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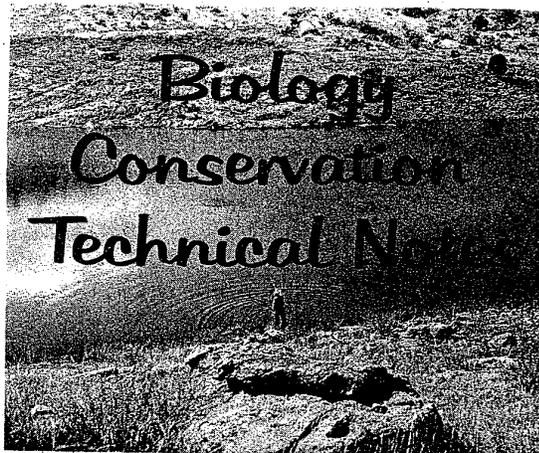


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U. S. DEPARTMENT OF AGRICULTURE NEW MEXICO SOIL CONSERVATION SERVICE

BIOLOGY NOTE NO. 21

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SUBJECT: Big Game Range Analysis

Attached is a single copy of a basic techniques reference for use in determining browse range condition and trend and for measuring annual utilization of browse.

The publication, "Big Game Browse Range Analysis Techniques for New Mexico" was prepared by an interagency team. The techniques are being used by the Forest Service, Bureau of Land Management, and New Mexico Department of Game and Fish to gather field resource data, and for its interpretation.

The method for determining annual browse utilization is referenced in the specifications for the practice - Wildlife Upland Habitat Management, Code 645.

File this technical note in the three-ring binder, "Biology Technical Notes."

Attachment

AC's & DC's

BIG GAME BROWSE RANGE ANALYSIS TECHNIQUES for NEW MEXICO



An Interagency Project

The New Mexico Department
of Game and Fish

U.S. Department of Agriculture
Forest Service • Southwestern Region

U.S. Department of the Interior
Bureau of Land Management

BIG GAME HABITAT

ANALYSIS

FOR

NEW MEXICO

Participating Agencies

New Mexico Department of Game & Fish

Bureau of Land Management

U. S. Forest Service

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INTRODUCTION

This techniques manual is a product of cooperation among the various agencies involved.

It is recognized that the basic problem involved is to find factors that limit population levels of New Mexico's big game herds. A first step in this direction is an analysis of their habitat that presently exists.

The table of contents indicates the broad spectrum this technique guide will cover when completed. Because this is such a long range program, each technique as it is developed and receives interagency approval, will be sent to the field people representing the various agencies.

Before any technique receives agency endorsement, it will have been the product of many meetings, discussions, and extensive field trials. Adequate field training will precede any instructions that make using a given technique mandatory.

Because management of deer and elk habitat is of primary importance in New Mexico, developed scorecards apply specifically to their use of the habitat. There is no reason, however, that if local scorecards are developed to cover other big game species, that the techniques described cannot be used.

A basic objective of this analysis will be to gather reliable data on condition, trend, and use of various vegetative components occupied by big game. The end result is information on which to base enlightened plans of management.

Cooperation among the various agencies is essential to this habitat analysis program. Any responsible officer from the agencies may initiate the studies, but should always enlist the participation of other agencies involved. It is also desirable to obtain sportsmen and stockmen participation whenever possible.

CHAPTER I - BROWSE RANGE ANALYSIS

The carrying capacity of a browse range is dependent upon the total amount of forage produced, less needed reserves to: (1) Assure plant health and vigor; (2) Provide for years of low production; and (3) Allow for years of very heavy utilization. Production will vary over long periods with site quality and with age and vigor of forage plants; over short periods, or from year to year, it will vary with weather (particularly precipitation), with insect and rodent activity, and to some extent with current utilization.

For the present we will not be concerned with capacity estimates of big game browsing ranges. Rather, through transect sampling we will attempt to determine the condition of the important big game browse ranges as they exist today. By remeasuring these areas at future intervals, we establish trend; and by obtaining annual utilization figures we can evaluate the part this may have played in any condition change.

Browse analysis will consist of two parts (I) Measuring condition and Trend; (II) Measuring Annual Utilization.

I. MEASURING CONDITION AND TREND

Six main items are considered in judging condition and trend of big game browse ranges:

A. Composition

This factor refers to the species of browse plants present on the range and their relative value as game food. Also, to be considered is the fact that the better ranges will provide a variety of the preferred forage species. Nutritional requirements of big game animals are much better met by a mixture of species than by a single species.

