting with a neighbor (now deceased) they treed two 20-pound kittens near Hillis Creek in the Greenbrier area, and killed them. Branam gave a good description of the kittens.

5. 1945-1946 - (Summer or Fall) Reported by G. Branam. He spotted a full-grown lion crossing the road leading into Greenbrier.

Before 1960

6. 1955 - Jim Garland (now dead), a park employee stationed at Bunker Hill Tower. He saw a lion from the tower as it approached some deer. The deer saw it and ran off. The lion stood up and walked away.

7. 1956-1957 - Reported by J. R. Buchanon, park employee, who does considerable hiking in the park. He saw lion tracks around Bunker Hill Tower, then saw a covered kill. He and Arthur Whitehead stayed to watch the kill, and saw a lion as it returned.

Before 1970

8. 1960 - Reported by Outward Bound Camp Director. The Director was in a station wagon with five or six school boys when a lion crossed the road in front of them. They were near Park Headquarters at the time, coming down from Newfound Gap. They stopped and got out of the car to watch the animal as it walked off down hill.

9. 1961 - (Fall) Reported by Mrs. C. C. Potter, resident of Gatlinburg. She saw a lion off the road near the entrance to Elkmont. She was with her husband at the time, both got a good look at it, and she gave a good description of the animal.

10. 1962 - (June) Mr. Murl Brown and son Charles, residents of Maryville, saw a lion near Gregory Bald. They gave a good description of the animal.

11. 1962-1963 - Grady Whitehead saw a lion cross the road near Panther Creek in the Bunker Hill area. He got a good broadside look at the animal as it stood on the edge of the road.

12. 1963 - (Fall or Winter) Lee Cochran, park employee, saw a lion cross the road in Alarka area near Bryson City. He returned the next day to track it with dogs, but the dogs only followed the scent a short while.

13. 1965 - (June) Fred Chub, a resident of Sevierville, saw a lion cross U.S. 129 just north of Tapoco. He gave a good description of a lion.

14. 1965 - (September) Stan Morse of Knoxville saw a lion cross U.S. 441 between Indian Gap and Collins Gap. A good description was given.

15. 1967 - (March) Park Ranger Patterson saw a lion cross U.S. 441 near the Deep Creek trailhead. He stopped his car and watched the animal from the side of the road.

16. 1968 - (November) The County Agent for Graham County saw a lion off the side of the road near Cherokee. He gave a good description.

1970's

17. 1970 - (Fall) J. Sutton was raised in Cataloochee, then spent 22 years in California, helping the U.S. Government trap lions. He saw two lions near the park, north of Bryson City. One was larger than the other, both looked like adults. He saw them (or similar animals) near the same location 8 months later.

18. Early to mid-1970's - Ray Dehart, park employee, who has lived most of his life in the area, saw tracks several times, around Heintooga Campground and Round Bottom area. In this area, he saw tracks indicating a female and two kittens. He did not notice any small tracks during 1976; however, he saw a lion near the High Rocks Tower on a trail.

19. 1971-1972 - (Fall) Bud Rice, Park Safety Officer, saw a lion cross the Clingman's Dome road early one morning.

20. 1971 - (October) John Shipman was taking pictures on Gregory Bald, when he noticed a lion on some rocks. He quickly took a picture of the animal and showed the picture to a Park Ranger. The Ranger did not seem very interested in the photograph and did not report the incident. The picture was misplaced and has not yet been found.

21. 1972 - (June) Dr. and Mrs. William T. Smith saw a lion cross the Blue Ridge Parkway near Crabtree area.

22. 1972 - (Spring or Fall) Bud Rice, Park Safety Officer, saw a lion up Caldwell Fork in the Big Poplar area. He also saw what may have been a covered lion kill near Palmer Creek.

23. 1973 - Rev. Bell of Cosby, saw a lion cross the road at Del Rio near the French Broad River. A good description was given.

