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MOVEMENTS OF TRANSPLANTED EUROPEAN WILD BOAR IN NORTH CAROLINA AND TENNESSEE [1]

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ABSTRACT

Movements and homing instinct of transplanted European wild boar were studied on adjacent wildlife management areas in western North Carolina and eastern Tennessee over a six-year period (1960-1965). Ninety-one wild boars were live-trapped within the Great Smoky Mountains National Park, transferred to the game department representing the state within which they were captured, ear-tagged for subsequent identification, and released at distances ranging from 13 to 27 airline miles from the point of capture. Movements information was derived by (1) recovering tags and pertinent kill data from hunters, (2) retrapping, and (3) locating dead animals. Hunters reported tags from 26 (28.5 percent) of the transplanted wild boars during the study period. Hunter-killed boars had traveled airline distances of from one-half mile to approximately 14 miles from the release site and were killed at time intervals ranging from one day to over three years following the release date. None of the transplanted wild boar were known to return to the Great Smoky Mountains National Park as determined both by a continuous trapping program and the direct removal of 44 additional animals from areas of heavy concentration within the park.

The objective of this study was to determine movements and homing instinct of European wild boar (*Sus scrofa L.*) transplanted from the Great Smoky Mountains National Park to wildlife management and adjacent areas in North Carolina and Tennessee. Boars were removed from the park because of wildlife management policies adopted by the National Park Service which specify the perpetuation of native fauna and the elimination or reduction of exotic species (National Park Service, 1955).

Under the terms of cooperative agreements, hogs trapped within the park were given to the game department representing the state within which they were captured for use in supplementing established hog populations on lands managed by that state. State agencies represented were the North Carolina Wildlife Resources Commission and the Tennessee Game and Fish Commission.

This paper presents movement data on transplanted wild boar collected during a six-year period, 1960 through 1965, and discusses homing instinct.

The terms *wild boar* and *wild hog*, or *hog*, are used interchangeably in the present paper to denote descendents of 13 swine of European

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wild boar stock imported from Germany in 1912 to a fenced preserve on Hooper Bald, located in the Snowbird Mountains of Graham County, North Carolina. In the early 1920's these swine and their offspring escaped into the surrounding mountains and established a wild population. Interbreeding between feral swine and wild razorbacks has occurred to an unknown extent over the years but physical characteristics common to European wild boar have prevailed. All degrees of intergradation are, however, represented in the population (Jones, 1959).

The authors are grateful to U. S. Park Service personnel, wildlife protectors, and game area managers for the labor involved in trapping, handling, and transplanting the wild boar involved in this study. Valuable criticism of portions of the manuscript was provided by Mr. Jim Lewis, Supervisor of Game Research, Tennessee Game and Fish Commission.

DESCRIPTION OF THE STUDY AREA

The study area constituted the heart of wild boar range in the Appalachian Mountains and consisted of: (1) the southwestern section of the Great Smoky Mountains National Park in Swain County, North Carolina, and both Blount and Sevier Counties in Tennessee (102,000 acres); (2) the Santeetlah Wildlife Management area and nearby Snowbird Mountains of the Nantahala National Forest in Graham County, North Carolina (37,880 acres); and (3) the Tellico Wildlife Management Area of the Cherokee National Forest in Monroe County, Tennessee (78,500 acres, Fig. 1).

The entire study area was a rugged wilderness of jagged mountain peaks, steep slopes, narrow valleys dissected by fast moving streams, and covered with forests in advanced stages of succession. Altitudes ranged from 1,800 feet to a maximum 6,642 feet at Clingman's Dome in the Great Smoky Mountains. An extremely variable climate, influenced by elevation, was characterized by moderately cold winter temperatures, warm summer days with cool nights, and one of the highest rainfalls (averaging 56 inches) in the United States.

Virgin timber stands existed in the more remote areas of the National Park and in the 3,800-acre Joyce Kilmer Memorial Forest within the heart of the Santeetlah wildlife area. Logging operations were limited to timber stand improvements in the two national forests. Access into the state and federal areas was by unimproved roads and trails. Farmland occupied less than one percent of the total area and was restricted to private lands bordering state and federal areas.

The vegetation of the Great Smoky Mountains has been adequately described by Whittaker (1956).

