U. S. Forest Service Resource Bulletin SE-2 December 1963

Deer Browse Resources of North Georgia

by

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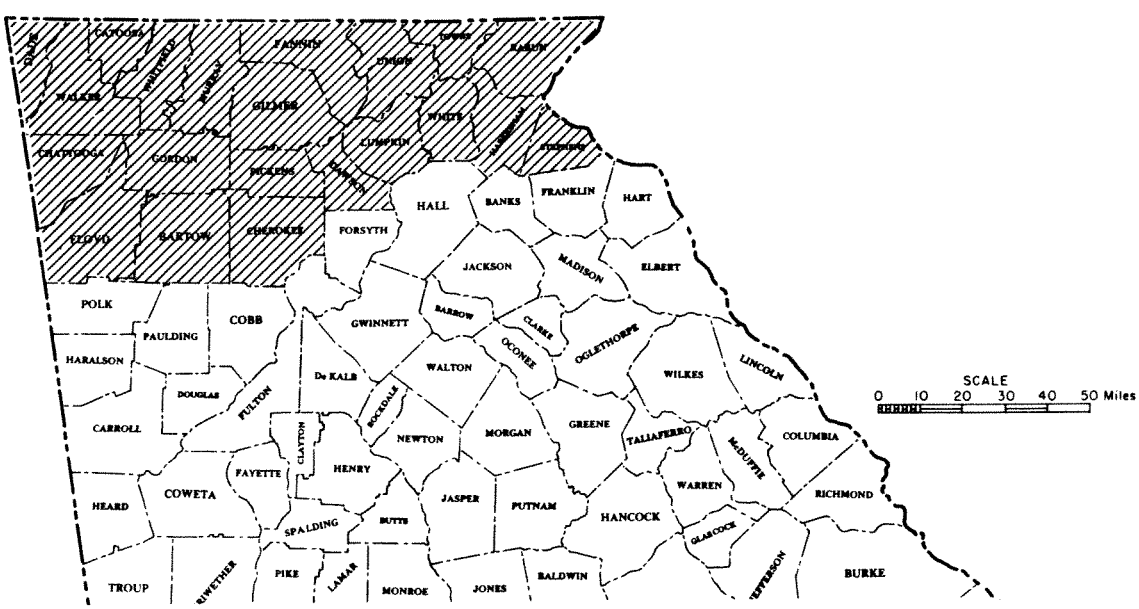
Following tests in the coastal plain and Piedmont of Georgia (Moore et al. 1960), a procedure was developed and used to assess browse resources in 21 counties of north Georgia involving a total land area of approximately 4 million acres (fig. 1). Although the Forest Survey is designed primarily to yield information on timber, it also provides an excellent sampling vehicle for measuring other forest resources. For example, West Virginia, working with the Northeastern Forest Experiment Station, obtained a statewide habitat map which has been of great value in managing wildlife resources (Wilson 1950). Similarly, Forest Survey teams at the Southern Station have sampled hydrologic conditions on a trial basis in Arkansas. Work in the Central States has been concurrent with our study (Ehrenreich 1962), and extensive sampling of deer forage resources has been completed.

That the Forest Survey will be repeated at regular intervals, probably every 7 to 10 years, to maintain continuing inventory of forest resource, is another important feature. Just as we are concerned with the total volume of timber that is available now or in the predictable future, we are also concerned with the amount of game habitat that is, and will be, available. Sampling for game habitat at regular intervals using permanent stations should yield good estimates of future resource potentials. Management efforts could be adjusted to trends that are clearly evident through repeated inventories of forage resources.

Figure 1.--Map of north Georgia. Hatching shows area sampled in browse survey.



Methods

Forest Survey crews were trained to recognize all important browse plants found in north Georgia. The species found are listed in table 1, together with the relative forage value preference rankings by one of four classes, the first two of which are considered desirable foods and the second two undesirable (from a forage standpoint).

Desirables

Preferred--Delicacies or "candy" species are the first species consumed by deer. These are usually highly nutritive.

Staple--Foundation or "bread and butter" species. These constitute the bulk of deer diet on good range. They are high in nutritive value and provide for normal animal weight gain and reproduction.

Undesirables

Emergency--Life-sustaining species. These provide a large part of the diet on overstocked ranges. They are generally low in nutritive value and produce little or no animal weight gain, and animal reproduction is usually low.

Stuffing--Starvation species. These plants have little or no food value. Animals continually lose weight and animal reproduction is very low, if they are a major part of the diet. Some may even be toxic.

Rankings used in this study are based on work by Ruff[1/] and Miller[2/] and field experience of biologists closely associated with the habits of white-tailed deer in the Southern Appalachians.

Sampling procedures used by the Forest Survey crews were followed and extended to obtain browse information. First, a cruise was completed to obtain sample tree descriptions, volume, growth, etc. of timber species in the overstory using a variable radius plot taken from a sample plot center. Then, the crew located 20 systematically spaced points to measure regeneration, competing vegetation, and obtain area description. Each of these points was inspected for the presence of browse-producing plants. The points sampled actually consisted of cylindrical plots 1 milacre in area and $4\frac{1}{2}$ feet high; the center of this cylinder was defined by the point.

1/ Ruff, Frederick J. The white-tailed deer of the Pisgah National Game Preserve. U. S. Dept. Agr., Forest Serv., South. Region, 249 pp. 1938.

2/ Miller, Howard A. Guide to timber management and wildlife coordination. U. S. Forest Serv., Region 8. 1959. (Rev. Nov. 1960.)

