THE FEASIBILITY OF A SUBJECTIVE HABITAT EVALUATION TECHNIQUE

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Abstract: A subjective technique of evaluating habitat potential based on forage availability for white-tailed deer (*Odocoileus virginianus*) in Mississippi was critically appraised. The technique provides a useful index to forage abundance and requires about 20% of the time required by analogous vegetative sampling techniques.

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Since the turn of the century, the primary interest in the forested land of the southeastern United States has been in its value as a timber resource. Wildlife resources were long regarded as a coincidental by-product, but with the advent of multiple-use concepts these resources have become more important and are requiring increased management. To manage wildlife resources effectively, it is frequently necessary to inventory and evaluate habitat.

Habitat evaluation based on browse and forage availability has long been of interest to biologists. Many objective and subjective techniques have been developed and used with varying degrees of success. Objective approaches such as those described by Campbell and Cassaday (1955) and Harlow (1955, 1977) which utilize vegetational sampling are relatively accurate, but are inherently time consuming and expensive. Subjective techniques such as those used by Aldous (1944) or Lay (1967) replace tedious vegetative sampling with qualitative judgments or estimates. Unfortunately, with subjective approaches, human bias is likely to be introduced and a certain amount of accuracy sacrificed. This study was undertaken to critically appraise 1 such subjective habitat evaluation technique (Perkins 1973, Buckner and Perkins 1974).

METHODS

The objective of this study was to determine the feasibility of the Perkins technique for evaluating white-tailed deer habitat. Factors considered included accuracy of the technique, consistency of evaluators, expected cost of administration, and optimum timing. To determine reliability, a series of stands were evaluated using the technique. Later the same stands were sampled using an objective technique (Harlow 1955) and qualitative aspects of the habitat. The results of the 2 techniques were compared using regression analysis.

The study area was the John W. Starr Memorial Forest, a 3600 ha forest owned by the School of Forest Resources, Mississippi State University. The forest is located approximately 13 km south of Starkville, MS. Within this area, 14 stands were selected for evaluation. Each individual stand was as homogeneous as possible with respect to site index, age, basal area, and understory composition. The various stands differed in age and silvicultural characteristics. The predominant overstory species was loblolly pine (*Pinus taeda*), and all stands were typical sites within the Interior Flatwoods land resource area of Mississippi (Vanderford 1962). According to Zeedyk (1969), 6 factors that should be considered in evaluating wildlife habitat are: (1) soil fertility, (2)

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abundance and variety of food, (3) interspersion of food and cover requirements, (4) escape cover, (5) ability of the habitat to resist severe weather and (6) adequate water. Except for abundance and variety of food, the stands included in the study were virtually identical in all these aspects.

The Perkins technique requires an evaluator, or team of evaluators, to systematically traverse a stand and visually estimate habitat quality. A series of circular sample plots 3.05 m in radius are located inside each stand. Sample plots consist of an imaginary cylinder 6.10 m in diameter, extending from the ground surface to the forest canopy. Plots are located at arbitrary intervals (usually 40 m) along transect lines. A rating system consisting of integer values from 1 (poorest) to 6 (excellent) is used to evaluate habitat potential. Evaluators are allowed 1 minute per plot for scoring. After all plots are scored, an average for the stand is calculated.

Fifteen nests of 3, mil-ha plots (Fig. 1) were located within each stand at 20 m intervals along randomly chosen transects. Plot centers were approximately 4.6 m from a common center point. During the summer, fall and winter of 1975-76, 1 plot from each nest was randomly selected and evaluated both by the subjective technique and by clip sampling.