During the study period wild boar herds ranged throughout the southwestern section of the national park in Tennessee, north to the vicinity of Cades Cove, east along a line roughly following the ridge separating the two states to the vicinity of Noland Divide and south throughout the North Carolina section to the park boundary (Fig. 1). Wild hog herds were concentrated on the two wildlife management areas principally because of suitable habitat and protection from both poachers and free-ranging dogs. Adjacent national forest lands were also occupied by hogs as these areas contained suitable hog range characterized by favorable mast crops and remoteness from civilization.

The Little Tennessee River separating the national park from the wildlife management areas was not considered a natural barrier to the movements of wild boar, since hogs have been observed swimming the 300-yard distance across the river. Wild boar herds in the study area were considered as one contiguous population.

Hunting was permitted on the wildlife management and surrounding federal lands exclusive of the national park. Managed big game hunts for bear, boar, and deer were held on the two wildlife management areas. Hunts for bear and boar were classified either as (1) party hunts permitting the use of dogs, or (2) individual still hunts excluding dogs. Managed hunts were scheduled in advance for dates extending from mid-October through November. Open seasons on the national forest and surrounding private lands for bear and boar extended from mid-October through the first of January.

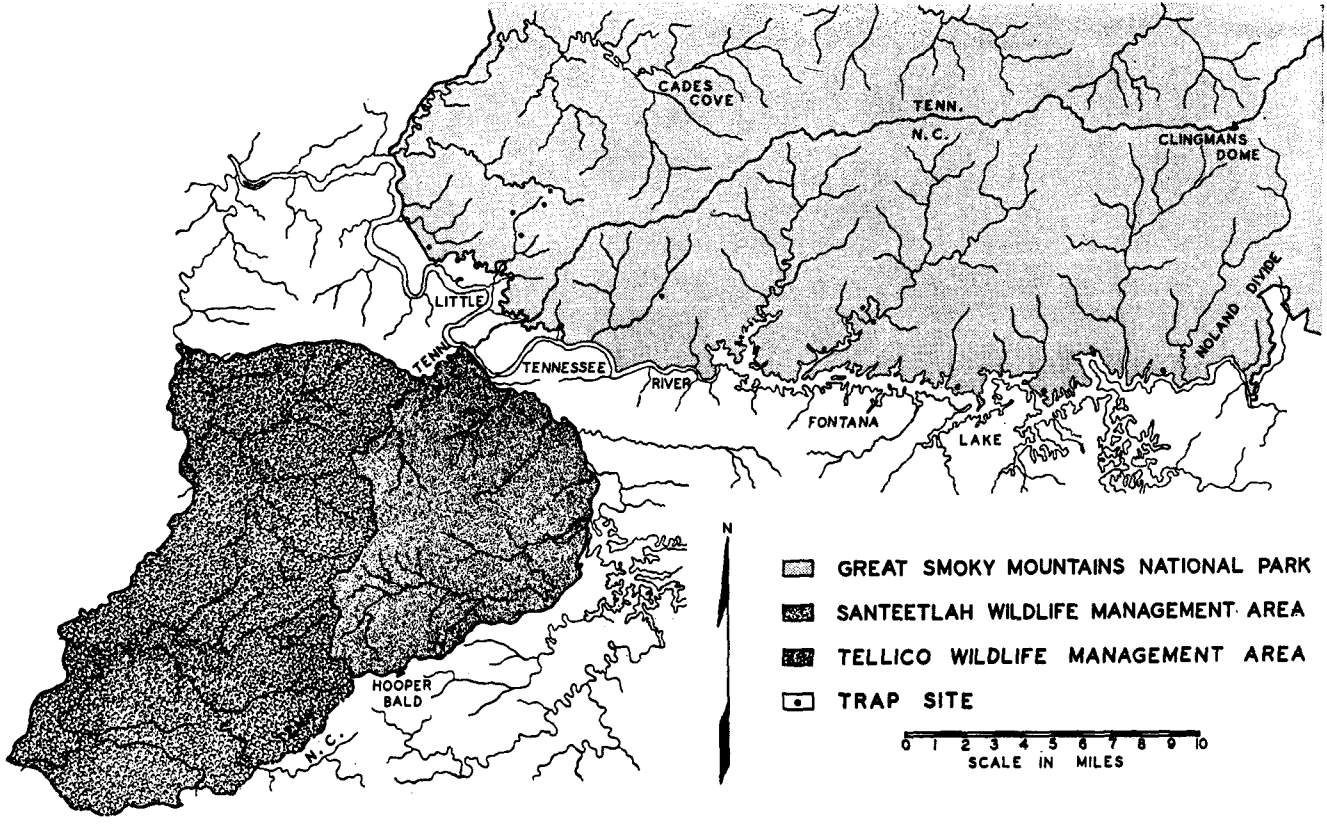

Fig. 1. Map of study area. Wild boar range within the Great Smoky Mountains National Park during the study period (1960 - 1965) was roughly confined to that portion of the park shown above.