Table 1.--Important browse plants found in north Georgia, arranged by preference classes

DESIRABLE BROWSE	
Preferred:	
Buffalo-nut	Pyrularia pubera Michx.
Strawberry-bush	Euonymus americanus L.
Japanese honeysuckle	Lonicera japonica Thunb.
Greenbrier	Smilax spp.
Staple:	
Blackgum	Nyssa sylvatica Marsh.
Chestnut; chinkapin	Castanea spp.
Yellow-poplar	Liriodendron tulipifera L.
Sourwood	Oxydendrum arboreum (L.) DC.
Ash	Fraxinus
Maple	Acer rubrum L., A. saccharum L., A. negundo L.
Black locust	Robinia pseudoacacia L.
Dogwood	Cornus spp.
Viburnum	Viburnum spp.
Sassafras	Sassafras albidum (Nutt.) Nees
Willow	Salix spp.
Apple (domestic)	Malus spp.
Serviceberry	Amelanchier spp.
Azalea	Rhododendron spp. (deciduous species)
Sweet-shrub	Calycanthus floridus L.
Witch-hazel	Hamamelis virginiana L.
St. John's-Wort	Hypericum spp.
Fringetree	Chionanthus virginicus L.
Spicebush	Lindera benzoin (L.) Blume
Hydrangea	Hydrangea spp.
Redbay	Persea borbonia (L.) Spreng.
Bramble	Rubus spp.
Grape	Vitis spp.
UNDESIRABLE BROWSE	
Emergency:	
Mulberry	Morus spp.
Honeylocust	Gleditsia triacanthos L.
Cherry; plum	Prunus spp.
Hard maple	Acer saccharum Marsh., A. pensylvanicum L., A. spicatum Lam., A. leucoderme Small
Eastern cottonwood	Populus deltoides Bartr.
Basswood	Tilia spp.
Oak	Quercus spp.
Magnolia	Magnolia spp.
Eastern redbud	Cercis canadensis L.
Common persimmon	Diospyros virginiana L.
Birch	Betula spp.
Sweetgum	Liquidambar styraciflua L.
Tree-of-Heaven	Ailanthus altissima (Mill.) Swingle
Butternut	Juglans cinerea L.
Rhododendron	Rhododendron spp. (evergreen species)
Poison-ivy	Toxicodendron radicans
French-mulberry	Callicarpa americana L.
Sumac	Rhus spp.
Buckeye	Aesculus spp.
Doghobble	Leucothoe spp.
Cane	Arundinaria spp.
American elder	Sambucus canadensis L.
American mountain-ash	Sorbus americana Marsh.
Common sweetleaf	Symplocos tinctoria (L.) L'Her.
Mountain-laurel	Kalmia latifolia L.
Blueberry	Vaccinium spp.
Huckleberry	Gaylussacia spp.
Crossvine	Bignonia capreolata L.
Trumpet-creeper	Campsis radicans (L.) Seem.

Table 1.--Important browse plants found in north Georgia, arranged by preference classes (continued)

UNDESIRABLE	
Stuffing:	
Pine	*Pinus* spp.
Hemlock	*Tsuga* spp.
Spruce	*Picea* spp.
Fir	*Abies* spp.
Eastern redcedar	*Juniperus virginiana* L.
Atlantic white-cedar	*Chamaecyparis thyoides* (L.) B.S.P.
Northern white-cedar	*Thuja occidentalis* L.
American beech	*Fagus grandifolia* Ehrh.
Hackberry	*Celtis* spp.
Eastern hophornbeam	*Ostrya virginiana* (Mill.) K. Koch
Bluebeech	*Carpinus caroliniana* Walt.
Bigleaf snowbell (storax)	*Styrax grandifolia* Ait.
American sycamore	*Platanus occidentalis* L.
Black walnut	*Juglans nigra* L.
Silverbell	*Halesia* spp.
Hickory	*Carya* spp.
Elm	*Ulmus* spp.
Southern catalpa	*Catalpa bignonioides* Walt.
Chinaberry	*Melia azedarach* L.
Royal paulownia	*Paulownia tomentosa* (Thunb.) Sieb. & Zucc.
Hazelnut	*Corylus* spp.
American holly	*Ilex opaca* Ait.
Alder	*Alnus* spp.
Hawthorn	*Crataegus* spp.
Common buttonbush	*Cephalanthus occidentalis* L.
Pawpaw	*Asimina triloba* (L.) Dunal
New Jersey-tea	*Ceanothus americanus* L.
Virginia creeper	*Parthenocissus quinquefolia* (L.) Planch.

Three specific attributes of browse encountered at each point were recorded. First, all plants contributing to the browse supply in the cylindrical plot were examined, and the species contributing the most total weight during the winter season was tallied to characterize the point. The second attribute recorded was estimated weight, with estimates controlled by weekly, scheduled clippings to maintain crew accuracy. In this case, the observer estimated the total weight of browse present in the cylindrical plot as air-dried in a winter condition. In order to assist in both initial training and control of species identification and weight estimate, a series of photo standards were developed. Using scaled background, photographs of representative samples of clipped forage were pictured with the dry weight in a winter condition recorded immediately under the photograph (fig. 2). Standards for converting clipped samples of summer twig growth (used in weight estimate control) to comparable air-dried winter samples were used. The third attribute, that of use, was assessed by simply recording the presence or absence of any recognizable deer browsing activity.[3] This assessment of utilization was not restricted to the current year's growth, but was recorded if recognizable at all.