B. Density

In these instructions the word "density" expresses the percentage of total ground area covered by the live crown of browse plants.

C. Vigor

The vigor, or relative state of health of the plant, indicates its probable productivity. In shrubs, vigor is appraised by classifying the plants as to age and hedging class.

D. Availability

When plants grow out of the reach of big game animals, the type can become almost useless from a forage standpoint. Man has at his disposal, many techniques to improve the availability class of browse stands.

E. Soil

Vegetation and soil are basic resources. Over a long period, satisfactory range conditions can be maintained only on stable soils, and stable soils are maintained only under adequate vegetative cover.

F. Understory

Composition and relative density of the understory vegetation, especially as it relates to cool season growers, is important to big game animals. Consideration will be given this portion of the habitat when evaluating condition and trend of big game browse ranges.

Step 1 - MAKE SMALL SCALE MAP

Color quadrangle maps of $\frac{1}{2}$ " = 1 mile are available at the State BLM Office for most areas. Wherever this coverage is available, it will be used. Where it is not, this stage of the analysis will be completed on another $\frac{1}{2}$ " = 1 mile map. The following information will be placed on overlays keyed to the small scale map.

- A. Herd or Mgt. unit boundaries as defined by the Department of Game and Fish; their name or number.
- B. Seasonal ranges are defined as that area used by game animals through all or nearly all of that respective season in most years. Seasonal ranges will be delineated if they are known.
- C. Concentrated use areas. These are areas where big game use over the years has resulted in an obvious alteration of the browse plants. Because of the map scale, ultimate accuracy of the exterior boundary of these areas is not important.
- D. The best combined knowledge of all field people involved should go into preparation of this small scale map.

STEP 2 - SELECT AREAS TO BE ANALYZED

When the analysis job is complete, all browse ranges of any importance to a big game herd will have been typed and analyzed as to condition based on composition, density, vigor, and availability. Because of the job's magnitude, a starting place must be selected. This will be accomplished by the field people selecting the browse areas most important to the big game herds first and working out from there.

STEP 3 - ANALYZE AREA

- A. Type Vegetation.
 1. All browse areas selected for analysis (Step #2) will be type mapped.
 2. Field type mapping will preferably be accomplished on aerial photos and later transferred to base maps (2" = 1 mile) by use of plotting machines. Type mapping directly on base maps will be acceptable.
 3. Types larger than 40 acres should be delineated. Smaller types may be shown separately if they are of particular significance.

4. Types will be designated giving type numbers followed by standard symbols to indicate both the general aspect and the most abundant species. Unless exceptional conditions prevail, not more than 2 or 3 symbols will be shown in a type designation. (Symbol list and type numbers are found in the Appendix).
5. Type maps made for livestock range analysis will be available in some cases. If so, the applicable typing may be transferred to the browse analysis map.

B. Establish transects

1. All browse types to be analyzed will be sampled with paced condition transects.
2. Transect locations will be carefully selected to fall within a representative portion of the type.
3. Transects will not cross type lines.
4. An additional transect will be installed in the same type whenever a change in condition is recognized.
5. Each transect will have an identification number which will be placed on the aerial photo and/or type map. Identification number will consist of the examiner's last initial, consecutive number for the examiner's write up, and the year write up was made. (For example: John Black's 4th transect write up in 1968 will be shown as B-4-68).
6. Within the vegetative type to be studied, select a route of travel for a 100 point paced transect. The chosen route should provide the best possible cross-section of the type being sampled. A monument should be placed at the starting point and a photo taken showing the area to be covered by transect with monument in the foreground.
7. Select a sampling interval, such as each two or three paces.
8. Pace along the selected route, always heading toward some chosen landmark. Walk only in the openings between shrubs and trees.
9. At each sample point, record whatever is found (hit) within a 3/4 inch loop immediately in front of a mark on the boot toe. This may be bare ground, erosion pavement, rock, litter grass, or forb.

Common grasses and forbs will be identified and tallied by individual species.

Record "hits" on perennial grasses or forbs when all or part of the live root crown falls inside the loop. When no perennial vegetation root crown falls within the loop, dot tally what is "hit," and then look for the nearest grass, forb, or half shrub within 180 degrees in front of the toe.