24. 1973 - (November) Steve Hannah has lived for 23 years in the area. He lives adjacent to the Cataloochee section of the park and rides his horse there frequently. He saw a lion just outside of the park, south of Waterville Lake. A good description was given.

25. 1973-1974 - (Summer) Bud Rice, Park Safety Officer, saw a lion cross the road near Cove Creek Gap, up towards Stevens Gap (in Cataloochee area).

26. 1974 - (June) J. R. Buchanon, park employee, saw lion tracks in the Texas Creek area near the Appalachian Trail.

27. 1974 - (Winter) Bootie Miller has lived in the area all his life, and does a great deal of hunting. He and four other men saw a lion cross the trail from Happy Valley to Abrams Falls.

28. 1975 - (February) Douglas Hobbs, Forest Service employee, saw a lion cross the Blue Ridge Parkway at approximately Milepost 360. He gave a good description.

29. 1975 - (March) Mead Warren, Jr. and Bob Sloan saw a lion cross the road near Tapoco, North Carolina.

30. 1975 - (June) A woman at Cataloochee Campground saw a lion near the campground and described it to the ranger. Her description of the lion was good.

31. 1975 - (June) Ranger J. Shronce saw a lion cross the Cades Cove loop road, near the J. Cable Cemetery.

32. 1975 - (July) Park Superintendent Boyd Evison saw a large cat track (approx. 4" x 4") on Rainbow Falls Trail.

33. 1975 - (July) Lee Cochran, Walter Laws, Emmett Wiggins, and Horace Cunningham, park employees, saw a lion run across a field next to Cataloochee Bunkhouse.

34. 1975 - (July) Orberry Jackson, a resident of the area who frequently hunts in the area saw large cat tracks (3" x 3-1/4") with a stride of approximately 3 feet. They were found in the park on Greenbrier Cove. The tracks had been set down in mud.

35. 1975 - (August) Carson Foard and daughter saw a lion and two kittens cross the Blue Ridge Parkway 1 mile east of Pisgah Inn. Several other tourists saw them, and one person (unidentified) jumped from his car and chased them. A good description was given.

36. 1975 - (Fall) J. R. Buchanon, park employee, saw lion tracks near the Appalachian Trail just south of Cosby. He followed the tracks for a while in the snow.

37. 1975 - (October) Steve Pedigo, Assistant Ranger for Wayah R. D. in Nantahala National Forest, saw a lion cross the Blue Ridge Parkway north of Brevard, near Wagon Road Gap. He gave a good description.

38. 1975 - (December) Mr. O'Harris, a retired animal trainer who trained big cats for 55 years, saw a female lion with two kittens near U.S. 441, near the Chimneys picnic area. He jumped from his car and trailed them for about 1/2 mile. Other tourists were present. One man, unidentified, took a picture.

39. 1976 - (Spring) James Sutton saw a lion on the side of a jeep road near Soco Gap. His description was good.

40. 1976 - (July) Ranger J. Sherance saw a lion off the Cades Cove loop road, near Hyatt Lane cross road.

41. 1976 - (Summer) Francis Singer, Wildlife Biologist for Great Smoky Mountains National Park, saw lion tracks near Rich Mountain Road on Cades Cove Loop Road.

42. 1976 - (September) J. R. Buchanon saw fresh lion tracks while tracking a wounded sow hog. He said that the lion looked as if it were following the sow.

43. 1976 - (October) Steve Hannah was riding his horse about 2 miles north of Walnut Bottoms, past the junction of Yellow Creek and Big Creek. A lion ran across the trail in front of him, then crossed the stream. He gave a good description.

44. 1973 - (December) Three State Wildlife Biologists saw a lion in Andrew Johnson Wildlife Management Area (Nowak 1976).

APPENDIX II

Summary of Deer Herds in North Carolina and Tennessee

Polk County, Tennessee (excluding Ocoee Wildlife Management Area)

The number of deer killed by hunters in Polk County has been declining ever since 1952. In 1952, 27 buck deer were harvested by hunters in the county. By 1969, this had dropped to 19. Since then, only two deer have been reported taken by hunters, the last one in 1971 (Tennessee Wildlife Resources Hunter Harvest).