During the period of sampling (May 18-August 1) there was little or no twig growth observed; accordingly, no attempt was made to adjust for increases in weight that occurred as the season progressed. Ehrenreich's observation (*op. cit.*) involving twig growth, applicable in the more northerly situations of Missouri, parallels ours. He found that current growth was complete by mid-June, and that it was unnecessary to adjust clipped weights for similar samplings between June 19 and September 1.

[3] Although it is impossible to sort cattle and deer use, there is very little livestock grazing in the sample areas; hence, we disregarded this source and considered all use to be from deer.

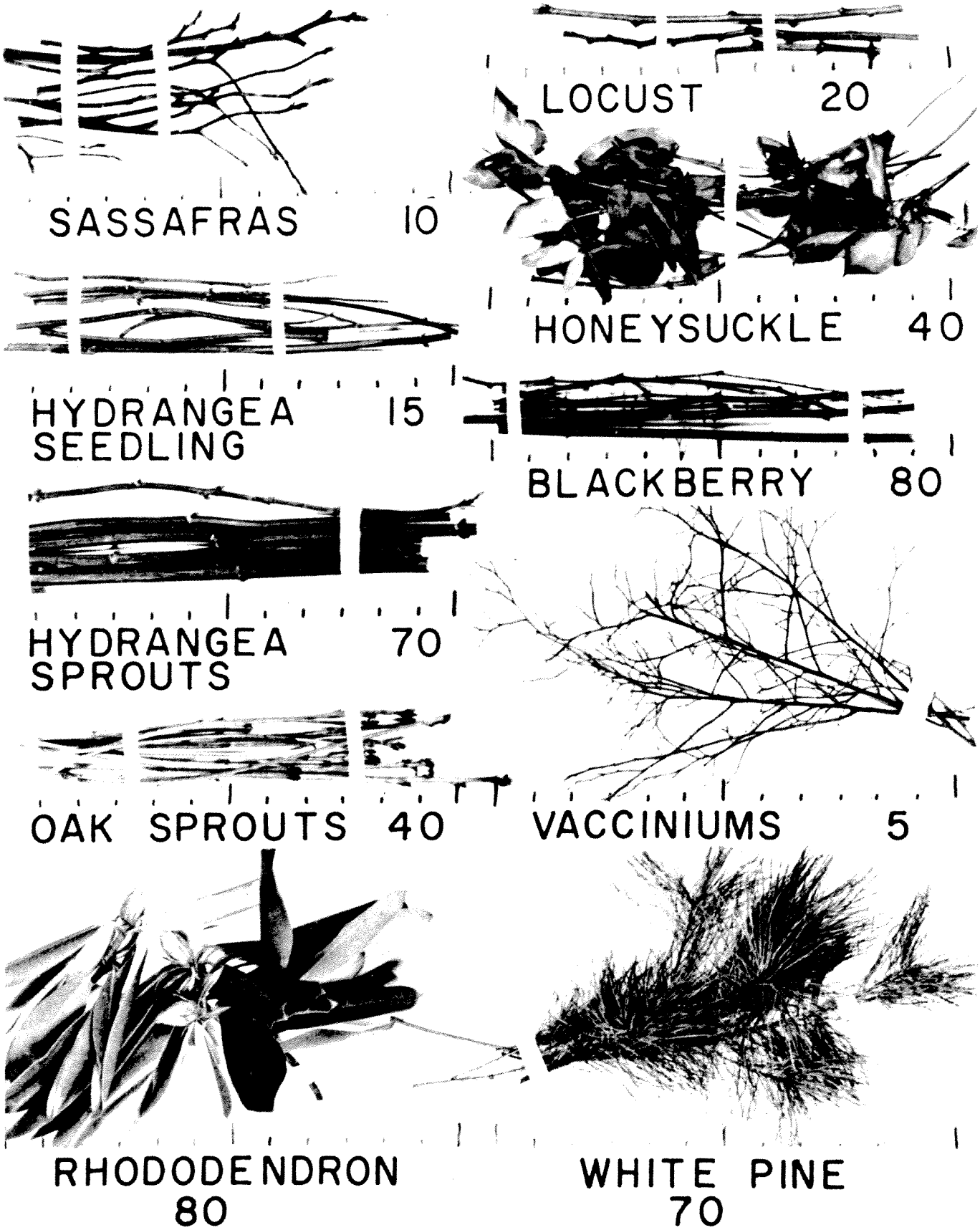


Figure 2.--Samples of clipped forage showing air-dried weight in winter condition.

Checks made on crew weight estimates prior to full-scale sampling indicated that errors rarely exceeded 10 percent. Considering that over-all intensity of sampling was generally low, and the high degree of variability in understory browse populations, the error incurred through observer estimates was considered negligible and probably (though contributing to variance) more or less compensating.

Eight hundred ninety-four plots, consisting of 17,880 points sampled on commercial forest lands, were used in this study. Approximately 20 percent were taken on the Chattahoochee National Forest with the remaining on private land, except for a small percentage from other public holdings.

Point sample data on dominant browse species and weight were summarized for each plot and punched, along with survey data, on a single plot card. Except for utilization summaries, all point data for each plot were averaged and viewed as a single observation (a cluster of plots). These, in turn, were used for summary and analysis of variance. We expect that the means reported here probably represent the most reliable estimate of central tendency at this sampling intensity. We think that errors computed from these systematic samplings would tend to be high; hence, we have elected to accept a probability of 90 percent as significant. In each case, however, we have shown the degree of probability if it exceeded 90 percent.