If species occur less than 1 foot from toe, tally in left hand side of "dot tally" column. If plant occurs from 1 to 3 feet from toe, tally in the right hand side of "dot tally" column. If nearest perennial plant (excluding browse) is over 3 feet from toe, no tally will be made. Composition of herbaceous vegetation will be calculated on the basis of total plants tallied in all 3 columns. Relative density will be estimated by comparing the number of tallies in each column. Annual plants are not to be counted.

Record as litter if more than half of the loop is covered by dead plant material older than that resulting from current growth. Do not depress standing vegetative matter so it occurs under the loop. Record hits on rock only for rock in place. Small loose moving rock should be tallied as erosion pavement (E.P.).

10. At each sample point, tally by species the age and form class of the nearest shrub (any part of plant) to the boot-toe that occurs within a 180° arc in front of that sample point. The following definition of age and form classes will be used.

a. Age Classes

Y--

Established young plants. Elongated growth form, simple branching, usually less than 10 years old, and basal stem diameter not over $\frac{1}{2}$ " (a young looking plant).

M--

Mature plants more than 10 years old. Distinguished by heavier, often knarled stems, complex branching, rounded growth form. Crown made up of more than $\frac{1}{2}$ living wood.

D--

Decadent plants. Crown made up of more than $\frac{1}{2}$ deadwood.

Dead. All dead plant hits (nearest shrub to toe) in the transect will be tallied as dead. When a transect "hit" does involve a dead plant, the nearest live plant will also be recorded and classified. Any transect that shows over 10 hits on dead plants should include an explanation in remarks as to the apparent cause of this browse loss. Dead plants will not be considered in calculating composition.

b. Form Class -

- (1) All available, little or no hedging.
- (2) All available, moderately hedged.
- (3) All available, severely hedged.
- (4) Partly available, little or no hedging.
- (5) Partly available, moderately hedged.
- (6) Partly available, severely hedged.

11. If over 50% of plant is unavailable, also dot tally "unavailable" column.
12. At each tenth sampling point, estimate shrub density using the angle gauge, crown density guide or ocular estimate. Count and record total density, including all browse shrub species. (If a tree overstory exists, the density of tree species must be tallied separately from browse and recorded on form under the "Woody Plant Density" heading--"Trees.")

In some cases the use of the angle gauge may not be practicable; such as very dense and "clumpy" stands of oakbrush, in extremely dense stands of other species (particularly if shrubs are tall), or in the case of such decumbent, patchy species as manzanita. When the use of the angle gauge is not practicable, density may be estimated by step-point procedure, by the use of dot-grid, crown density guide (crown coverage scale) using aerial photos, or by ocular estimate.

13. Relative Range Use by Big Game and Livestock

As browse condition transects are established, relative degree of occupancy by big game and livestock will be obtained by fecal group counts.

Ten 1/100th acre (11' 9" radius) fecal group plots will be analyzed during each browse condition transect. The fecal group plot will be established on each tenth observation point. All readily identifiable groups, regardless of age, will be counted. Pellet deposits from washing, etc. should not be counted. Groups on the edge of the plot should be counted only when half or more of the group occur inside the plot.

No attempt will be made to compute animal days use per acre. Rather, the total number of pellet groups or dropping per acre will be computed for each animal species involved.

These data will give relative intensity of use by class of animal and trend in relative use between transect readings.

14. Trend Indications

In addition to trend ratings made by comparing successive condition classifications, there are some indicators of trend which may be observed at any time. The following paired criteria are examples of such indicators which should be looked for each time range areas are examined. If a rather definite up or down trend is indicated for any rated item (i.e. "vigor"), the fact will be noted as remarks on the back of Interagency Form #1.

<u>Indicators of "Up" Trend</u>	<u>Indicators of "Down" Trend</u>
Well-established young plants of key species present in numbers sufficient to replace decadent or dying plants.	Young plants of key species scarce or lacking, or young plants mostly of least desirable species.
Apparent recovery from past heavy hedging of key species.	Heavy use maintaining "clubbed" appearance of key species.
Few plants of desirable and intermediate species receiving excessive current use. Very little use of least desirables.	Many plants of desirable and intermediate species currently heavily browsed, considerable use of least desirables.
Vegetation and litter apparently increasing and covering bare soil areas. Rills and gullies being stabilized by perennial vegetation.	Soil movement obvious, litter piling up against rocks or plants. Erosion pavement and bare ground increasing in area. Rills forming, gullies with raw edges, extending, without perennial vegetation.