In 1971, the area was stocked with deer, but heavy poaching has slowed the rate of increase of these introduced animals (Duncan, personal communication; Harry Switzer, personal communication).

Within Polk County is the Ocoee Wildlife Management Area. This area is thought to be overstocked with deer at the present (Switzer, personal communication). Weights of deer in the management area have been declining over the years, and the reproductive rate is thought to be low (Tennessee Wildlife Resources estimates). In 1975, 55 bucks were taken by hunters and 86 were taken in 1976 (Tennessee Wildlife Resources Deer Harvest Data). An either-sex hunt was instituted in 1976, and 22 does were taken in that hunt.

The Ocoee is rather inaccessible to hunters. As a result, fewer deer are harvested there than should be, if the population is to decrease to healthier levels. Poaching is said to be quite heavy in the more accessible areas of the Ocoee (Switzer, personal communication; Smith, personal communication).

Monroe County, Tennessee (outside of Tellico Wildlife Management Area)

Monroe has relatively few deer, since much of the county is composed of agricultural land and urban centers in the north. Seven deer were taken from Monroe County in 1975, and nine in 1976 (Tennessee Wildlife Resources Deer Harvest Data).

Most deer in Monroe County are found in the Tellico Wildlife Management Area. This management area is thought to be overstocked with deer. Weights and antler development of harvested bucks are both poor (Duncan, personal communication). Ninety deer were taken in 1975, and 283 deer were taken in 1976 (Tennessee Wildlife Resources Deer Harvest Data). Either-sex hunts are being conducted in the Tellico Wildlife Management Area to reduce the rate of herd increase.

Blount County, Tennessee (outside of park boundary)

In 1975, no deer were taken in Blount County, and in 1976, the entire county was closed to hunting. The deer population in the county is extremely low, and restocking efforts may be needed to increase the number of deer.

Sevier and Cocke Counties in Tennessee

Sevier and Cocke Counties were both closed to hunting in 1975 and 1976, due to extremely low deer populations. Deer in Cocke County suffer from high poaching pressure (Wildlife Biologist for Nolichucky R. D., personal communication). The area of the Cherokee National Forest near the park in Cocke County was stocked with deer in 1974. Due to poaching, the deer have been almost eradicated in that area now (ibid.). There are practically no deer close to the park in either Sevier or Cocke Counties, due to high human populations, heavy poaching, and the complete failure of restocking programs.

Greene County, Tennessee (outside of Andrew Johnson Wildlife Management Area)

The Greene County deer harvest was 10 deer in 1975, but increased to 19 deer in 1976. Most deer in the county are located within or

near the Andrew Johnson Wildlife Management Area. Thirty-five deer were harvested in the management area in 1975, and 51 in 1976. This management area is nearing the upper limits of its supportable deer population. Antler development is poor, but weights are not yet as low as for the overstocked levels in Tennessee.

Unicoi County, Tennessee (including Unicoi Wildlife Management Area)

Unicoi County is almost entirely devoted to the Unicoi Wildlife Management Area, and so both regions will be treated as a unit. In 1975, there were 74 deer harvested in the management area alone.

Countywide harvest figures were not available for that year. An either-sex hunt was conducted to reduce the rate of population increase, and by 1976, 87 deer were harvested for the entire county. Forty-three of these deer were taken on the management area.

The area is thought to be overstocked with deer, even after the either-sex hunt. Antler development and reproductive success are both low, and weights have been declining over the years (B. Duncan, personal communication). Future either-sex hunts will aim at reducing the population further.

Carter County, Tennessee (excluding Laurel Forks Wildlife Management Area)

Carter County has a fairly good deer population, with 83 deer taken in 1975, and 40 in 1976. Within Carter County is the Laurel Forks Wildlife Management Area. Twenty-five deer were harvested from the management area in 1975, and 34 in 1976. Antler development and weights of deer in the management area are both good (Duncan, personal communication). It seems that the Laurel Forks area has a healthy, growing deer population.