Findings and Discussion

Of the total 4,214,100 acres sampled in north Georgia, 3,284,600 acres were classed as commercial forests, based on Forest Survey classification of plots (table 2). Of this total, only 11,800 acres were not classed for the commercial production of forest products. Principal comparisons in this report deal with the 670,200 acres for National Forest and the total 2,570,600 acres for all private commercial forest land (table 3).

Table 2.--Area 1/ by land class, north Georgia, 1961 (21 counties)

(In thousand acres)

Land class	Area
Commercial forest land	3,272.8
Other forest land	11.8
Total forest land	3,284.6
Nonforest land	929.5
All land 2/	4,214.1

1/ From U. S. Bureau of the Census, Land and Water Area of the United States, 1950.

2/ Adjusted to exclude 6,100 acres of water created since 1950.

Degree of utilization by preference classes and ownership were determined for all points sampled (table 4). Reported values for utilization were not tested for differences but indicate only that there is a general gradient of use from preferred to stuffing food.

Summary findings for occurrence and weight of "desirable" and "undesirable" browse are shown in figures 3 and 4 for all National Forest and other public land and all private commercial forest lands. Detailed findings for these and other breakdowns are in the appendix, together with statements of confidence or probability of difference.

Table 3. --Ownership distribution of commercial forest land in north Georgia, 1961 (21 counties)

(In thousand acres)

Ownership class	Area	Plots	Points	Percent
Federal:				
National Forest	670.2	180	3,600	20
Other public:				
Other Federal	24.7			
State	5.6			
County and municipal	1.7			
Total other public	32.0	26	520	3
Private:				
Forest industry:				
Pulp and paper	252.6			
Other wood-using industries	79.2			
Total forest industry	331.8			
Farmer-owned	1,391.9			
Miscellaneous private	846.9			
Total private	2,570.6	689	13,780	77
All ownerships	3,272.8	895	17,900	100

Table 4. --Degree of utilization on deer browse resources by preference classes and land ownerships in north Georgia

Preference class	Percent utilization (points browsed)			
	National Forest	Other public	Private	Total
Preferred	16.5	0	3.3	4.6
Staple	4.6	0	1.8	2.4
Emergency	3.7	1.3	2.3	2.7
Stuffing	3.7	0.9	0.7	1.1

Though based on meager samples, and relatively less important, "other public" lands apparently had more favorable browse conditions than National Forests or private land, and forage conditions generally appear more favorable on private lands than National Forests. This condition is probably caused by two principal factors: First, private lands are subject to much more frequent land use change with large acreages in high forage production during early stages of plant succession. Secondly, National Forests (though they include some highly productive timber lands) generally include a preponderance of marginal, low-site land which has been protected from major disturbance such as fire, clearing, heavy and repeated logging, and grazing.

Two forest types--pine, with 50 percent or more conifers, and hardwoods, with less than 50 percent conifers--were recognized (appendix tables 2, 5, and 6) to examine the relations between type and

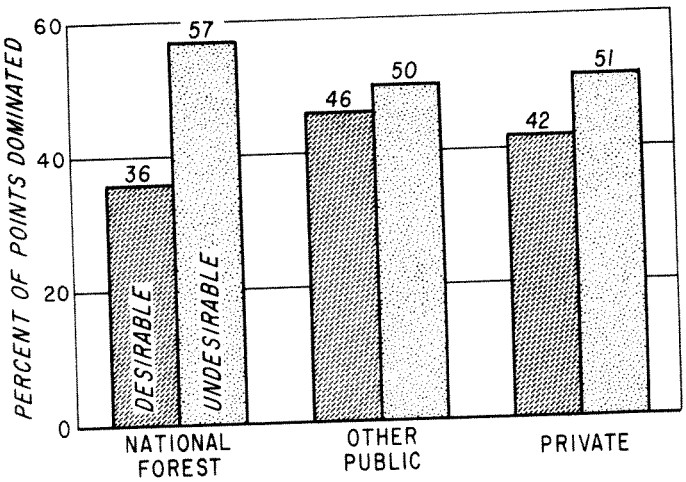


Figure 3.--Percent of points (per plot) dominated by desirable and undesirable deer browse for National Forest, other public, and private lands in north Georgia.

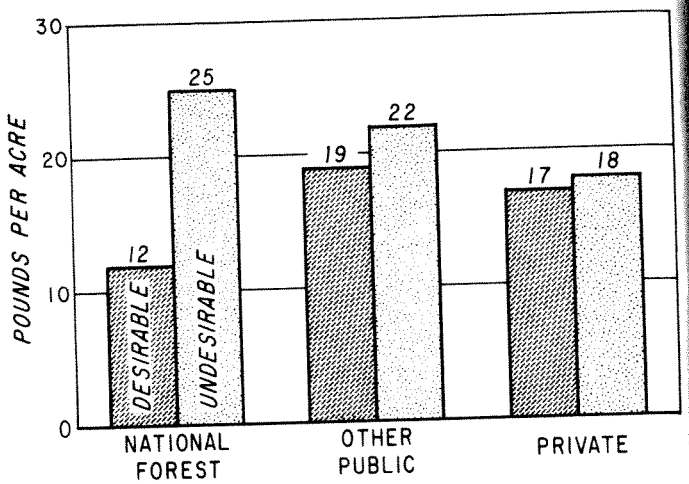


Figure 4.--Weight (air dried in winter condition) of desirable and undesirable deer browse on National Forest, other public, and private lands in north Georgia.

