probably result in reduced hunting opportunities due to increased costs, but hunting quality will probably be increased.

Landowners must make their holdings produce income. If hunting does not produce this income, some other land-use will be employed. Current alternatives to profit-oriented hunting businesses include commercial development, tame grass pasture conversion, "clean" farming and extensive forest monocultures.

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A PLAN OF FOREST WILDLIFE HABITAT EVALUATION AND ITS USE BY INTERNATIONAL PAPER COMPANY

by

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ABSTRACT

A habitat evaluation system which employs a systematic plot survey of each stand or unit of a tract to be evaluated is described. Scores are recorded by individual species and stand and/or tract values reflecting habitat quality are quantified. From these values and other observed information, a precise management plan can be written.

INTRODUCTION

There exists a need for a field scoring system to evaluate the quality of wildlife habitat for management purposes. This need is particularly acute on industrial forest land where profound habitat changes are caused by silvicultural practices such as harvest cutting, site preparation, prescribed burning, etc. Although the quality and quantity of wildlife food can be estimated by detailed studies, other factors of habitat such as escape cover, feeding conditions, nesting cover, etc., are

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not quantified by these studies. Many such systems of habitat analysis are time consuming, expensive, or restricted to small areas.

"Habitat condition" as defined here is restricted to the desirability or livability of a given area for a particular species. Since the condition of a given habitat is constantly changed by natural ecological succession, any habitat evaluation system is only valid at a given point in time, particularly when used in plant community stages other than the climax type. This short term applicability is particularly true when the "disruptive ecology" of intensive forest management practices is superimposed on the natural scheme of succession.

RELATED HABITAT SURVEY SYSTEMS

There are many tupes of habitat evaluation plans listed in the literature. Examples can be summarized as:

I. Reconnaissance Type

Reconnaissance type plans include cover mapping (Graham 1945) and cover density evaluations (Webb 1942).

II. Evaluation of Food Supplies

Evaluating food supplies encompasses food productivity (Allen and McGinley 1947; Sharp 1958); availability (Haugen and Fitch 1955; Ripley and Perkins 1965); consumption (Schwan and Swift 1941); and nutrition (Hanson and Smith 1970).

III. Vegetative Analysis

Analysis of vegetation ranges from gross ocular estimation to detailed studies documenting species succession (Greig-Smith 1957).

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PLAN OBJECTIVES

A major problem area in habitat work has been the numerical evaluation of habitat condition. By meeting a need for a relatively quick but accurate and detailed method of habitat description, this system of evaluation will partially bridge the widening gap between intensive documentation and gross ocular estimation of the status of wildlife habitat.

Although subjective, it is a tool which can be used by the professional management biologist in assessing the habitat status of an individual stand or tract; and provide data for (1) land management decisions as well as (2) assist in establishing

priorities for management programs. If an area is evaluated before a silvicultural practice is applied, a subsequent evaluation will reflect the effects of this practice. If periodic evaluations are made, comparison of the indices will reflect changes in the quality of the habitat over time.

Presently, this system is concerned only with the evaluation of habitat for five species of primary game importance:

1. White-tailed deer *(Odcoileus virginianus)*
2. Wild Turkey *(Meleagris gallopavo)*
3. Bobwhite quail *(Colinus virginianus)*
4. Cottontail rabbit *(Sylvilaqus floridanus)*
5. Tree squirrels (Gray - *Sciurus carolinensis)* (Fox - *Sciurus niger)*

SCORING STANDARD

The standard of comparison for the habitat rating scale must be the best habitat conditions which exist on the overall area encompassed by the evaluation. If an evaluation for deer were to be carried out on selected areas of a state, for example, the standard for comparison would be the best habitat conditions for deer within the boundaries of that state. This may or may not be the highest theoretical potential for habitat quality existing in the state. The evaluator may choose as his standard certain habitat conditions which represent the optimum existing conditions rather than those conditions which may exist on an individual area managed solely for deer production.

EVALUATOR REQUIREMENTS

The evaluator must:

1. Be familiar with the habitat requirements of the animal species being considered.
2. Be knowledgeable of the food-supplying plant species, many of which must be of late winter importance.
3. Agree with other evaluators on the scoring of individual habitat types and be able to relate habitat conditions from different plant communities (e.g., galberry-palmetto-slash pine to multi-species river swamp) and, if necessary, different physiographic regions (e.g., coastal plain to uplands).
4. Be cognizant of the local importanct of an individual plant species which may not rank in importance other than in an isolated area and be able to relate the value of this locally important food item to that of a widely accepted one.
5. Be observant of habitat conditions between plots but once on plot center, he must consider the scoring criteria for that plot and that plot alone.

PROCEDURE

This evaluation system requires the evaluator to systematically visit each stand and collect accurate information in order to make prescriptions for the management of the stand.

I. *Stand and Sample Plot Delineation*

A tract to be evaluated should be previewed from existing maps or aerial photographs and stratified into stands. A stand is an individual body of timber occupying a specific area and being of sufficiently uniform age, composition, site and stocking to distinguish it from surrounding areas of the forest. Because of its unity, an entire stand lends itself to the same silvicultural treatment.