C. Compile and Evaluate Data

1. When 100 sampling points, 10 woody plant density and 10 accumulated P. G. plots have been taken and recorded; Make computations as follows:

- a. Compute average of browse and tree density estimates.
- b. Total these to get woody plant density.
- c. Subtract the average woody plant density percent, as determined in "b" above, from 100. The remainder, called the "area factor," represents the percent of the total area not under the crown of shrubs or trees.
- d. Convert "hits" for each category of ground cover (as bare ground, rock, litter, etc.) to a number, then multiply each number by the "area factor." The result represents the percent of the total ground area in interspaces among browse plants and trees occupied and protected by each ground cover category.
- e. Enter, in space provided on back of form, observations on current erosion, plant pedestaling, etc., for use in making soil condition classification.
- f. Total all understory vegetation (hit, 0-1', 1'-3') and calculate % of cool season species represented.
- g. Add across dot tallies for each browse species encountered and compile a total by species for age class and form class. Make sure both totals agree for each species. That number is the % composition for each species and should be entered in the "% Comp." column. (Do not include dead (Dd) plants in calculations).
- h. Total downward the young, mature, decadent, and dead columns for each species class. (i.e., decreaseers (A), increaseers (B), invaders (C)).
- i. Form class will also be totalled by each species class. For score card purposes, species tallied as form class 4 will be totalled with and appear in totals for form class 1; form class 5 will be totalled with and appear in total for form class 2; and form class 6 will be totalled with and appear in totals for form class 3.
- j. Total hits in unavailable column by species class (see h. above).
- k. After all computations are complete, apply resulting data to score card and rate the soil understory

vegetation, browse composition, density, vigor and availability. After all condition ratings have been made, record the condition rating symbol in the appropriate box on the form.

NOTE: Shrub density is one indicator of the amount of forage available to browsing animals. In some cases, however, density can be so great that animals cannot penetrate without great difficulty. As a result, only the perimeters of such stands contribute available forage.

If, in the opinion of the observer, density is so great that the amount of forage available to animals is definitely limited, the stand shall be rated as V = very dense.

Observers should consider the effects of excessive density when stands average 35% or greater.

2. As a transect is installed and browse condition classified, the transect should be shown on the type map and aerial photo. The transect is represented by the symbol "X__," the "X" being the starting point. Classification symbols H, M. or L (high, medium, or low), will be placed in the following order: composition, density, vigor, availability above the transect line; soil, and understory vegetation below the line.

Example: X $\frac{HML}{ML}$

for a type rating high in composition, low in density, medium in vigor, low in availability, medium in soil stability, and low in understory vegetation.

D. Determine Trend

1. Trend on browse types will be determined by comparing successive ratings of vegetative composition, density, vigor, availability, and soil stability as established by condition transect.
2. It is important that we sample the same area each time a transect is run for trend purposes, but it is not essential that the same plants be a part of the transect. It will be sufficient to find the starting point and use the direction established for the initial transect.
3. When succeeding observations are made on these transects, they should be made on dates which correspond quite closely to the original ones. Wholly comparable results may be

difficult to obtain if density estimates are made in one case when shrubs are bare of leaves, and in another case when in full leaf or after current twig growth is complete.

E. Complete Large Scale Map.

1. The following items should appear on large scale map.

(2" = 1 mile)

- a. Type lines and type designations.
- b. Acreage figures for each type and condition class.
- c. Concentrated use areas (optional).
- d. Management or herd unit boundaries, and name or number.
- e. Browse transect condition rating symbol at transect location.
- f. Transect identification number (cross reference to write up sheet).

II. ANNUAL UTILIZATION

The second portion of the Browse Range Analysis will include the annual utilization check.

In past years utilization figures have been used to support harvest recommendations. Because the plants and areas used fluctuated from year to year, the current annual figure of utilization may or may not have had much meaning.

The new approach to Browse evaluation will be to determine trend in the condition rating of browse ranges and use the utilization data to evaluate the part utilization played in the condition change.

Through the years, much time and energy has been lost in trying to standardize the selection of key areas and key browse species. The instructions for conducting an extensive utilization check are designed to eliminate personal bias and keep consistency at a maximum.

There has also been past objection to the small samples involved in the twig length measurement technique. This has been rectified with the extensive transect.

Technical ability of the observer, time, and efficiency were all considered in selecting this technique over other acceptable procedures.