browse conditions. Pine-hardwoods and hardwood types representing approximately two-thirds of the acreage sampled were combined because differences between these types were not suspected to be important or meaningful. Although hardwood types occur without a conifer component, these are limited; and the preponderance of acreage in this combination has some conifers. Disregarding ownership the pine types had significantly greater weights of preferred browse (22 vs. 14 pounds per acre). It was suspected that type differences could be important especially on private lands with the more fertile old field sites on farms and on company holdings managed essentially for pure pine. No important weight differences could be seen between types on National Forests, but pine types were significantly higher on private lands. These are reflected in class differences shown in appendix tables 5 and 6 for these types. A higher percentage of points, however, were dominated by preferred browse in hardwoods than pine on National Forest lands. These differences probably reflect two major conditions which result in more desirable forage in pines on private lands. First, high, near-xeric ridges and west slopes on National Forest land support heavy volumes of low-quality browse, such as Kalmia and several species of poor quality Vacciniums. Secondly, on better sites, pine types probably were subject to more active disturbance by cutting and include a high percentage of areas in early stages of succession, especially on private land. These conditions may explain the apparently high total weight and lower quality of browse forage in pine types on National Forest lands and a contrasting lower weight and higher quality on private land. Though less striking, we suspect similar conditions prevail in the "hardwood" types where higher weights but poorer quality result from large quantities of less desirable browse on potentially poorer range or timber land.

It was thought that site might have an important relation to browse production and that this might be associated with type differences. Two strata of site were used: "good," producing an average pine, 80 or more feet tall and an

average hardwood with 2.5 or more logs; and "poor," supporting average pines less than 80 feet in total height or hardwoods with less than 2.5 logs. Over-all, better sites were dominated by more preferred browse even though weight differences were not significantly higher for preferred browse on good sites (appendix table 3). It is evident that good sites were dominated by higher quality browse, but that weights were more nearly equal on National Forest lands. Generally, the reverse was true with lower quality browse on poorer sites (see appendix tables 7 through 10). Again, we suspect this is due to contributions from low-quality forage on xeric or near-xeric sites.

Stand size, in this survey reflecting stem diameter, age, and density together, was thought to bear important relations to browse production. Analysis across all strata indicated, however, that only weight of desirable forage differed significantly, with 17 pounds per acre associated with seedling and pole sizes in contrast to 14 pounds for larger materials (see appendix table 4). Although limited observations in other strata failed to show size differences, it appeared that there may be differences on the pine types generally and in hardwoods on National Forest lands (appendix tables 11 through 18). On good pine sites on private land, both high weight and high quality browse were associated with small sawtimber and other larger and older trees--although not significantly (appendix table 16). We suspect that this results from broken canopies with large quantities of excellent browse, such as Japanese honeysuckle (Lonicera japonica). This condition was not indicated, however, on poor sites (appendix table 15). On all National Forest plots an expected reduction in weight of desirable browse and an associated reduction in number of points dominated by desirable forage were seen (except on poor hardwood sites in the latter case) as stand size increased. Although this was significant only for good hardwood sites, we suspect it reflects the effects of crown closure on understory forage supplies in all sites and types on National Forest lands.

Some general observations on carrying capacities seem reasonable at this point. Assuming that an average white-tail can be maintained on 2.5 pounds of desirable browse (preferred and staple plants) per day through approximately 100 days of a critical period, it will take a minimum of 250 pounds of forage to support each deer wintered over on these ranges. Further, if we also assume utilization of 40 percent to be a maximum allowable level, 625 pounds of desirable browse will be needed to carry each animal. It follows, then, that approximately 52 acres of National Forest and 33 acres of private lands would be needed to carry each white-tail (see appendix table 1). These acreage figures are certainly liberal for they do not include provisions for consumption of emergency foods which would reduce the acreage requirements for each deer.

Some tentative management implications may be seen in certain type, site, and stand size relations. In general, it seems that more favorable browse supplies are associated with the pine types. Especially on better sites, it may be that management leading to increased pine production is desirable or at least not apparently detrimental to browse supplies.

Clearly, better sites produce better browse (that is, a high percentage and total weight of desirable forage species). Hence, better sites should be favored for a measure to increase browse production. On National Forest lands particularly, reductions in quality browse were associated with advancing stand size, and this suggests that thinning of pole stands and frequent harvest cuttings in local ranges are desirable measures for improving forage production.

Summary

A sample of 894 plots and 17,880 points taken on forest land in 21 counties of north Georgia in conjunction with Forest Survey gave estimates of browse production heretofore unobtainable. Quality estimates of browse weight, stratified by ownerships, forest types, stand size, and site provide basic management data.

Utilization, as expected, was localized and confined largely to National Forest lands, where it ranged from 16.5 percent on preferred to 3.7 percent on stuffing species. Gradients of use (high to low) confirmed plant assignments in forage preference groupings used in the study.

Over-all, in north Georgia, an average of 36 pounds of browse forage was estimated, with 16 pounds from generally desirable browse plants and 20 pounds from plants providing emergency or stuffing foods. Of the major ownerships sampled, National Forests had less desirable forage (12 pounds) and more undesirable forage (25 pounds) than either private or other public lands, which had 19 and 22, and 17 and 18 pounds, respectively, for desirable and undesirable forage.

Examinations of site productivity and forest type showed generally better production on good sites in pine types. Stand size also affected forage conditions mainly in the pine types where best production was associated with small sawtimber. This is probably the result of canopy breaks and heavy production in local areas.