Cherokee County, North Carolina

Cherokee County has a seemingly low deer population, although there are no actual population estimates for the region. The 1976 Hunter Harvest Data was only 50-60 percent complete at the time this was being written (A. E. Ammons, personal communication). So far, nine deer have been reported harvested in the county in 1976. Cherokee County borders Polk County to the southwest, and Clay County to the southeast. Both of these counties have areas of high deer density near Cherokee. It is possible, but unverified, that spillover of deer from these well-stocked areas into Cherokee County may occur. These large reservoirs of deer available in these adjoining counties to the south of Cherokee County probably contribute to a fair deer population in Southern Cherokee.

The northeast section of the county has very few deer, and has been designated as a deer restoration area (A. E. Ammons, personal communication). Restocking programs will aim at bringing the deer population up to harvestable levels.

Graham County, North Carolina (outside of Santeetlah Wildlife Management Area)

Most deer in this county are in the old Santeetlah Management Area. In 1970, 47 deer were harvested there. So far, 15 deer have been reported harvested in Graham County in 1976. Most of these were probably taken near Santeetlah, or possibly along the edge of Lake Fontana, which also has a fair deer population (A. E. Ammons, personal communication).

Near Robbinsville, in the center of the county, there are practically no deer, and restocking efforts have begun there (Brown, personal communication). Poaching is said to be high there, and low deer densities are attributed to poaching (ibid.).

There is good habitat available for deer in the county, and plenty of room for growth of the deer population. In spite of this, the deer population has been decreasing throughout the area for the past 15 years (Brown, personal communication).

Macon County, North Carolina (contains both Wayah and Standing Indian Wildlife Management Areas)

Macon County contains both the Wayah and Standing Indian Management Areas, and supports fairly good deer populations in its southern half (Pedigo, Ammons, personal communication). The old Standing Indian Wildlife Management Area at the southern end of the county has quite a few deer, with approximately 75 deer a year harvested there (Pedigo, personal communication). North of Standing Indian is the old Wayah Wildlife Management Area, which had a buck harvest of 41 animals in 1970. Between these two areas of high deer density, there is a fair deer population, but poaching is a problem in the area (Pedigo, personal communication). The most severe poaching is in the northern part of the county. Deer have been so depleted in that section that restocking efforts have begun. Forty deer have been introduced so far. Hopefully, they will be able to withstand the heavy poaching pressure.

Swain County, North Carolina (outside of park boundary)

Swain County is largely composed of national park lands. Outside of the park, the county has a fairly low deer population, with only seven deer reported taken in 1976, so far. Most of Swain County is involved in the same restocking effort as northern Macon County. In comparison with Macon County, poaching in Swain County is as least as bad, and probably worse. Deer population may remain low as a result (Ammons, personal communication).

Jackson County, North Carolina (outside of park boundary)

Jackson County also borders on the park, and the deer population is quite low outside the park lands. Only two deer have been reported harvested in the 1976 hunting season, with 50-60 percent of the reports compiled (A. E. Ammons, personal communication). Deer are not plentiful anywhere in the county. Deer are said to cross back and forth from Georgia into the southern end of Jackson County, and this makes it difficult to assess deer population of the county (Henry, personal communication).

Less than 60,000 acres of national forest lands exist in Jackson County, so relatively little suitable deer habitat is available. Deer populations will probably remain fairly low in this county as a result.

Buncombe, Transylvania, Henderson Counties, in North Carolina

Buncombe, Transylvania, and Henderson Counties all contain portions of the Old Pisgah Wildlife Management Area. This is a large management area (90,000 acres), and in 1970, 201 deer were harvested there. The highest deer densities in these counties are still within or adjacent to this old management area (A. E. Ammons, personal communication).