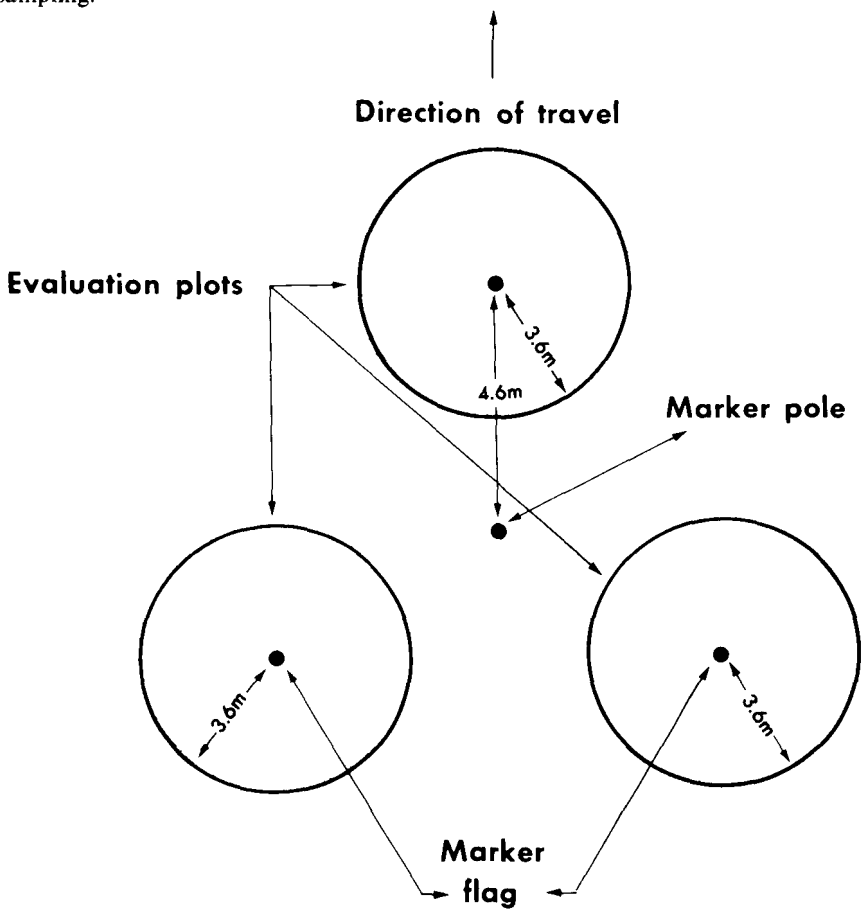

Fig. 1. Arrangement of nested plots used in the evaluation of deer food abundance and quality.

A team of 5 evaluators was used for administering the subjective evaluation. Prior to the evaluation, the team was given 4 hours of instruction on the technique. All evaluators were knowledgeable of deer food plants and animal requirements. Evaluators were instructed to spend no more than 1 minute per plot and were requested to note any problems or difficulties encountered during the evaluations. Approximate times required to evaluate each stand were noted. Each plot was assigned 2 scores by each evaluator; the first reflected browse abundance and quality at the particular time of the evaluation and the second indicated food availability and quality on a year-round basis.

Comparisons between evaluation techniques consisted primarily of comparing scores from the Perkins technique with the amounts of forage collected. Within a few days following the subjective technique, deer forage availability was determined by vegetative clipping. A 1 m^2 subplot within each mil-ha plot was clipped to a height of approximately 1.7 m. Only palatable portions of plants considered to be either staple or preferred deer forage were clipped (Table 1). Clip samples were placed in paper bags with preferred and staple species bagged separately. Samples were placed in a dehumidifier dryer for 1 week and dry weights recorded to the nearest 0.5 g.

Table 1. Plants clipped and sampled as deer browse.

Plant Name	*Part Collected*
Preferred	
Berchemia scandens +	Leaves
Bidens spp. +	Tips of Immature Plants
Callicarpa americana ++	Leaves
Lonicera japonica	Leaves
Smilax spp. +	Tender Growing Stems
Smilax spp. +++	Leaves
Vaccinium spp. +	Immature Stems
Staple	
Acer rubrum	Immature Leaves
Campsis radicans	Immature Stems and Leaves
Cornus florida	Leaves
Desmodium spp.	Immature Leaves
Diospyros virginiana	Immature Leaves
Lespedeza spp.	Leaves and Stems
Lonicera japonica	Stems
Mitchella repens	Stems and Leaves
Nyssa sylvatica	Immature Leaves
Panicum spp.	Immature Leaves and Rosettes
Parthenocissus quinquefolia	Immature Leaves
Rhus copallina	Leaves
Rhus glabra	Leaves
Rhus radicans	Leaves
Rubus spp.	Immature Leaves
Smilax spp.	Leaves
Ulmus spp.	Leaves
Vitis spp.	Leaves

\+ Summer only.
++ Fall only.
+++ Winter only.

