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Michael O. Leavitt
Governor
Ted Stewart
Executive Director
James W. Carter
Division Director

State of Utah
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203
801-538-5340
801-359-3940 (Fax)
801-538-5319 (TDD)

UTAH DIVISION OF OIL, GAS AND MINING
FACSIMILE COVER SHEET

DATE: 5/23/95

FAX # 801-637-8603

ATTN: Bill Malencik

COMPANY: DOGM

FROM: Susan White

DEPARTMENT: DOGM

NUMBER OF PAGES BEING SENT (INCLUDING THIS ONE): _____

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We are sending from a Murata facsimile machine. Our telecopier number is (801) 359-3940.

MESSAGES:

What do you think? Call me tomorrow morn if you can. I still have questions, [redacted] I'm assuming this is a trend study for the entire suite, not to meet performance standards.

Susan

Date: May 13, 1995

RE: Hidden Valley Revegetation - Rating the Success of the Range Seeding

To: Joe Jarvis, JBR Consultants
Susan White, Utah State Division of Oil, Gas and Mining

From: Patricia K. Johnston, Revegetation Specialist

As has been discussed in the past, additional parameters and the location of permanent transects would assist considerably in the evaluation of the revegetation of Hidden Valley. Further, a rating system is described as follows which will provide a record of density and plant development through time, or simply a measurement of trend. The contribution of this rating system is that factors which make for successful stands are surveyed and evaluated to determine the success of the reclamation. (*Hull, A.C. 1954)* Finally, a photographic record of one randomly selected, permanently marked photo plot per transect will be established.

The following is the proposed methodology for data collection and analysis.

Establish Eight Permanent 100 foot Line Transects

Eight permanent transects would be established throughout the revegetation area with the assistance of the state reclamation botanist, Susan White. These transects would be place so as to represent all aspects, vegetation types, soil types and treatment/non-treatment areas within the revegetation site. Transects will be mapped and permanently marked in the field with metal stakes, opposing ends of each transect will be so marked that they can be easily identified as a matched pair.

The line-intercept method for cover by vegetative species and cover delineations by bare ground, litter and rock cover will be collected. Additional detailed information regarding bare ground, litter and rock will be collected but not compiled for inclusion in the vegetation trend report; instead it will be used at a later date to address erosion and site stability issues. (See attached form.)

Statistical adequacy will be met by the use of the largest occurring parameter, which is known to be bare ground. It is estimated the eight permanent transects will be adequate to meet statistical adequacy.

Rating System

Density

Density is measured by the number of plants per square foot counted. A welded steel-rod frame 2' x 2' square, subdivided into four units 1' x 1' is placed at 4 foot intervals, starting with zero along the left hand side of the permanent 100 foot transect. This will

give 100 1-foot square observation units. The average of the 100 observation units will give the density for the sample, which is the 100 foot permanent transect. Each species of plant is counted within each 1-foot square to provide density. A total of 8 samples of 100 observation points will be collected.

Plant Development

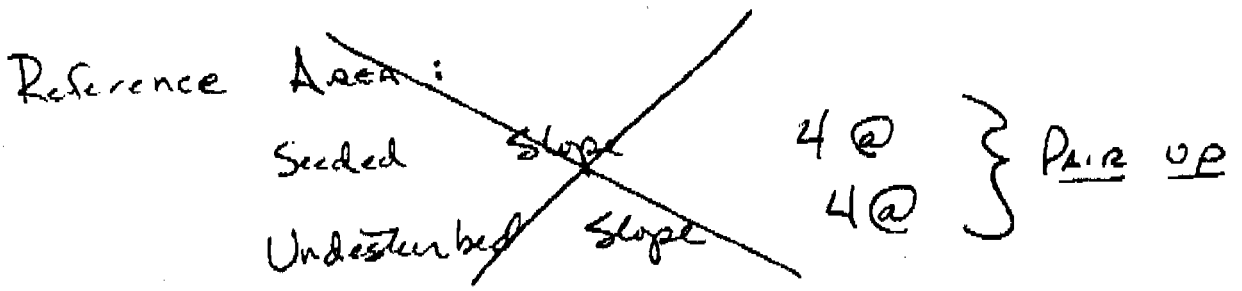
Plant development of each plant recorded along the line intercept transect will be identified by the following symbols: S=seedlings, B=boot for grasses, buds for forbs; H=headed out; SR=seed ripe; SS=seed shattered; DR=plants dry and dormant(perennial) DD=dead. This will give an accurate record of plant development which is an identifiable measurement of trend by each species. Annuals = A

Photo Trend Plots

At the beginning of each permanent transect a 2' x 2' square photo plot will be established. Two of the corners (across the diagonal) will be permanently staked with angle iron to insure a repeatable photograph. The frame as described in the density-rating system will be placed inside of the angle irons to delineate the plot for the photograph.