Haywood County, North Carolina

Haywood County possesses some of the highest deer densities in the entire North Carolina area under consideration. Most of these deer are located in the Sherwood-Shining Rock Wildlife Management Area (Ammons, personal communication). One hundred and forty-five deer were harvested in this management area in 1970, and the incomplete 1976 harvest figure for the entire county stands at 101 deer so far. Although the Sherwood area is densely stocked, it is not thought to be overstocked yet (Ammons, personal communication). The deer population has probably been increasing in the county over the years, especially where logging operations have provided good deer habitat (Reed, personal communication). Just north of the Sherwood area is a broad belt of private lands and human settlements. Deer are quite scarce through this area. North of this belt, up to the Harmon Den Wildlife Management Area in Haywood County, is a large area with moderately good deer populations.

The Harmon Den Wildlife Management Area has fairly good deer herds, but is not so well stocked as the Sherwood area. In 1970, 25 deer were taken in the Harmon Den area.

Clay County (outside of Fires Creek Wildlife Management Area)

Clay County contains the old Fires Creek Wildlife Management Area site within its boundaries. In 1970, 68 deer were harvested in the Fires Creek area alone, indicating a good deer population.

Incomplete tallies of the 1976 deer harvest show that so far 42 deer have been taken in the entire county. Most of these deer were probably killed near the old Fires Creek Wildlife Management Area (Ammons, personal communication). Generally, Clay County has a fairly good deer population, although deer densities are still highest near the old management area site.

Madison County, North Carolina

Madison County contains the old Rich-Laurel Wildlife Management Area within its boundaries. Twenty-nine deer were harvested in Rich-Laurel in 1970, and the incomplete tally of the county-wide 1976 harvest stands at 25 deer so far. Madison County is thought to have a fair deer population, although most deer are concentrated in the northern portion near the Rich-Laurel area (Ammons, personal communication).

Yancey County, North Carolina

Yancey County contains both the Flat Top and Mt. Mitchell Wildlife Management Areas. The Flat Top Wildlife Management Area is on the northern edge of the county and seems to have a good deer population. Fifty-two deer were harvested there in 1970. To the south of this wildlife management area the deer density is moderately good. The Mt. Mitchell Wildlife Management Area is in the southern end of the county. Deer are fairly well stocked in that area, with 50 deer taken by hunters there in 1970.

PERSONS CITED

Ammons, A. E., North Carolina Wildlife Resources Commission, Biologist. Lake Junulska, North Carolina.

Assistant Ranger, Cheoah District, Nantahala National Forest, Robbinsville, North Carolina.

Duncan, B., Tennessee Wildlife Resources Commission, Biologist, Morristown, Tennessee.

Engle, Charles, Hiwassee District Ranger, Cherokee National Forest, Etowah, Tennessee.

Herd, D., Tennessee Wildlife Resources Commission, Biologist.

Hyder, B., Tennessee Wildlife Resources Commission, Biologist.

Lee, David, Curator of Birds and Mammals, North Carolina State Museum of Natural History, 101 Halifax Street, Post Office Box 27647, Raleigh, North Carolina 27611.

Pedigo, S., Wayah District, Assistant Ranger, Nantahala National Forest, Franklin, North Carolina.

Pelton, M., Forestry Department, University of Tennessee, Knoxville.

Reed, J., Pisgah District Ranger, Pisgah National Forest, Pisgah, North Carolina.

Saunders, R., Tennessee Wildlife Resources Commission, Biologist, Morristown, Tennessee.

Switzer, Harry, Ocoee District Ranger, Cherokee National Forest, Brenton, Tennessee.

Weber, A., Wildlife Biologist, North Carolina State University, Forestry Department, extension service.

Wildlife Biologist, Nolichucky District, Cherokee National Forest, Greenville, Tennessee.

LITERATURE CITED

Belden, R., M. Pelton, 1975. European Wild Hog Rooting in the Mountains of East Tennessee. Proc. 29th Ann. Conf. of Southeast Assoc. of Game and Fish Comm. p. 665.