A. Selecting the Area.

During the year all field men will observe to find the heaviest used areas for a given management unit. The job is not to find the "one" heaviest used area in a game management unit, but the several concentration points used during the year. These may occur in the same general location each year, but more than likely will fluctuate to some extent. This should not be a concern. Place the transect in the area you know to be the heaviest used location for that year.

The reason "heaviest used" areas are chosen is that if browsing intensities are responsible for changing the condition, it will happen first in these areas. If the fluctuation in use gives sufficient rest to the plants, it is possible that this "heaviest" use will not be destructive.

B. Running the Transect.

The observer will go to the "heaviest used" area and select the following:

1. A starting point.
2. A distant object to maintain his line of travel.
3. The pace intervals between sampling points. (All transects will be 100 paces so a 3-pace interval will generally exceed 1/4 mile.)

After taking the first paced interval, the observer will locate the browse plant nearest his toe within a 180° arc in front of him. He will record the species name and dot tally to the nearest 10%, the estimated percent utilization of current annual growth. The estimate of utilization can be made in several ways, but the suggested techniques follow:

1. Note the second hand location on your watch.
2. Using your route of travel as the 6 o'clock-12 o'clock line, go to the position on the browse plant that is indicated by your second hand. (For this example we will use 3 o'clock).
3. Take an available twig that is on the 3 o'clock side and count down 10 shoots of annual growth. If 4 show use (any use) dot tally the 40% column, if 7 show any degree of use, dot tally the 70% column, or if only 1 was used it would be recorded as 10% use.

The examiner will not try to walk in an absolute straight line. Walk toward your direction point, but in the interspaces between browse plants.

After utilization has been recorded, dot tally by species the age and form class of each hit. The following descriptions will aid in classification:

Age Classes

- Y - Established young plants. Basal stem diameter not over 1/2", simple branching and elongate growth or (a young looking plant.)
- M - Mature plant. Heavy growth, often gnarled stems, complex branching, crown made up of more than 1/2 living wood.
- Dec. - Decadent plants. Same as mature but crown made up of more than 1/2 dead wood.
- Dead - The plant is dead and shows no signs of growth.

Form Class

Availability

- 1-2-3 All available - The entire plant growth is below five feet or from two to six feet depending upon known winter snow depths (For elk these range up to seven feet.)
- 4-5-6 Partly available - Less than 1/2 of plant crown is out of reach of the animal concerned.
- 7 Mostly unavailable - More than 1/2 of the plant crown is out of reach of the animal concerned.
- 8 Unavailable - No plant crown is available to the animal.

Degree of Hedging

- 1 & 4 Little or no hedging - indicating light use in the past three or four years.
- 2 & 5 Moderately hedged - use in past three or four years caused much development of lateral branching and more complex growth form.

3 & 6 Severely hedged. Heavy use in past three or four years causing a very much "clubbed" or broomed appearance.

(See diagram)

- 1 - all available, little or no hedging
- 2 - all available, moderately hedged
- 3 - all available, severely hedged
- 4 - partly available, little or no hedging
- 5 - partly available, moderately hedged
- 6 - partly available, severely hedged
- 7 - mostly unavailable
- 8 - unavailable

When you have completed 10 stations, you will let point 10 be the center for a 100th acre pellet group plot reading. Pellet group counts in conjunction with the extensive browse transect will be conducted as follows:

Ten 1/100th acre circular plots will be read, one at each 10th sampling point. The sampling point rather than the nearest shrub should be used as the plot center. An attempt will be made to count only current year groups. Individuals running the transect will make the determination of countable pellets. Pellet groups on the edge of the plot must have one half or more of the group inside the plot to be counted. Pellet groups or dropping for deer, elk, and cattle will be recorded on all transects. Pellet groups per acre for each class of animal will be figured by multiplying the total number of groups for each class of animal by 10.

Examiners should agree on what pellets they believe are current year's groups. We realize the information is not 100% accurate, but our management can't be to that degree of accuracy either, so use your best judgement.

At Station 50 the observer will figure average utilization of all species he hit on the first 1/2 of the transect. All species averaging 50% or heavier use at this point will be circled.

At Station 51 if the plant hit is one of the species circled, it will be recorded like any of the first 50. If at Station 52 the plant hit is not circled, its utilization, form and age class will be recorded; but then the observer will locate the nearest one of any of the circled plants and also record its utilization (only) opposite the appropriate species name.