References Back board for reference

Hull, A.C., Jr.s 1954 Rating Seeded Stands on Experimental Range Plots. J. Range Management 7(3): 122-124.



FAX: 801-586-8793

7 PAGES TOTAL

Date: May 15, 1995

RE: Time Table for Hidden Valley Revegetation Survey and Analysis

To: Joe Jarvis, JBR Consultants

From: Patricia K. Johnston, Revegetation Specialist

As I understand we have four field days in order to complete the described work, and have the field portion of the work completed by the end of June. I propose the field work start on Friday, June 2 & 3, and be completed the following Friday and Saturday. this would allow for some additional time as necessary or alternate days as needed.

In the mean time I will need to acquire the following for the project:

1. Have locally manufactured a 2' x 2' square plot further subdivided into 1' x 1' sections.

2. 16 @ permanent stakes to mark transects, length (?), material (rebar?)

3. 16-32 @ angle iron to permanently mark 8 photo points, length (?)

4. 35mm film, slide or print for photo trend plots?

I will also need a 100' tape, marked off in .10 foot intervals, in the past I have been able to borrow one of JBR's or one from the BLM. I no longer have access to the BLM equipment.

I will talk with you later today. I will be in and out of my office at the Chamber of Commerce, 637-2788.

TRANSECT NO _____

BARE GROUND and GRAVEL

Deposited by runoff	Sheet washed	Rill (<6 inches)		Gully (>6 inches)		Crusted	Visibly Crypto-gamic	Stable
		Active	Inactive	Active	Inactive			

LITTER

Redeposited, washed from upstream	Fallen, in-place	Windblown	Unknown	Serves as sediment trap

ROCK

Particle Size			Forms pedestal cap	Serves to trap sediment or litter on upgradient side
Small Cobble (2.5-10 inches)	Large Cobble (5 - 10 inches)	Boulder (>10 inches)		

Rating Seeded Stands on Experimental Range Plots[1]

A. C. HULL, JR.
Range Conservationist, U. S. Forest Service, Washington, D. C.

Herbage yields have been widely used as a measure of the productivity of native (Pechanec and Pickford, 1937) and seeded species (Frischknecht and Plummer, 1949). Yields record herbage production but do not show the success of seedling stands, completeness of mature seeded stands or the vigor and growth characteristics of the species. Furthermore, securing records of herbage yields either by *estimating* or *clipping* is slow and expensive. With these limitations, there is need for some method of evaluating seeded stands where it is not feasible to measure herbage yields.

A method of rating seeded range plots was developed and tested at the Intermountain Forest and Range Experiment Station during 1938 and 1939. A similar rating system was also developed by workers in Nebraska (Nowell and Tysdal, 1945). The Forest Service rating has been used, with some modification, by most western forest and range experiment stations of the Forest Service. It is adapted to showing the relative success of a large number of species or methods of seeding. It is suitable chiefly for: (1) tests where seedlings are so small that herbage yields are not satisfactory; and (2) mature stands where a quick appraisal of results is necessary and where measurement of yields is too expensive.

Ratings are not to replace but rather to supplement records of herbage yields. They provide a record of the time and extent of germination; plant numbers, vigor and mortality; rate of plant development and spread; and climatological, biological and other factors which influence the final stand.

The Rating System

The rating system consists of a series of observations and measurements recorded on a 8-by 10½ inch form (Table 1). An explanation of the observations follows:

Number of plants per square foot is counted or estimated. Even in estimating it may be necessary to count the plants on several samples to arrive at an estimate.

Distribution is the evenness with which the plants are spaced over the seeded area. It is expressed in numbers from one to five: 1 = very poor, 2 = poor, 3 = fair, 4 = good, and 5 = excellent. For excellent or 5 distribution, plants must be evenly spaced over the entire plot. Distribution is a major consideration in relative ratings (Fig. 1).

