

# EVALUATION OF DEER BROWSING AND WHY

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A scientific study of the feeding habits of deer in a given locality can be a "wolf in sheep's clothing." In other words, in an area of high deer concentration of long duration, a wildlife biologist cannot expect to get a true picture of browsing preferences. In such an area a careful check of browsing or a stomach analysis may show that a certain food ranks high in the list of foods taken when as a matter of truth, that food may be one of the last to be eaten in a similar habitat not overpopulated. Such information can lead to misdirected management.

Such a condition was experienced during an investigation of deer browsing habits in loblolly pine-hardwood type of forest in west-central Alabama on the lands of the Allison Lumber Company. Two detailed examinations of deer browsing intensity were made, one near Bellamy, Alabama containing a deer herd of long duration and high density and the other near Jachin, Alabama, twenty-five miles south, with a herd of relatively short duration and normal or less than normal stock of deer.

## METHODS

The method of study, with some modification, was that developed by Aldous (1944). His method consists of studying a series of random plots in which careful estimates are made of the degree of browsing of each plant and the relative amount of that plant available to deer. In this study 1/10-acre plots were used instead of 1/100-acre plots described by Aldous. Reconnaissance of the two localities revealed local areas in which the random plots were to be checked in order to get food representation of the habitat.

## RESULTS AND DISCUSSION

Tables 1 and 2 show the results of the checks. At Bellamy those species of plants that revealed more than accidental browsing were included in Table 1. At Jachin (Table 2) the same list was used so that a good comparison could be made of the browsing between the two deer herds. In addition certain plants were added to the Jachin list although they did occur at Bellamy but were out of reach of the deer.

Heavier and more recent cutting of timber, especially pine, on the Jachin tract was partly responsible for the greater amount of browse available, but was by no means the only one. It is clear that deer browsing pressure was an important factor in the overall availability of deer browse at Bellamy. The greater amount of grape and buckeye at Bellamy can be partly attributed to the many park-like or open stands of pine which encourages these species.

As a group the greenbiers or smilaxes are the best and most important deer browse plants in the South on most types of forest land. Certain species, however, such as *Smilax glauca* and *S. pumila* are taken sparingly or not at all. At the

Table 1. Winter utilization of browse by deer<sup>a</sup> in loblolly pine-hardwood forest, Bellamy, Alabama, March 1948. 100 plots, 1/10-acre in size.

Name of Plant	Per Cent	Average	Utilization	Per Cent	Per Cent
	Plots			Density	
	Present			Eaten	Available
Sweetgum ( <i>Liquidambar styraciflua</i> )	72	5.65	200.12	30.96	17.87
Bamboo-briers ( <i>Smilax rotundifolia</i> and <i>S. hispida</i> )	22	1.30	72.98	11.29	4.11
Stretchberry ( <i>Smilax bona-nox</i> )	14	0.70	49.25	7.62	2.21
Flowering Dogwood ( <i>Cornus florida</i> )	7	0.60	38.14	5.90	1.89
French-mulberry ( <i>Callicarpa americana</i> )	27	1.65	35.14	5.43	5.22
Blueberries ( <i>Vaccinium</i> spp.)	26	1.65	35.06	5.42	5.22
Maple ( <i>Acer</i> sp.)	20	1.15	26.74	4.13	3.63
Sumacs ( <i>Rhus</i> spp.)	9	0.65	26.36	4.07	2.05
Grapes ( <i>Vitis</i> spp.)	40	4.25	26.01	4.02	13.44
Blackgum ( <i>Nyssa sylvatica</i> )	15	0.65	20.36	3.15	2.05
Rattan ( <i>Berchemia scandens</i> )	10	0.50	20.25	3.14	1.58
Winter-huckleberry ( <i>Batodendron arborcum</i> )	14	0.90	17.35	2.68	2.84
Elms ( <i>Ulmus</i> spp.)	21	1.05	15.75	2.43	3.32
Blackberries ( <i>Rubus</i> spp.)	8	0.55	11.34	1.75	1.74
Saw-brier ( <i>Smilax glauca</i> )	4	0.20	7.25	1.12	0.63
Horse-sugar ( <i>Symplocos tinctoria</i> )	2	0.01	7.00	1.08	0.31
Azalea ( <i>Azalea</i> spp.)	5	0.30	6.30	0.97	0.94
Oak sprouts ( <i>Quercus</i> spp.)	24	1.70	6.01	0.93	5.37
Red-haws ( <i>Crataegus</i> spp.)	16	0.90	5.62	0.86	2.84
St. John's-worts ( <i>Asyrum</i> spp.)	4	0.20	4.50	0.69	0.63
Pawpaw ( <i>Asimina</i> sp.)	2	0.10	3.50	0.54	0.31
Persimmon ( <i>Diospyros virginiana</i> )	14	0.90	3.54	0.54	2.84
Holly ( <i>Ilex opaca</i> )	3	0.20	3.33	0.51	0.63
Hickories ( <i>Carya</i> spp.)	23	1.15	2.00	0.30	3.63
Ash ( <i>Fraxinus</i> spp.)	3	0.15	1.50	0.23	0.47
Buckeye ( <i>Aesculus</i> sp.)	52	4.45	0.84	0.12	14.08