The primary question addressed in this study was whether the scores could be interpreted as a ratio scale of measure, i.e., "Does a score of 4 indicate that an area is twice as good as an area receiving a score of 2?" If the answer to this question is yes, then given the above assumptions, one would expect that score should be linearly related to the amount of available food sources and provide a useful index of habitat potential. Simple linear regression was employed to determine if scores were linearly related to dry browse weights. Both average seasonal and annual scores (for the stand) were used as dependent variables with forage weights as the independent variable.

Although forage availability was considered the primary factor determining habitat potential, it was felt that evaluators also considered forage quality, i.e., a plot containing only preferred browse species should receive a higher score than a plot with an equivalent weight of only staple browse species. Under this presumption, score was assumed to be a function of the quantity of staple and preferred forage. Strength of this relationship was determined by multiple linear regression analysis.

The relative practicality of the 2 techniques was judged by the time requirements. In an effort to determine if 1 season was more advantageious than another for evaluation purposes, average evaluation times were compared.

RESULTS

The accuracy of evaluators in judging the quantity of available deer forage was analyzed by regressing evaluation scores on the dry weight of clipped vegetation. Results of these analyses are presented in Table 2. Coefficients for all regressions considered were highly significant ($P < 0.005$). Annual scores yielded higher correlation coefficients than seasonal scores, and highest correlation coefficients were observed during the fall evaluation.

The ability of evaluators to detect differences in the amounts of preferred and stable forage species was examined by multiple linear regression analysis (Table 2). A significant increase in the correlation coefficient by considering staple and preferred forage weights as independent variables versus the regression with total browse as a single independent variable would suggest that evaluators were able to account for different amounts of

Table 2. Correlation coefficients of score-weight regressions based on 14 stands (Mississippi State University School Forest, 1975-1976).[a]

Data Group	*Independent Variable (s)*	*Dependent Variable*	
		Overall Score	*Seasonal Score*
Combined	Total dry wt.	.87082	.85950
	Dry wt. staple, dry wt. preferred	.87636	.87555
Summer	Total dry wt.	.78849	.77308
	Dry wt. staple, dry wt. preferred	.80175	.77448
Fall	Total dry wt.	.96525	.93859
	Dry wt. staple, dry wt. preferred	.97866	.96226
Winter	Total dry wt.	.90541	.89662
	Dry wt. staple, dry wt. preferred	.90898	.89666

[a]All coefficients significant ($P < .005$).

staple and preferred forage. This did not appear to be the case, as increases in correlation coefficients were very slight.

The practicality of the 2 techniques was judged by consideration of time requirements. Evaluators had no difficulty in meeting the 1 minute per plot time limit. It was found that after scoring a few stands, 1 minute was probably longer than needed. Informal timing of the evaluation revealed that a stand with 15 plots could be evaluated in approximately 15 to 20 minutes regardless of season. It was noted that a slightly longer amount of time was required to perform an evaluation during the summer than during the other 2 seasons. This was because of the increased difficulty of travel between plots due to the denser vegetation. Also, the summer heat tended to make the evaluation more laborious than during other seasons.

An immense savings in time of a subjective evaluation was apparent from this study. Including travel time and 15-20 minutes/stand for administration, the entire subjective evaluation required approximately 40 man-hours (per season). The objective technique required approximately 6.5 hours per stand. With two persons working, this translates to a total requirement of about 180 man-hours for each seasonal evaluation using clip sampling.

CONCLUSIONS

A team of trained evaluators was able to judge forage quantity subjectively and provide a meaningful index of forage availability for white-tailed deer. Evaluators were unable to account for differences in forage quality with regard to preferred and staple forage species. Some variability in assignment of scores by evaluators was apparent from the data. This, however, does not necessarily detract from the overall effectiveness of the technique. The fact that each evaluator is an individual can be assumed to be a source of consistent variability between scorers, but most of the inconsistency is apparently removed by calculation of an average score on a stand basis. Highest correlation of scores and forage weights was observed for the fall evaluation, and this season was also the optimum time for conducting the evaluation from the standpoint of comfort and ease of travel for the evaluators. While evaluators were not required to discriminate between areas based on other habitat variables such as cover and water, it is felt that these parameters could be considered by trained evaluators if it were necessary. However, since within the pinelands of the Southeast most of these additional habitat requirements are sufficiently met, it is felt that a measure of forage availability provides an adequate and useful index of habitat potential for the white-tailed deer. Because of its ease of administration, the Perkins technique appears to have the capacity of providing the wildlife manager with timely information on the status of deer habitat while incurring a minimum of expense.

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