METHODS

All transplanted wild boar discussed in the present study were live-trapped within the Great Smoky Mountains National Park by Park Service personnel. Large, single-gate, box-type traps of heavy gauge, chain-linked wire were used to capture hogs (Matschke, 1962). Trapped hogs were given to the appropriate state wildlife agency for handling and transporting to release sites. Immobilizing drugs were used in Ten-

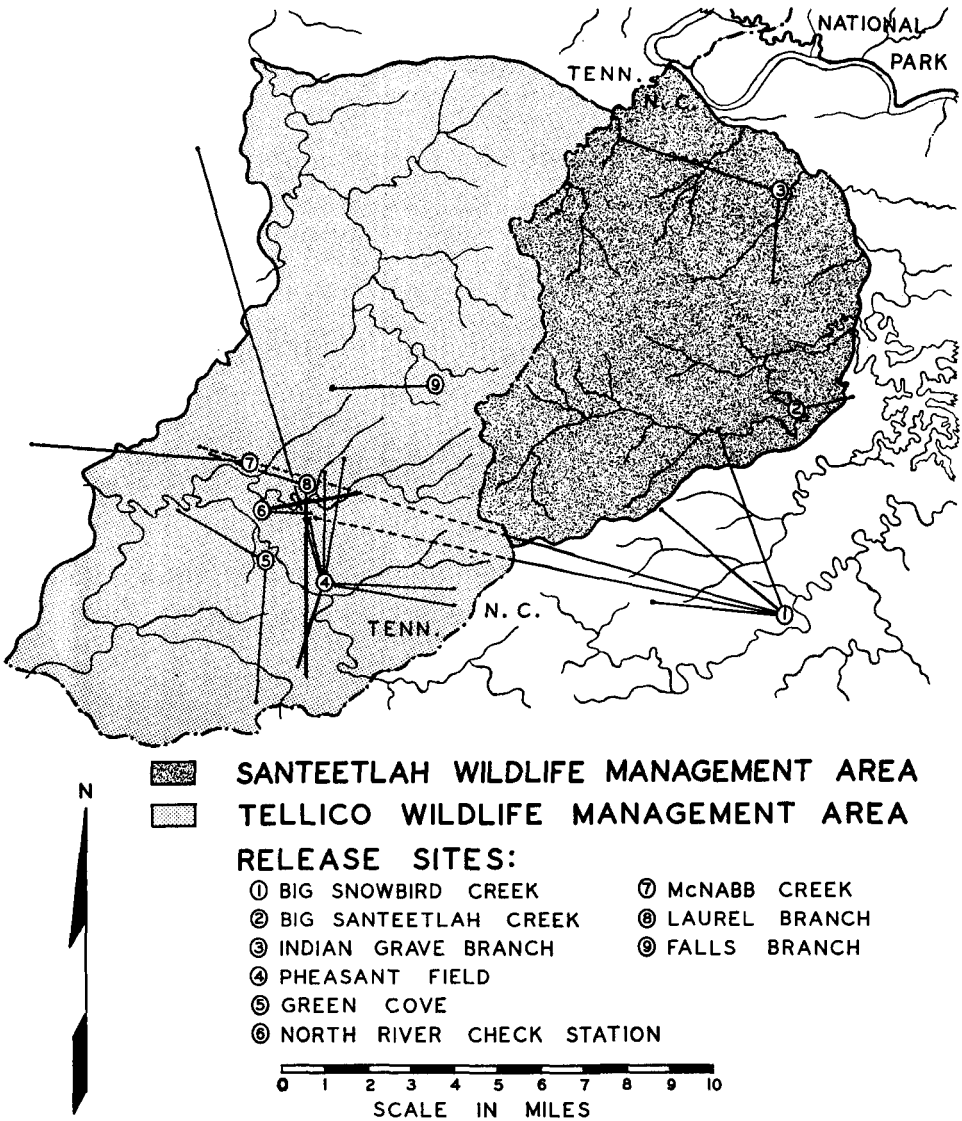

Figure 2. Release site locations for wild boar transplanted from the Great Smoky Mountains National Park. Straight lines connect release sites with kill locations and indicate both the airline distance and direction of travel taken by each killed hog. Each of the two lines at release site Number 2 (Big Santeetlah Creek) denotes the airline distance and direction of travel for four wild boar; two killed at each location at the same time.