For all lands the average production of desirable forage on 39 acres can probably safely carry one deer if utilization is held to 40 percent. Requirements of 52 acres per deer would be liberal on National Forest lands, compared to 33 acres per deer on private lands. Reasonable consumption of emergency foods would reduce these acreage estimates substantially.

Management leading to increased pine production probably is not detrimental to forage supplies, especially if short rotations are used in conjunction with precommercial thinnings. It is apparent that any cultural work aimed at increasing browse production apparently will be more beneficial on better sites.

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APPENDIX

Table 1. --Frequency distribution and weight of deer browse forage resources by preference classes for land ownerships in north Georgia

Preference class	Distribution of points by preference classes				Forage weight			
	National Forest n = 178 670,200 acres	Other public n = 26 32,000 acres	Private n = 690 2,570,600 acres	Probability of difference	National Forest n = 178 670,200 acres	Other public n = 26 32,000 acres	Private n = 690 2,570,600 acres	Probability of difference
	- - - - Percent - - - -				- - Pounds per acre - -			
Total desirable 1/	36	46	42	0.975	12	19	17	0.975
Total undesirable 2/	57	50	51	0.990	25	22	18	0.990
Unknown plants	1	0	1	n. s.	0	0	0	n. s.
No browse	6	4	6	n. s.	0	0	0	n. s.
Totals	100	100	100	--	37	41	35	--

1/ Includes preferred and staple foods.
2/ Includes emergency and stuffing foods.

Table 2. --Frequency distribution and weight of deer browse forage resources by preference classes for forest types in north Georgia

Preference class	Distribution of points by preference classes			Forage weight		
	Pine n = 283 103,606 acres	Hardwood n = 611 2,236,871 acres	Probability of difference	Pine n = 283 103,606 acres	Hardwood n = 611 2,236,871 acres	Probability of difference
	- - Percent - -			Pounds per acre		
Total desirable 1/	43	41	n. s.	22	14	0.995
Total undesirable 2/	49	53	0.900	20	19	0.990
Unknown plants	1	1	n. s.	0	0	0.900
No browse	7	5	0.995	0	0	n. s.
Totals	100	100	--	42	33	--

1/ Includes preferred and staple foods.
2/ Includes emergency and stuffing foods.

Table 3. --Frequency distribution and weight of deer browse forage resources by preference classes for sites in north Georgia

Preference class	Distribution of points by preference classes			Forage weight		
	Poor site n = 720 2,635,920 acres	Good site n = 174 637,014 acres	Probability of difference	Poor site n = 720 2,635,920 acres	Good site n = 174 637,014 acres	Probability of difference
	- - Percent - -			Pounds per acre		
Total desirable 1/	39	53	0.995	16	20	n. s.
Total undesirable 2/	55	39	0.995	20	13	n. s.
Unknown plants	1	1	n. s.	0	0	n. s.
No browse	5	7	n. s.	0	0	n. s.
Totals	100	100	--	36	33	--

1/ Includes preferred and staple foods.
2/ Includes emergency and stuffing foods.

Table 4. --Frequency distribution and weight of deer browse forage resources by preference classes for stand sizes in north Georgia

Preference class	Distribution of points by preference classes				Forage weight			
	Nonstocked n = 0	Seedlings-Poles n = 623 2,280,803 acres	Sawtimber n = 271 992,131 acres	Probability of difference	Nonstocked n = 0	Seedlings-Poles n = 623 2,280,803 acres	Sawtimber n = 271 992,131 acres	Probability of difference
	- - - - Percent - - - -				- - Pounds per acre - -			
Total desirable 1/	--	40	43	n. s.	--	17	14	0.995
Total undesirable 2/	--	54	50	n. s.	--	20	18	n. s.
Unknown plants	--	1	1	n. s.	--	0	0	n. s.
No browse	--	5	6	n. s.	--	0	0	n. s.
Totals	--	100	100	--	--	37	32	--

1/ Includes preferred and staple foods.
2/ Includes emergency and stuffing foods.

Table 5.--Frequency distribution and weight of deer browse forage resources by preference classes for forest types on National Forest lands in north Georgia

Preference class	Distribution of points by preference classes			Forage weight		
	Pine n = 29 109,185 acres	Hardwood n = 149 560,985 acres	Probability of difference	Pine n = 29 109,185 acres	Hardwood n = 149 560,985 acres	Probability of difference
	- - Percent - -			Pounds per acre		
Total desirable 1/	28	38	0.900	10	12	n. s.
Total undesirable 2/	66	55	0.950	35	23	n. s.
Unknown plants	0	1	n. s.	1	0	n. s.
No browse	6	6	n. s.	0	0	n. s.
Totals	100	100	--	46	35	--

1/ Includes preferred and staple foods.
2/ Includes emergency and stuffing foods.

Table 6.--Frequency distribution and weight of deer browse forage resources by preference classes for forest types on private lands in north Georgia

Preference class	Distribution of points by preference classes			Forage weight		
	Pine n = 244 909,144 acres	Hardwood n = 446 1,661,796 acres	Probability of difference	Pine n = 244 909,144 acres	Hardwood n = 446 1,661,796 acres	Probability of difference
	- - Percent - -			Pounds per acre		
Total desirable 1/	44	42	n. s.	23	15	0.995
Total undesirable 2/	47	53	0.975	18	17	0.990
Unknown plants	1	1	n. s.	0	0	0.900
No browse	8	4	0.995	0	0	n. s.
Totals	100	100	--	41	32	--

1/ Includes preferred and staple foods.
2/ Includes emergency and stuffing foods.