The size of the stand will determine the number of plots employed. An individual plot is circular and 20 feet (6.1 meters) in diameter. Although there is no maximum, no stand should receive fewer than 25 plots and these are to be taken in a systematic grid pattern.

II. *Plot Evaluation*

Each plot must be considered representative of the entire area with the exception of its proximity to such requirements as escape cover, roosting cover, etc. The evluator stands on plot center, makes a visual examination of the plants within the plot boundary, estimates the importance of the proximity requirements, considers other possible limiting factors of the proximity requirements, considers other possible limiting factors (Sheet 1) and judges how he would classify it as to the habitat for deer, rating it in one of the following categories:

Plot Score	Habitat Description
1	Very poor - nonexistent
2	Poor
3	Fairly poor
4	Fairly good
5	Good
6	Excellent

Figure 1. Basic Habitat Requirements and Plot Scoring Information.

I. Deer

A. Cover

1. Maximum distance to consider deer will travel from cover is 440 yards (¼ mile). If the plot is over that distance from cover, score "1" regardless of other factors.

B. Food

Harlow and Hooper (1971) report primary winter foods in the Southeastern Coastal Plain consists of green leaves, fruits, succulent twigs and buds, and a small amount of hardwood twigs and buds. Also, the annual contribution of forbs, grasses and sedges, fungi and dried leaves equalled the amount provided by the green leaves of woody plants. Primary winter foods include Japanese honeysuckle, yellow jessamine, acorns, greenbriar, sumac fruit, gallberry, and others of lesser importance. Score on the basis of quality, quantity and availability of food items present.

II. Quail

A. Cover

1. Escape cover - brush, thicket, bay head, or similar type cover is necessary, if a plot is over 300 yards from cover, score "1". Between 200-300 yards reduce score by 1 point.
2. Feeding cover - some bare ground is essential but must be fairly open so quail can travel uninhibited. Ground litter will retard or make feeding impossible.
3. Diversity or "edge" and lesser plant communities of early successional stages and important to quail.

B. Food

Score on basis of quality and quantity. Fall and winter quail foods consist of seeds from the legumes, euphorbias, grasses, oaks, sweetgum, blackgum, sumac, dogwood, and many others.

III. Rabbit

A. Cover

Escape cover is necessary. This may consist of brush piles, briar patches, windrows, etc. Reduce score by one point if cover is over 100 yards. Score "1" if cover is over 200 yards.

B. Food

Low growing, green succulent vegetation is very desirable. Winter foods include evergreen leaves, greenbriar, blackberry, trumpet vine, and others. Habitat conditions which favor quail also favor cottontail rabbits.

IV. Turkey

A. Cover

Turkeys require cover but will use the perimeter of large open areas readily. Consider 300 yards the maximum distance for optimum scoring. From 300 to 500 yards to cover, reduce by one point. Over 500 yards, score "1". In any situation, score according to openness of visibility and ease of travel (relative to the turkey).

B. Food

Turkeys will eat a great variety of foods including seeds, mast, forage (grasses, clovers, sedges, etc.), insects and fruits. Score according to quality, quantity, and availability of foods. (Korschagen 1967).

V. Squirrels (Consider Fox and Gray Squirrels together)

A. Cover

Trees of mast bearing age are essential. In the deep South, den trees are desirable but not necessary.

B. Food

Squirrels of both species depend heavily on mast. However, food diversity is very important. Squirrels eat a variety of fruits and berries, buds, roots, fungi, insects, and bird eggs. Score on quantity and quality of food.

He records the score number for the plot in a column opposite the plot number under "Deer" on the stand tally sheet (Sheet 2).

In the same manner, the evaluator next determines the quality of the quail habitat, taking into consideration the distance to escape cover, feeding cover, etc. Anumerical value is assigned using the same scoring categories and this number is entered on the tally sheet opposite the plott number and under "Quail" (Sheet 2).

The same procedure is followed for evaluating habitat for turkey, rabbit and squirrel. A single plot is rated for each species, individually, and the scores recorded before proceeding to the next plot.

III. *Stand Evaluation*

After all plot scores are recorded, the average habitat value for each animal species can be calculated. These average values are an index to the quality of the habitat for that animal species in that stand. Before proceeding to another stand, the evaluator writes a short report on his pertinent observations. This may include management recommendations, primary browse or food plants available, overstory condition, featured wildlife species, etc.

Figure 2. STAND TALLY SHEET

Tract Name: Ownership: Date:
Location: State: County:
Stand No.: 1 Stand Acres: 120 Evaluator:

Plot No.	Deer	Quail	Rabbit	Turkey	Squirrel	Remarks
1	3	5	4	2	3	
2						
3						
4						
5						
:						
:						
p.n						
Total						
Stand Average	4.2	1.3	1.7	3.5	5.1	

Stand Conditions: (Forest type, age, soil information, etc.)