nessee to facilitate the handling of large hogs (*op. cit*). Prior to release, all wild boar were ear tagged with consecutively numbered metal tags, sexed, and weighed (weights were estimated in North Carolina). In addition, Tennessee biologists used an ear notch number-system in case ear tags became lost (Winters, 1952). Swine released in Tennessee were aged through the use of known-age skulls and tooth erruption patterns (G. H. Matschke, Report of European Hog Research, 1964, unpublished Tennessee Game and Fish Commission report).

Wild boar were released on the Santeetlah Wildlife Management Area at two locations and on the nearby Snowbird watershed at one location. Six locations were utilized as release sites within the Tellico Wildlife Management Area (Fig. 2).

Wild boar movements were determined by (1) recovering tags from hunters on the wildlife management and adjacent open hunt areas, (2) retrapping on the Tellico Wildlife Management Area, and (3) locating dead swine. Airline distances from the release site to retrap or kill locations were plotted and computed with the aid of maps.

All wild boar live-trapped or killed by National Park Service personnel within the national park were examined for both ear tags and ear notches.

RESULTS

During the six-year study period 91 wild boar were transplanted from the Great Smoky Mountains National Park to wildlife management areas and adjacent lands in North Carolina and Tennessee. The North Carolina Wildlife Resources Commission transplanted 62 wild boar at three locations on and adjacent to the Santeetlah Wildlife Management Area and the Tennessee Game and Fish Commission transplanted 29 wild hogs at six locations on the Tellico Wildlife Management Area. The number of wild hogs released at each site is given in Table 1.

Table 1. Number of Transplanted Wild Boar Released at Established Release Sites and the Number of Wild Boar Killed or Found Dead.

Release Sites	Released	Killed by Hunters	Found Dead
North Carolina			
Big Snowbird Creek	37	5	
Big Santeetlah Creek	19	4	
Indian Grave Branch	6	2	
Tennessee			
Pheasant Field	13	7	
Green Cove	6	1	1
North River Check Station	3	2	
McNabb Creek	2	0	1
Laurel Branch	4	2	
Falls Branch	1	1	
TOTALS	91	24	2

Twenty-nine tagged boar (32 percent of all transplanted swine) were recovered during the study period. Of these recovered swine 11 had been released in North Carolina and 18 had been released in Tennessee. Hunters accounted for the nine tagged hogs recovered in North Carolina. In Tennessee transplanted hogs were recovered in the following manner: (1) 15 were recovered by hunters (this figure includes two hogs released in North Carolina); (2) three were retrapped, examined, and released (two of these swine were later killed by hunters); and (3) two were found dead (Table 2).

During the study period all of the wild boar were transplanted at distances ranging from 13.4 airline miles to 27.4 airline miles from

TABLE 2

MOVEMENTS DATA ON HUNTER-KILLED WILD BOAR TRANSPLANTED FROM THE GREAT SMOKY MOUNTAINS NATIONAL PARK TO WILDLIFE MANAGEMENT AREAS IN NORTH CAROLINA AND TENNESSEE (1960 - 1965)

Tag Numbers	Sex	Age at Time of Release	Date of Release	Date of Recovery	Time Interval Between Release and Recovery	Airline Distance (in miles) from: Release Site to Point of Recovery	Initial Trap Site to: Release Site	Initial Trap Site to: Point of Recovery
425 426	F	J	3/14/60	4/06/60	23 days*	2.8*	18.3*	18.5*
480 481	M	J	5/17/60	4/24/60	7 days*	5.1*	17.3*	20.6*
494 495	F	J	6/28/60	11/04/63	3 years & 5 months	2.1	13.4	14.8
537 538	F	A	2/09/61	11/ /61	9 months	3.2	20.2	23.2
710 711	M	A	1/05/62	11/09/63	1 year & 10 months	2.7	18.9	16.7
744 745	M	A	2/03/62	7/ /63	1 year & 5 months	10.5	18.5	13.6
754 755	F	A	5/08/62	11/04/63	1 year & 5 months	3.2	18.5	15.5
863 864	F	J	4/21/64	11/02/65	1 year & 7 months	4.4	27.4	30.2

*Animal found dead.

the initial point of capture. The mean distance involved was 18.0 airline miles.