<sup>a</sup> A deer herd of long duration and high density.

Table 2. Winter utilization of browse by deer in loblolly pine-hardwood forest, Jachin, Alabama, March 1948. 100 plots, 1/10-acre in size.

Name of Plant	Per Cent		Average Degree Browsing	Utilization Factor	Per Cent	
	Plots Present	Average Density			Food Eaten	Browse Available
Bamboo-briers ( <i>Smilax rotundifolia</i> and <i>S. hispida</i> )	30	2.95	36.83	108.65	26.43	6.23
Stretchberry ( <i>Smilax bona-nox</i> )	20	1.75	39.25	68.69	16.71	3.69
Rough-leaf Dogwood ( <i>Cornus asperifolia</i> )	15	1.75	22.00	38.50	9.36	3.69
Blackgum ( <i>Nyssa sylvatica</i> )	24	1.90	14.17	26.92	6.54	4.01
Whitebay ( <i>Magnolia virginiana</i> )	5	0.35	62.00	21.70	5.27	0.73
Ash ( <i>Fraxinus</i> sp.)	8	0.65	30.00	19.50	4.74	1.37
Rattan ( <i>Berchomia scandens</i> )	21	0.95	15.29	14.52	3.53	2.00
Flowering Dogwood ( <i>Cornus florida</i> )	31	1.75	6.61	11.57	2.81	3.69
Azalea ( <i>Azalea</i> sp.)	13	1.10	10.00	11.00	2.67	2.32
Tulip-poplar ( <i>Liriodendron tulipifera</i> )	7	0.40	22.86	9.14	2.22	0.84
Blackberries ( <i>Rubus</i> spp.)	28	2.25	3.75	8.44	2.05	4.75
Sweetgum ( <i>Liquidambar styraciflua</i> )	80	10.10	0.81	8.18	1.99	21.35
Sumacs ( <i>Rhus</i> spp.)	17	1.30	5.88	7.64	1.85	2.74
Blueberries ( <i>Vaccinium</i> spp.)	23	2.25	3.26	7.33	1.78	4.75
Blackhaws ( <i>Viburnum</i> spp.)	11	0.55	12.27	6.75	1.64	1.16
Horse-sugar ( <i>Symplocos tinctoria</i> )	4	0.20	32.50	6.50	1.58	0.42
French-mulberry ( <i>CalliCARPA americana</i> )	33	3.40	1.70	5.78	1.40	7.18
Maple ( <i>Acer</i> sp.)	27	2.05	2.78	5.70	1.38	4.33
St. John's-worts ( <i>Ascyrum</i> spp.)	12	0.65	8.75	5.69	1.38	1.37
Grapes ( <i>Vitis</i> spp.)	31	1.85	2.58	4.77	1.16	3.91
Winter-huckleberry ( <i>Batodendron arboreum</i> )	18	1.55	2.50	3.87	0.94	3.27