Form and age class will be estimated for the 100 "nearest the toe" browse hits only. In this way composition can be calculated by using the form and age class totals. Use all plants in calculating utilization.

In this technique we let the animal use tell us what area and species are key.

This technique also assures that utilization figures on key species comes from a minimum of 51 plants. This is a considerable improvement in sample size over previous production-utilization studies.

C. Summarizing the Transect Information.

1. Utilization Percent

- a. Multiply the number of shrubs tallied in each block on the form by the number in the column heading (0, 10, 30, 50, etc.) and enter the resulting number in the block "Total Utilization."
- b. Add across the dot tallies for each species to get total number of shrubs and record in appropriate block.
- c. Divide total utilization by total number of shrubs to get average utilization of that species.

2. Percent Composition - Age and Form Class

- a. Add across dot tallies for each species listed under decreaser, increaser, and invader and place total as percent under "% comp." column.
- b. Total downward the young, mature, decadent and dead columns for each species class, i.e., decreaser, increaser, invader.
- c. Form class will also be totaled by each species class.
- d. For interpretations of data on percent composition, and form and age class, refer to guides under the Condition and Trend Section. These yearly interpretations will be used as indicators only.

APPENDIX

BROWSE CONDITION CLASS SCORECARD

To use scorecard: Apply basic data (on composition, density, vigor, and availability) from condition transect record to scorecard. Start at highest class in each category and work down until data fits a condition class description.

Example (for composition only): A shrub stand has 31% bitterbrush (A), 48% sage (B), 13% skunkbush (C), 8% snowberry (C). It fails to fit "High" (too few A's.). It fits "Medium" (well over 50% A's and B's, with over 15% A's).

COMPOSITION

A and B species (must be two or more) making up 75% or more of the composition, with A species at least 45% of the composition.	H(high)
A and B species making up 50% or more of the composition with A at least 15% of the composition.	M(medium)
A and B species making up less than 50% of the composition, or A less than 15%.	L(low)

DENSITY

36% plus	H or V*
21 - 35%	H (high)
1 - 20%	M (medium)
0 - 10%	L (low)

*When density is in excess of 35%, the observer will make a rating decision between H and V. H if density appears beneficial to animal use and V if stand needs thinning for best use.

VIGOR

Hedging on "A" species mostly light or moderate with less than 16% of plants heavily hedged.	and	Decadent minus young **less than 16% of total number of plants.	H(High)
Hedging on "A" species mostly moderate, not more than 35% heavily hedged.	and	Decadent minus young not more than 35%	M(medium)
More than 35% of plants of "A" species heavily hedged.	or	Decadent minus young more than 35%	L(low)

**Subtract the number of "young" plants from the number of "decadents." The principle is that if young plants are replacing decadent plants, the condition is satisfactory. If there is an excess of decadent

BROWSE CONDITION TRANSECT

Transect Identification No. _____ Aerial Photo No. _____ Date _____
 Management Unit _____ Key Area _____ Type Designation _____
 Land Status _____ Examiners _____ Pace Interval: _____
 Transect Location _____

Dot Tally
Block

CONDITION RATING FROM SCORE CARD

Browse Comp.	Browse Den.	Browse Vigor	Browse Avail.	SOIL	Under-Story

GROUND COVER DATA

H=high M=Medium L=Low

Item	Hits	Understory Dot Tally		No. of Hits	Times Area Factr	Gr. Cov %	Woody Plant Density		
		0-1 ft.	1-3 ft.				No.	Shrubs	Trees
Bare Gr. & EP							1		
Rock							2		
Litter							3		
G&F Spp.							4		
							5		
							6		
							7		
							8		
							9		
							10		
							Tot		
Total							Ave		

AREA FACTOR FORMULA

Woody plant density =
 Shrub density + Tree Density
 AREA FACTOR = 100 - woody
 plant density.
Ground Cover

1. Bare ground and eros. pave. _____
 2. Rock _____
 3. Litter _____
 4. Grasses & forbs _____
 5. Browse density _____
 6. Tree density _____
- Ground Cover index
 (Sum of Items 2-6) _____

BROWSE CONDITION

Species	Y	Age Class				Form Class						% Comp.	Unavail-able	
		M	Dec.	Dd	1	2	3	4	5	6				
A														
Totals														
B														
Totals														
C														
Totals														