Distances traveled by transplanted wild boar from the time of release to recovery varied from 0.5 airline miles to 13.7 airline miles. The mean movement from the point of release to the recovery site was detemined to be 3.4 airline miles for all boar recovered; 4.9 airline miles for adults and 2.6 airline miles for juveniles.

TABLE 2 (continued)

Tag Numbers	Sex	Age at Time of Release	Date of Release	Date of Recovery	Time Interval Between Release and Recovery	Airline Distance (in miles) from: Release Site to Point of Recovery	Airline Distance (in miles) from: Initial Trap Site to: Release Site	Airline Distance (in miles) from: Initial Trap Site to: Point of Recovery
883 884	F	J	5/04/64	10/30/65	1 year & 4 months	2.1	24.0	18.9
899 900	F	A	6/13/64	11/06/64	5 months	2.6	16.8	16.2
964 965	M	J	6/10/64	11/02/65	1 year & 5 months	2.2	20.2	22.2
972 976	F	J	6/27/64	11/14/64	5 months	2.5	16.4	17.2
985 986	M	J	7/03/64	11/07/64	5 months	2.6	16.8	16.8
995 996	F	A	7/20/64	11/06/64	5 months	1.3	16.0	15.4
997 998	M	J	7/28/64	11/09/64	5 months	1.5	20.0	18.9
494 495	F	J	6/28/60	7/19/60	21 days**	3.7**	13.4**	18.9
883 884	F	J	5/04/64	8/14/64	3 months**	0.5**	24.0**	24.1

**Animal captured in live trap, examined, and released.

TABLE 2 (continued)

Tag Numbers	Sex	Age at Time of Release	Date of Release	Date of Recovery	Time Interval Between Release and Recovery	Airline Distance (in miles) from: Release Site to Point of Recovery	Initial Trap Site to: Release Site	Initial Trap Site to: Point of Recovery
972 976	F	J	6/27/64	7/03/64	5 days**	0.3**	16.8**	21.8
NC-3305	M	A	10/27/62	10/27/62	1 day	4.5	17.2	15.6
NC-3313	F	J	4/29/63	11/09/63	7 months	11.0	17.4	24.6
NC-3385	F	A	3/31/62	11/19/63	1 year & 7 months	13.7	14.8	19.7
NC-4003 4004	F	J	3/05/64	10/15/64	8 months	0.5	13.9	14.1
NC-4007 4008	F	J	3/20/64	10/15/64	7 months	0.5	13.9	14.1
NC-4013 4014	M	A	4/27/64	11/03/64	7 months	3.2	15.7	17.4
NC-4020 4021	M	J	5/08/64	11/ /64	6 months	1.0	15.0	14.3
NC-4024 4025	F	J	5/12/64	11/ /64	6 months	1.0	15.0	14.3

**Animal captured in live trap, examined, and released.

TABLE 2 (continued)

Tag Numbers	Sex	Age at Time of Release	Date of Release	Date of Recovery	Time Interval Between Release and Recovery	Airline Distance (in miles) from: Release Site to Point of Recovery	Initial Trap Site to: Release Site	Initial Trap Site to: Point of Recovery
NC-4040 4043	M	A	8/31/64	12/19/64	4 months	3.9	23.8	25.5
NC-4057 4058	F	J	11/06/64	11/14/64	9 days	3.2	17.1	21.8
NC-4061 4062	M	J	11/30/64	12/02/64	3 days	2.0	17.1	17.8

Distances from recovery sites to the original point of capture for transplanted wild boar varied from 13.6 airline miles to 30.2 airline miles. The average distance involved was 18.7 airline miles.

The interval of time which existed from the release date to the time of recovery varied from one day to three years and five months. The average period of time involved was 10.5 months for adults and 9.0 months for juveniles.

The general direction of travel from the release site to recovery point was indicated by connecting the release site and recovery point with a straight line on a map (Fig. 2).