Table 2. Continued

Name of Plant	Per Cent Plots Present	Average Density	Average Degree Browsing	Utilization Factor	Per Cent	
					Food Eaten	Browse Available
Yellow-jessamine ( <i>Gelsemium sempervirens</i> )	9	0.55	6.67	3.67	0.88	1.16
Elms ( <i>Ulmus</i> spp.)	16	0.90	2.50	2.25	0.54	1.90
Saw-brier ( <i>Smilax glauca</i> )	10	0.50	3.00	1.50	0.36	1.05
Pawpaw ( <i>Asimina</i> sp.)	6	0.30	5.00	1.50	0.36	0.63
Rod-haws ( <i>Crataegus</i> spp.)	13	0.85	1.15	0.98	0.23	1.79
Oak sprouts ( <i>Quercus</i> spp.)	14	0.80	0.36	0.29	0.07	1.69
Persimmon ( <i>Diospyros virginiana</i> )	14	1.10	0.00	0.00	0.00	2.32
Holly ( <i>Ilex opaca</i> )	9	1.15	0.00	0.00	0.00	2.43
Hickories ( <i>Carya</i> spp.)	8	0.40	0.00	0.00	0.00	0.84
Buckeye ( <i>Aesculus</i> sp.)	7	1.05	0.00	0.00	0.00	2.21

Jachin area *Smilax bona-nox* and *S. hispida* constituted about 43 per cent of all browse eaten, taking first place in the list (Table 2). Experience elsewhere has shown similar results under light to moderate deer browsing pressure. At Bellamy these two greenbriers gave up first place to sweetgum which comprised about 31 per cent of all browse taken. This does not mean that sweetgum is preferred. It means that preferred and more palatable browse was not available in adequate quantities because of too heavy browsing. The relatively high listing of such fourth rate browse as French-mulberry, blueberries, and winter-huckleberry at Bellamy also indicate a shortage of more palatable browse.

The browsing picture indicated in Table 2 depicts what I consider moderate, or slightly less, browsing for this type of loblolly pine-hardwood forest. Although more study may be needed to get a true ranking of the plants as to palatability the listing in Table 2 is not far from correct.

Among the factors indicating an overpopulation of deer in relation to the food supply at Bellamy are:

1. The comparatively high ranking of relatively unpalatable browse species.
2. Browsing on certain plants not taken at all or rarely under conditions of moderate browsing pressure, such as sweetgum, persimmon, buckeye, and pine.
3. The scarcity of certain highly preferred browse as roughleaf dogwood, whitebay, and flowering dogwood sprouts and others. The smilaxes would be a great deal less abundant than they are if it were not for their habit of developing enormous quantities of underground tubers and rhizomes. Some species have been known to produce as much as twelve pounds of underground parts to each plant (Coker, 1944). This storage of surplus food enables these plants to hold up well under heavy browsing pressure.
4. It is common knowledge among those familiar with the Bellamy area that deer become very poor in late winter during years of poor mast crops. This is good evidence that the supply of good browse is inadequate to sustain the deer in good physical condition through the winter. On April 1, 1948, I examined two recently dead yearling deer, both were extremely emaciated and covered with ticks, strongly suggesting that they died lingering deaths. I could find no evidence of wounds, so under these circumstances I came to the conclusion they had slowly starved.

Pearson (1943) reported the results of an analysis of one hundred ninety-five deer stomachs taken in December during the period 1936 - 1941 in the vicinity of Bellamy, Sumter County, Alabama and nearby counties (Table 3). One hundred eighty of the stomachs were taken in Sumter County. The table below is reproduced from Pearson's report so that it may be compared with the browse study.

Among other things, a comparison of the results of the two methods brings out the relative importance of the greenbriers and other browse. The stomach analysis also emphasizes the well-known fact that deer are fond of acorns. It is significant that sweetgum did not show up in quantity in the stomach analysis, whereas it ranked first in the browse study. Why? The browse check at Jachin placed sweetgum twelfth in order of per cent of food eaten. This fact, substantiated by investigations elsewhere, shows that sweetgum is far from being a preferred food. This suggests that sweetgum may not be eaten in quantity until late winter or until better browse is seriously reduced. It also suggests that the browsing situation has

Table 3. Food items found in 195 deer stomachs collected near Bellamy, Alabama in December 1936 - 41.