Table 7. --Frequency distribution and weight of deer browse forage resources by preference classes for sites on pine types on National Forest lands in north Georgia

Preference class	Distribution of points by preference classes			Forage weight		
	Poor n = 24 90,360 acres	Good n = 5 18,825 acres	Probability of difference	Poor n = 24 90,360 acres	Good n = 5 18,825 acres	Probability of difference
	- - Percent - -			Pounds per acre		
Total desirable 1/	24	43	0.900	9	10	n. s.
Total undesirable 2/	71	43	0.950	38	18	n. s.
Unknown plants	0	1	n. s.	1	0	n. s.
No browse	5	13	n. s.	0	0	n. s.
Totals	100	100	--	48	28	--

1/ Includes preferred and staple foods.
2/ Includes emergency and stuffing foods.

Table 8. --Frequency distribution and weight of deer browse forage resources by preference classes for sites on hardwood types on National Forest lands in north Georgia

Preference class	Distribution of points by preference classes			Forage weight		
	Poor n = 104 391,560 acres	Good n = 45 169,425 acres	Probability of difference	Poor n = 104 391,560 acres	Good n = 45 169,425 acres	Probability of difference
	- - Percent - -			Pounds per acre		
Total desirable 1/	36	43	0.900	12	13	n. s.
Total undesirable 2/	57	49	n. s.	25	18	n. s.
Unknown plants	1	1	n. s.	0	1	0.900
No browse	6	7	n. s.	0	0	n. s.
Totals	100	100	--	37	32	--

1/ Includes preferred and staple foods.
2/ Includes emergency and stuffing foods.

Table 9.--Frequency distribution and weight of deer browse forage resources by preference classes for sites on pine types on private lands in north Georgia

Preference class	Distribution of points by preference classes			Forage weight		
	Poor n = 210 782,460 acres	Good n = 34 126,684 acres	Probability of difference	Poor n = 210 782,460 acres	Good n = 34 126,684 acres	Probability of difference
	- - Percent - -			Pounds per acre		
Total desirable 1/	42	56	0.995	22	29	n. s.
Total undesirable 2/	49	36	0.975	19	14	n. s.
Unknown plants	1	1	n. s.	0	0	n. s.
No browse	8	7	n. s.	0	0	n. s.
Totals	100	100	--	41	43	--

1/ Includes preferred and staple foods.
2/ Includes emergency and stuffing foods.

Table 10.--Frequency distribution and weight of deer browse forage resources by preference classes for sites on hardwood types on private lands in north Georgia

Preference class	Distribution of points by preference classes			Forage weight		
	Poor n = 360 1,341,360 acres	Good n = 86 320,436 acres	Probability of difference	Poor n = 360 1,341,360 acres	Good n = 86 320,436 acres	Probability of difference
	- - Percent - -			Pounds per acre		
Total desirable 1/	38	57	0.995	13	20	n. s.
Total undesirable 2/	57	36	0.995	19	11	n. s.
Unknown plants	1	1	n. s.	0	0	n. s.
No browse	4	6	n. s.	0	0	n. s.
Totals	100	100	--	32	31	--

1/ Includes preferred and staple foods.
2/ Includes emergency and stuffing foods.

Table 11. --Frequency distribution and weight of deer browse forage resources by preference classes and stand sizes for poor sites on pine types on National Forest lands in north Georgia

Preference class	Distribution of points by preference classes				Forage weight			
	Nonstocked n = 0	Seedlings-Poles n = 7 26,355 acres	Sawtimber n = 17 64,005 acres	Probability of difference	Nonstocked n = 0	Seedlings-Poles n = 7 26,355 acres	Sawtimber n = 17 64,005 acres	Probability of difference
	- - - - Percent - - - -				- - Pounds per acre - -			
Total desirable 1/	--	31	21	n.s.	--	14	7	n.s.
Total undesirable 2/	--	62	75	n.s.	--	29	43	n.s.
Unknown plants	--	1	0	n.s.	--	1	0	n.s.
No browse	--	6	4	n.s.	--	0	0	n.s.
Totals	--	100	100	--	--	44	50	--

1/ Includes preferred and staple foods.
2/ Includes emergency and stuffing foods.

Table 12. --Frequency distribution and weight of deer browse forage resources by preference classes and stand sizes for good sites on pine types on National Forest lands in north Georgia

Preference class	Distribution of points by preference classes				Forage weight			
	Nonstocked n = 0	Seedlings-Poles n = 2 7,530 acres	Sawtimber n = 3 11,295 acres	Probability of difference	Nonstocked n = 0	Seedlings-Poles n = 2 7,530 acres	Sawtimber n = 3 11,295 acres	Probability of difference
	- - - - Percent - - - -				- - Pounds per acre - -			
Total desirable 1/	--	60	32	n.s.	--	20	5	n.s.
Total undesirable 2/	--	38	46	n.s.	--	25	17	n.s.
Unknown plants	--	0	2	n.s.	--	0	0	n.s.
No browse	--	2	20	n.s.	--	0	0	n.s.
Totals	--	100	100	--	--	45	22	--

1/ Includes preferred and staple foods.
2/ Includes emergency and stuffing foods.