Pellet Group Counts

Plot	1	2	3	4	5	6	7	8	9	10	Total	Per Ac.
Deer												
Elk												
Cattle												

Remarks

(All recommendations for improvement should go here)

AGE CLASSES

- Y - Young
- M - Mature
- Dec. - Decadent
- Dd - Dead

FORM CLASSES

- 1 all available, little or no hedging
- 2 all available, moderately hedged
- 3 all available, severely hedged
- 4 partly available, little or no hedging
- 5 partly available, moderately hedged
- 6 partly available, severely hedged

unavailable---If over 50% of a browse plant is unavailable, the column "unavailable" will be dot tallied in addition to the availability class 4, 5 or 6.

TYPE SYMBOLS

<u>Type No.</u>	Description
1	Grassland
2	Meadow
3	Perrenial forbs
4	Sagebrush
5	Browse
6	Conifer
8	Rock and barren
9	Pinyon Juniper
10	Aspen

plants, condition is unsatisfactory. Example: Assume transect indicates 27% of the "A" species heavily hedged. Decadent hits totaled 25 and young plants totaled 5.

Decadent - Young
 $25\% - 5\% = 20\%$

This is more than 16% and less than 35%; so according to score card, the browse vigor rating for this transect would be M (medium).

If however, 27% of the "A" species were heavily hedged but you had 45 decadent hits and only 5 young.

Decadent - Young
 $45\% - 5\% = 40\%$

This is more than 35% so your vigor class would have to rate L (low) regardless of your hedging class.

AVAILABILITY

<u>% of "A" and "B" Species "Unavailable"</u>	<u>Rating</u>
0 - 20	H
21 - 49	M
50% plus.	L

SOIL STABILITY CONDITION CLASS

	<u>Rating</u>
Ground Cover index 65 plus	H (high)
Ground cover index 35-65 ,	M (medium)
Ground cover index less than 35.	L (low)

UNDERSTORY

Understory vegetation Totals 90 or more	and	20% plus are cool season growers	= H (high)
Understory vegetation Totals 65 or more	and	10% - 19% are cool season growers	= M (medium)
Understory vegetation Totals 35 or more	or	Less than 10% are cool season growers	= L (low)

TENTATIVE CLASSIFICATION LIST

VEGETATION OF ARIZONA AND NEW MEXICO

INTERAGENCY COMMITTEE ON BIG GAME RANGE ANALYSIS

A	B	C
Decreasers	Increasers	Invaders
Preferred	Staple	Low Value
Desirable	Intermediate	Least Desirable
Choice	Fair	Unimportant

TREES AND SHRUBS

GENUS	SPECIES	SYMBOL	COMMON NAME	RATING
Acer	glabrum	Acgl	Rocky Mountain Maple	B
--	negundo	Acne	Box elder	C
Alnus	tenuifolia	Alte	Thinleaf Alder	C
Amelanchier	Spp.	AMEL	Service Berry	A
Anisacanthus	Thurberi	Anth	Thurber Anisacanth	A
Arbutus	arizonica	Arar	Madrone	C
Arctostaphylos	patula	Arpa	Greenleaf Manzanita	C
Artemisia	cana	Arca	Silver Sagebrush	B
--	nova	Arno	Black Sagebrush	B
--	tridentata	Artr	Big Sagebrush	B
Atriplex	canescens	Atca	Fourwing saltbush	B
--	confertifolia	Atco	Shadscale	C
Baccharis	Spp.	BACC.	Baccharis	C
Betula	glandulosa	Begl	Bog birch	B
--	fontinalis	Befo	Water birch	A
Brickellia	Spp.	BRIC.	Brickellia	C
Calliandra	Spp.	CALL.	False mesquite	B
Canotia	holacantha	Caho	Crucifixion thorn	C
Ceanothus	fendleri	Cefe	Fendler ceanothus	B
--	greggii	Cegr	Desert ceanothus	A
--	integerrimus	Cein	Deerbrush ceanothus	A
Celtis	pallidum	Cepa	Hackberry	C
Cerocarpus	Spp.	CERO	Mountain mahogany	A
Chilopsis	linearis	Chli	Desert willow	C
Chrysothamnus	depressus	Chde	Dwarf rabbitbrush	A
--	nauseosus	Chna	Rubber rabbitbrush	C
--	viscidiflorus	Chvi	Douglas rabbitbrush	B
Coleogyne	ramosissima	Cora	Blackbrush	B
Condalia	Spp.	COND.	Grey thorn	C
Cornus	Spp.	CORN	Dogwood	B
Cowania	Stansburiana	Cost	Cliffrose	A
Crataegus	Spp.	CRAT.	Hawthorn	C
Dalea	formosa	Dafo	Indigobush	B
Dodonaea	viscosa	Dovi	Hopbush	C
Elaeagnus	angustifolia	Elan.	Russian olive	C
Ephedra	Spp.	EPHE.	Mormon tea	B
Eriodictyon	angustifolium	Erau	Yerba santa	C
Eurotia	lanata	Eula	Winterfat	A
Eysenhardtia	polystachya	Eypo	Kidneywood	A
Fallugia	paradoxa	Fapa	Apache plume	B
Fendlera	rupicola	Feru	Fendler bush	A
Foriestiera	neomexicana	Fone	Wild olive	B
Fraxinus	Spp.	FRAX	Ash	C
Fremontia	californica	Frca	California fremontia	A
Garrya	flavescens	Gafi	Yellowleaf silktassel	B
--	wrightii	Gawr	Wright silktassel	A
Grayia	spinosa	Grsp	Spiny hopsage	
Grayia	drandegei	Grdr	Hopsage	A
Gutierrezia	Spp.	GUTI.	Snakeweed	C
Hibiscus	Spp.	HIBI.	Desert hibiscus	A
Holacantha	emoryi	Hoem	Crucifixion thorn	C
Holodiscus	dumosus	Hodu	Rockspirea	C