	Per Cent	
	Volume	Occurrence
VEGETABLE MATTER .....	100.00	100.00
Oaks ( <i>Quercus</i> sp.) — acorns and leaves.....	48.85	95.90
Greenbriers ( <i>Smilax</i> sp.) —		
leaves, fruit and stems.....	8.83	84.10
Sumacs ( <i>Rhus</i> sp.) — fruit, twigs and leaves.....	4.66	34.36
Dogwoods ( <i>Cornus</i> sp.) — leaves and fruit.....	3.03	29.23
Cross-vine ( <i>Anisostichus crucigera</i> ) .....	2.44	37.44
Pines ( <i>Pinus</i> sp.) —		
needles, staminate cones, and twigs.....	1.80	59.49
Yellow Jessamine ( <i>Gelsemium sempovirens</i> ) —		
leaves, twigs and fruit.....	1.35	16.41
Sparkleberries ( <i>Vaccinium</i> sp.) — leaves.....	1.09	41.03
Panic Grasses ( <i>Panicum</i> sp.) — leaves and seeds....	0.71	31.79
Bayberries ( <i>Myrica</i> sp.) — leaves.....	0.67	20.00
Gums ( <i>Nyssa</i> sp.) — fruit.....	0.59	18.46
Other Vegetable Matter		
(100 kinds each less than 0.50 by volume).....	3.89	
Unidentified Vegetable Matter.....	22.09	82.56
ANIMAL MATTER — Insects.....	Trace	11.28

deteriorated considerably at Bellamy, since the deer stomachs were collected on the Allison Lumber Company land where the browse check was made. The above remarks are made on the basis that most of the deer taken in Sumter County came from the Allison property.

Field observations on this company's holdings indicated quite clearly that deer browse could not be increased by certain forest management practices. Pearson (1943) pointed out the importance of maintaining an adequate supply of mast-producing trees, particularly acorns. He also suggested that selective logging appeared to be a practical procedure for encouraging browse food. Although this method is practiced by the company, it is obvious that the important browse plants are not keeping up with the browse requirements of the deer on the Bellamy area. Heavier selective logging, whereby groups of trees are removed in certain favored spots, is needed. Light selective cutting is not enough. Long protection from fire has allowed many browse species to grow up out of reach of deer. Therefore, it appears that prescribed and careful burning could be employed to good advantage in increasing browse in the form of sprouts and late summer forbs. However, even these techniques may not provide adequate feeding conditions for deer under the present system of harvesting buck deer only. If a healthy deer herd is to be maintained, habitat improvement must be accompanied by regulations that permit the taking of both sexes in this locality. In fact, this applies to any area that has reached or gone beyond the carrying capacity of the habitat.

## SUMMARY AND CONCLUSIONS

A study, no matter how thorough, of deer feeding habits in an overpopulated habitat only, especially one of long duration, will not yield information for true evaluation of quality and quantity of food. For example sweetgum ranks first in the check of browse taken at Bellamy, Alabama, whereas at Jachin, Alabama, in an area not more than moderately browsed, it ranks twelfth. Likewise other browse species may assume importance all out of proportion to a more normal situation. It follows, therefore, that it would be erroneous to direct management measures at increasing sweetgum, or other relatively unpalatable browse, such as burning or cutting over patches of such plants to increase sprouts.

Evaluation of browsing of the two areas discussed herein yields data on browse availability, degree of browsing, and isolates those factors indicating overpopulation in relation to the food supply. There is clear and positive evidence that the area in and around Bellamy, Alabama is overpopulated.

Light selective logging has not produced enough browse, especially during years of poor mast crops, to carry the deer herd through winter in good physical condition. Heavier selective cutting and burning could be used to increase palatable browse. Further study is needed to learn how to discourage the more unpalatable species of plants.

Habitat improvement alone is probably not sufficient to maintain a healthy deer herd in an area already overpopulated. Taking of buck deer only will not keep an overpopulated herd down to a level commensurate with the food supply. Habitat improvement plus taking both sexes is needed.

### LITERATURE CITED

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