Bratton, S., 1974. An Integrated Ecological Approach to the Management of European Wild Boar (Sus scrofa) in the Great Smoky Mountains National Park. Management Report No. 3, Uplands Field Research Laboratory, Gatlinburg, Tn. p. 42.

Chase and Jenkins, 1962. Productivity of the Georgia Reserve Deer Herd. Proc. 1st Nat. W. T. Deer Disease Symp. 1:78-88.

Cook, R. M., White, D. Trainer, and W. Glazener, 1971. Mortality of Young White Tailed Deer Fawns in South Texas. Journal of Wildlife Management, Vol. 35(1):47.

Dechert, J., 1967. The Effects of Overpopulation and Hunting on the Fort Knox Deer Herd, Southeast Assoc. of Game and Fish Comm. p. 15.

Fox, J., M. Pelton, 1973. Observations of a White Tailed Deer Die-off in the Great Smoky Mountains National Park. Proc. of 27th Annual Conf. of Southeast Assoc. of Game and Fish Comm. p. 297.

Great Smoky Mountains National Park, 1965. Monthly Summary of Visitor Use. Compiled by the Great Smoky Mountains National Park, Tennessee.

Hawkins, R., W. Klimstra, 1966. Social Organization of White Tailed Deer. Journal Wildlife Management. p. 407.

Herald Chronicle, 1971. Winchester, Tenn., December 9, 1971. Figure on page 11-A.

Hornocker, M., 1970. An Analysis of Mountain Lion Predation Upon Mule Deer and elk in the Idaho Primative Area. Wildl. Monog. No. 21.

Kelker, 6., 1947. Computing the Rate of Increase for Deer. J. Wildl. Manage. 11(2):177.

La Follette, J., 1974. Some Aspects of the History of the Black Bear (Ursus americanus) in the Great Smoky Mountains National Park. M.S. thesis, University of Tennessee.

Linzey and Linzey, 1971. Mammals of the Great Smoky Mountains National Park. The University of Tennessee Press, Knoxville. p. 68-70, 75-76.

Nowak, R., 1976. The Cougar in the United States and Canada. U.S. Fish and Wildlife Service, Office of Endangered Species, Washington, D.C. p. 109.

Nowak, R., R. McBride, 1973. Feasibility of a Study of the Florida Panther. Report to World Wildlife Fund. p. 13.

Perry, M., R. Giles, 1970. Studies of Deer-Related Dog Activity in Virginia. Southeast Assoc. of Game and Fish Comm. 24:65-73.

Seidensticker, J., M. Hornocker, W. Wiles, and J. Messick, 1973. "Mountain Lion Social Organization in the Idaho Primitive Area." Wildlife Monograph No. 35.

Snedecor, G., W. Cochran, 1967. Statistical Methods. Iowa State University Press, Ames. p. 20-29 and 135-171.

Sweeney, J., L. Marchinton, J. Sweeney, 1971. Responses of Radio-Monitored White-Tailed Deer Chased by Hunting Dogs. Wildl. Monogr. 35(4):707.

U.S. Department of the Interior, National Park Service, Great Smoky Mountains National Park, 1975. Visitor Sampling Survey, Final Analytic Report. Professional series Contract No. CX2000-4-0035.

U.S. Fish and Wildlife Service, Region 1, 1976. Transactions of the Mountain Lion Workshop of the Western States and Canada. Held in Sparks, Nevada, January 13 and 14, 1976. p. 190.

Verne, L., 1969. Reproductive Patterns of White-Tailed Deer Related to Nutritional Plane. J. Wildl. Manage. Vol. 33(4):881.

Whittaker, R., 1956. Vegetation of the Great Smoky Mountains. Ecol. Monogr. 26:1-80.

Whittle, W., 1934. Movement of Population from the Smoky Mountains Area. University of Tennessee Agricultural Experiment Station. Paper No. 33. 40 pp.