GENUS	SPECIES	SYMBOL	COMMON NAME	RATING
Hymenoclea	Spp.	HYME	Burrobrush	C
Hyptis	emoryi	Hyem	Desert-lavender	B
Juniperus	Spp.	JUNI	Juniper	B
Koeberlinia	spinosa	Kosp	All-thorn	C
Krameria	Species	KRA	Range ratany	B
Larrea	tridentata	Latr	Creosote bush	C
Lonicera	Spp.	LONI.	Honeysuckle	B
Lycium	Spp.	LYCI.	Wolfberry	C
--	Trifoliolata	Lytr	Algerita	C
Menodora	spinescens	Mesp	Spiny menodora	
--	Spp.	MENO.	Menodora	A
Mimosa	Spp.	MIMO.	Mimosa	C
Philadelphus	microphyllis	Phmi	Littleleaf mockorange	A
Physocarpus	monogyrus	Phmo	Ninebark	
Pinus	edulis	Pied	Pinyon	B
Populus	tremuloides	Potr	Aspen	A
Potentilla	fruticosa	Pofr	Shrubby cinquefoil	B
Prosopis	Spp.	PROS.	Mesquite	C
Prunus	americana	Pram	American plum	B
--	virginiana	Prvi	Chokecherry	A
--	Spp.	FRUN.	Wild cherry	C
Purshia	tridentata	Putr	Bitterbrush	A
Quercus	Spp.	QUER.	Oak	B
Rhamnus	Crociea	Rhcr	Holly leaf Buckthorn	A
Rhamnus	Spp.	RHAM	Buckthorn	C
Rhus	microphylla	Rhmi	Littleleaf sumac	B
--	trilobata	Rhtr	Squawberry	B
Ribes	Spp.	RIBE.	Currant	C
--	aureum	Riau	Golden current	
--	velutinum	Rive	Desert gooseberry	
--	fiscosissimum	Rifi	Sticky currant	
Robinia	neomexicana	Rone	New Mexico locust	C
Rosa	Spp.	ROSA.	Rose	B
Rubus	Spp.	RUBU	Blackberry	
Salix	Spp.	SALI.	Willow	B
Sambucus	Spp.	SAMB.	Elderberry	A
Sarcobatus	vermiculatus	Save	Black greasewood	C
Simmondsia	chinensis	Sich	California jojoba	A
Sorbus	Spp.	SORB	Mountainash	
Syphoricarpos	Spp.	SYPH	Snowberry	C
Tetradymia	canescens	Teca	Spineless horsebush	C
Viburnum	Spp.	VIBU	Viburnum	C

TYPE SYMBOLS

No.	Description
1	Grassland
2	Meadow
3	Perrenial forbs
4	Sagebrush
5	Browse
6	Conifer
8	Rock and barren
9	Pinyon Juniper
10	Aspen