Table 13. --Frequency distribution and weight of deer browse forage resources by preference classes and stand sizes for poor sites on hardwood types on National Forest lands in north Georgia

Preference class	Distribution of points by preference classes				Forage weight			
	Nonstocked n = 0	Seedlings-Poles n = 52 195,780 acres	Sawtimber n = 52 195,780 acres	Probability of difference	Nonstocked n = 0	Seedlings-Poles n = 52 195,780 acres	Sawtimber n = 52 195,780 acres	Probability of difference
	- - - - Percent - - - -				- - Pounds per acre - -			
Total desirable 1/	--	35	36	n. s.	--	13	10	n. s.
Total undesirable 2/	--	57	59	n. s.	--	28	21	n. s.
Unknown plants	--	2	0	n. s.	--	0	0	n. s.
No browse	--	6	5	n. s.	--	0	0	n. s.
Totals	--	100	100	--	--	41	31	--

1/ Includes preferred and staple foods.
2/ Includes emergency and stuffing foods.

Table 14. --Frequency distribution and weight of deer browse forage resources by preference classes and stand sizes for good sites on hardwood types on National Forest lands in north Georgia

Preference class	Distribution of points by preference classes				Forage weight			
	Nonstocked n = 0	Seedlings-Poles n = 12 45,180 acres	Sawtimber n = 33 124,245 acres	Probability of difference	Nonstocked n = 0	Seedlings-Poles n = 12 45,180 acres	Sawtimber n = 33 124,245 acres	Probability of difference
	- - - - Percent - - - -				- - Pounds per acre - -			
Total desirable 1/	--	65	36	0.950	--	28	9	0.900
Total undesirable 2/	--	30	55	0.900	--	8	22	n. s.
Unknown plants	--	1	1	n. s.	--	1	0	n. s.
No browse	--	4	8	n. s.	--	0	0	n. s.
Totals	--	100	100	--	--	37	31	--

1/ Includes preferred and staple foods.
2/ Includes emergency and stuffing foods.

Table 15. --Frequency distribution and weight of deer browse forage resources by preference classes and stand sizes for poor sites on pine types on private lands in north Georgia

Preference class	Distribution of points by preference classes				Forage weight			
	Nonstocked n = 0	Seedlings-Poles n = 177 659,502 acres	Sawtimber n = 33 122,958 acres	Probability of difference	Nonstocked n = 0	Seedlings-Poles n = 177 659,502 acres	Sawtimber n = 33 122,958 acres	Probability of difference
	- - - - Percent - - - -				- - Pounds per acre - -			
Total desirable 1/	--	41	50	n.s.	--	23	16	0.950
Total undesirable 2/	--	51	40	n.s.	--	20	12	n.s.
Unknown plants	--	1	0	n.s.	--	0	0	n.s.
No browse	--	7	10	n.s.	--	0	0	n.s.
Totals	--	100	100	--	--	43	28	--

1/ Includes preferred and staple foods.
2/ Includes emergency and stuffing foods.

Table 16. --Frequency distribution and weight of deer browse forage resources by preference classes and stand sizes for good sites on pine types on private lands in north Georgia

Preference class	Distribution of points by preference classes				Forage weight			
	Nonstocked n = 0	Seedlings-Poles n = 21 78,246 acres	Sawtimber n = 13 48,438 acres	Probability of difference	Nonstocked n = 0	Seedlings-Poles n = 21 78,246 acres	Sawtimber n = 13 48,438 acres	Probability of difference
	- - - - Percent - - - -				- - Pounds per acre - -			
Total desirable 1/	--	48	68	n.s.	--	20	46	n.s.
Total undesirable 2/	--	40	30	n.s.	--	16	12	n.s.
Unknown plants	--	1	0	n.s.	--	0	0	n.s.
No browse	--	11	2	n.s.	--	0	0	n.s.
Totals	--	100	100	--	--	36	58	--

1/ Includes preferred and staple foods.
2/ Includes emergency and stuffing foods.

Table 17. --Frequency distribution and weight of deer browse forage resources by preference classes and stand sizes for poor sites on hardwood types on private lands in north Georgia

Preference class	Distribution of points by preference classes				Forage weight			
	Nonstocked n = 0	Seedlings-Poles n = 292 1,087,992 acres	Sawtimber n = 68 253,368 acres	Probability of difference	Nonstocked n = 0	Seedlings-Poles n = 292 1,087,992 acres	Sawtimber n = 68 253,368 acres	Probability of difference
	- - - - Percent - - - -				- - Pounds per acre - -			
Total desirable 1/	--	37	42	n. s.	--	13	13	n. s.
Total undesirable 2/	--	58	53	n. s.	--	20	14	n. s.
Unknown plants	--	1	1	n. s.	--	0	0	n. s.
No browse	--	4	4	n. s.	--	0	0	n. s.
Totals	--	100	100	--	--	33	27	--

1/ Includes preferred and staple foods.
2/ Includes emergency and stuffing foods.

Table 18. --Frequency distribution and weight of deer browse forage resources by preference classes and stand sizes for good sites on hardwood types on private lands in north Georgia

Preference class	Distribution of points by preference classes				Forage weight			
	Nonstocked n = 0	Seedlings-Poles n = 45 167,670 acres	Sawtimber n = 41 152,766 acres	Probability of difference	Nonstocked n = 0	Seedlings-Poles n = 45 167,670 acres	Sawtimber n = 41 152,766 acres	Probability of difference
	- - - - Percent - - - -				- - Pounds per acre - -			
Total desirable 1/	--	57	57	n. s.	--	20	21	n. s.
Total undesirable 2/	--	38	35	n. s.	--	12	10	n. s.
Unknown plants	--	1	1	n. s.	--	0	0	n. s.
No browse	--	4	7	n. s.	--	0	0	n. s.
Totals	--	100	100	--	--	32	31	--

1/ Includes preferred and staple foods.
2/ Includes emergency and stuffing foods.