Six adult hogs were taken on still hunts and four were taken with the aid of dogs. Of the 14 juvenile swine recovered, seven were taken on still hunts and seven were captured with the aid of dogs.

During the study period an extensive wild hog trapping and tagging operation was conducted on the Tellico Wildlife Management Area. Only three of the transplanted wild hogs were retrapped during the study period. Hogs were retrapped from five to 105 days following the initial release. Two were retrapped within one-half mile of the release point and the other hog, released in the Citico watershed, had moved approximately four miles and was recovered in the Tellico River drainage.

Two transplanted wild hogs released on the Tellico Wildlife Management Area in 1960 were found dead. One of these hogs had traveled approximately three miles from the release site within 17 days and the other hog had traveled approximately five miles within seven days. One of these hogs was emaciated when released and the other was found with a split skull.

DISCUSSION

Wild boar movements are probably influenced principally by such factors as the available mast crop, weather, and hunting pressure. Data relating to these factors was collected during the study period but is not presented here because of insufficient sample size. Nevertheless, the direction and distance traveled by transplanted wild boar from the release site to the point of capture over varying periods of time is of value for the management of this species.

Wild hogs released in Tennessee had a tendency to remain within the boundaries of the Tellico Wildlife Management Area. The relatively close proximity of kills within the Tellico River drainage reflects the popularity of this area from the standpoint of wild boar hunters, optimum range for wild hogs, and relatively little harrassment by dogs.

With few exceptions adult wild boar transplanted from their original home range to release sites within or near the wildlife management areas during the study period traveled greater distances than immature hogs. Adults ranged from 1.3 to 13.7 airline miles with a mean distance of 4.8 airline miles. Immature hogs ranged from one-half mile to 11 airline miles from the release site with a mean distance of 2.6 airline miles.

Distances traveled with respect to time following the release varied considerably. As pointed out previously one adult traveled 4.5 airline miles overnight, and two juveniles were killed 2.0 and 3.2 airline miles from the release site three and nine days following release. In contrast one juvenile hog was recovered 2.1 airline miles from the release site three years and five months following the release date. No pattern of distance with respect to time following release was evident from the data collected during the study period.

Movements of transplanted wild boar from release sites in North Carolina were not random but occurred in either a western or northwestern direction. It is believed that this occurred because these directions coincided with areas favorable to wild boar with respect to remote habitat and freedom from the pursuit of men and dogs. Random movements within the Tellico Wildlife Management Area indicate favorable wild boar habitat throughout much of that area.

Since none of the 91 wild boar transplanted from the Great Smoky Mountains National Park were retrapped within the boundaries of the park during the study period and none of the 44 wild boar killed by park rangers within the park were transplanted swine, it is reasonable to assume that wild boar do not have a tendency to return to former home ranges when removed distances of 13 or more airline miles, even when habitat conditions appear similar to those within the hogs' original home range. Data collected during the course of this study indicates a tendency on the part of transplanted wild boar to travel distances of several miles in a relatively short time, establish new home ranges at or near release sites (particularly immature hogs), or move from areas frequented by hunters and dogs to other areas before establishing a new home range. No tendency to return to former home ranges was indicated.

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NUTRITIONAL ANALYSES OF SELECTED DEER FOODS IN SOUTH CAROLINA

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INTRODUCTION

A comprehensive nutritional analysis was initiated on selected wild browse plants that were considered principal deer foods in the state of South Carolina. These samples were collected monthly over a period of one year, starting in early 1965, from seven specific areas in the state (Figure 1). The areas were carefully selected in order to include samples from each of the different geographical regions in the state, thus enabling the writer to determine what correlation existed between the geographical locations and the chemical composition of the browse species.

The nutritional analyses included the following determinations: moisture, nitrogen, crude protein, crude fiber, ether extract (crude fat), nitrogen free extract (carbohydrate), and ash. The ash was further analyzed for the following minerals: phosphorus, calcium, magnesium, and potassium. Soil samples were also analyzed for each area from which plant species were collected. These soil samples were tested for available phosphorus, potassium, calcium, and magnesium so that a comparison of the available mineral contents of the soils could be made with the associated plant species.

The primary objective of the present investigation was to determine whether a sample collected during any given month of the year would be representative of the nutritional value of that species for the entire season. The secondary objective was to determine if the chemical composition of a specific plant would vary from area to area. Another ob-