Vegetative Conditions: (Major vegetative species, browse availability, cover conditions, etc.)

Management Needs and Recommendations:

IV. *Tract Evaluation*

A tract composed of more than one stand cannot be considered a single "stand" because of the basic differences between stands, management practices, and needs. Thus individual stands must be stratified as to their size and number of plots to be taken in each before going into the field. A relative tract value for individual animal species can be derived by multiplying each species' stand average value by the percentage of the tract total size which each stand represents and adding the the values (Sheet 3).

Tract value numbers are valid for individual species but conglomerate "wildlife" values are not, because of the fundamental differences in habitat requirements between animal species.

Figure 3. TRACT EVALUATION SHEET

Tract Name:Ownership: Date:
Tract Acres: 564Location: Evaluator:

STAND AVERAGE TABLE

Stand No.	Acres	% Tract	Stand Averages Deer	Quail	Rabbit	Turkey	Squirrel
1	120	21	4.2	1.3	1.7	3.5	5.1
2	87	16	2.7	2.1	2.3	2.6	2.5
3	55	10	2.9	3.5	3.9	4.2	1.3
4	115	20	4.6	1.8	1.4	1.2	2.7
5	187	33	3.1	2.6	2.4	2.6	2.9
Totals	564	100%					

Tract value by stands is calculated by multiplying "% Tract" by stand average from tally sheet. For example, the tract value for "Deer" would be calculated by:

% Tract		Stand Average - Deer	
21	x	4.2	= 0.88
16	x	2.7	= 0.43
10	x	2.9	= 0.29
20	x	4.6	= 0.92
33	x	3.1	= 1.02
100%		3.5 =	Tract Value for "Deer"

Tract Value Table

	Deer	Quail	Rabbit	Turkey	Squirrel
	0.88	0.27	0.36	0.74	1.07
	0.43	0.34	0.37	0.42	0.40
	0.29	0.35	0.39	0.42	0.13
	0.92	0.36	0.28	0.24	0.54
	1.02	0.86	0.79	0.86	0.96
Tract Value	3.5	2.2	2.2	2.7	3.1

Tract Management Recommendations:

Tract management recommendations can now be written incorporating the stand management recommendations (from Stand Talley Sheets), tract value, landowner objectives, wildlife species to be featured, timber management objectives and other pertinent considerations.

Habitat Evaluation on International Paper Company Lands

The first use of this evaluation system within International Paper Company will be a direct survey to quantitatively evaluate the condition of game habitat in third-forest pine stands. The results of this survey will give Company managers a "point in time" condition of game habitat in these stands. These data will be used to predict the habitat conditions which will exist at selected ages in the life of such stands and will also serve as a basis for assessing the results of game management practices, silvicultural treatments, and successional changes.

Using this evaluation system, the forest stands surveyed will be primarily, although not entirely, plantations. Stands will be divided into the following classes:

(1) Uncut mature (This is necessary in order to relate the survey information to pre-third forest conditions).

(b) Age 0-1, (c) 5 years, (d) 10 years, (e) 15 years, (f) 20 years.

The survey is to cover Company-owned lands in portions of Georgia, Florida, and Alabama and is proposed for a one year period, 1975, with the intent to renew it beyond 1975 or to incorporate the objectives and needs into further work.

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THE ROLE OF ACCESS IN HUNTER USE OF CANAAN VALLEY, WEST VIRGINIA[1]

by

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ABSTRACT

The purpose of this study was to determine how an area of low quality unmaintained access affects hunter satisfaction and use of the Canaan Valley in northeastern West Virginia. The 10,120 ha (25,000 acres) northern half of the valley supported a high, well distributed population of hunters during the 1973-74 hunting season. The valley floor, where access is the most difficult, supported 67 hunter days per 40.5 ha (100 acres) and the mountainside supported 63 hunter days per 40.5 ha (100 acres). Approximately 10 percent (160) of the hunters using the valley during the 1972-73 season were interviewed by telephone. Hunters were satisfied with road conditions even though the three main access roads into the valley must be negotiated by truck, four-wheel drive vehicle or ATV. A difficult ride into a hunting area may play an important role in the total hunting experience.

INTRODUCTION

Large roadless areas are difficult to manage for hunting since most hunters will not venture far from access. Small game hunters in North Carolina prefer to hunt within a half mile of a road or trail (James et al. 1969). Johnson (1943) found that a high percentage of deer kills in the Lincoln National Forest of New Mexico were made within one mile of an automobile road and James et al. (1964) found that most deer kills in North Carolina are within one-half mile of roads or trails. The results are over-harvesting and high hunter density near access, and low use and under-harvesting in remote areas. An even distribution of hunters throughout an area is usually desirable, but often necessitates a good network of roads and trails. However, such a system is not only expensive to build and maintain, but may run counter to other management goals. The purpose of this study was to determine how an area of low quality, unmaintained roads and trails affects Hunter satisfaction and distribution.

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