Vigor is the health of the plants as indicated by size, color, spread, etc. at the stage of growth for each species. Site, climate and other conditions which may affect plants are taken into consideration. Using the best possible vigor for each species as the standard, plant vigor is expressed numerically with the same system of numbers and adjectives as used for distribution.

Average height is recorded in inches or tenths of inches below one foot and in inches above one foot. Extreme height variations are noted in the right hand column of table 1.

Plant development of each species is recorded by the following symbols: S = seedlings; B = boot for grasses, buds for forbs; H = headed out; SR = seed ripe; SS = seed shattered; D = plants dry. Entries in this column vary considerably between the different forest and range experiment stations.

FIGURE 1. A 2-year-old stand of crested wheatgrass in southern Idaho where average annual precipitation is 10 inches. Plants are as vigorous as can be expected for this site, hence a vigor rating of 5. Plants average slightly less than one to a square foot. They are not evenly spaced so that bare spots, such as those in the foreground, are evident in some places. This allows a plant distribution rating of 4. A relative rating of 8 is given this seeded stand. (Photograph by U. S. Forest Service)

[1] *The author gratefully acknowledges the assistance of A. Perry Plummer, Intermountain Forest and Range Experiment Station, Ogden, Utah; George Stewart and J. H. Robertson, formerly Intermountain Forest and Range Experiment Station; C. Kenneth Pearse, FOA, Egypt; and Joseph F. Pechanec, U. S. Forest Service, Washington, D. C.*

Table 1. Sample of field sheet used in recording plot ratings

Location Santaquin Park Study 8-9 (Seeded October 1948)

Date August 29, 1950 Examiner Dorsa and Klomp

Species and Plot No.	Relative Rating[1]	No. of Plants[2]	Distribution[3]	Vigor[3]	Aver. Height (in.)	Plant Development[4]	Competing species, spreading habits, mortality, outside influences, etc.
Acr 2	8	5	5	5	9	SR	Seed not filled
15	8	4	4	3	9	SS	Seed not filled
Alo 4	10	5	4	4	30	SR	Some seeds not filled
12	10	5	4	4	28	SR	Some seeds not filled
Bin 5	9	4	4	4	14	SS	Lightly grazed
16	10	5	4	4	13	SS	Lightly grazed
Eju 6	5	2	2	4	8	S	No seedstalks
13	4	2	2	4	8	S	No seedstalks

[1] Relative rating: 0 = failure, 1-2 = very poor, 3-4 = poor, 5-6 = fair, 7-8 = good, 9-10 = excellent.
[2] Per square foot for both broadcast plots and row seedings.
[3] Distribution & Vigor: 1 = very poor, 2 = poor, 3 = fair, 4 = good, 5 = excellent.
[4] Plant development: S = seedling; B = boot for grasses, bud for forbs; H = headed out; F = in flower; SR = seed ripe; SS = seed shattered; D = plants dry.

Relative rating represents the stand present in relation to the best possible stand under existing soil and climatic conditions. All observations listed above are considered. Their total gives a summation of the present success of the stand as judged by its potential. The stand is then rated on the basis of 0 to 10. The following adjectives help describe the numerical ratings: 0 = failure, 1 and 2 = very poor, 3 and 4 = poor, 5 and 6 = fair, 7 and 8 = good, 9 and 10 = excellent. A seeded area which supports the optimum number of well-distributed vigorous plants under the existing soil and climatic conditions rates 10 or excellent. With vigorous plants, a rating of 5 means that half the plot is occupied by the maximum stand possible on that site. The relative rating is thus that portion of the plot with enough vigorous plants for a full stand (Fig. 1).

A full stand of plants is one which may make use of all available soil moisture. The number of plants required for a full stand varies with species, site and distribution. Inherently large plants and poor sites require fewer plants per area to constitute a full stand than do naturally small plants and good sites.

The relative rating considers present plants only and does not anticipate spread or mortality. A rating of 10 in a seedling stand indicates enough seedlings to produce an excellent stand if all develop normally, but, because of seedling mortality, this stand might not rate excellent at maturity.

The ability or failure of stands to reseed or spread by rhizomes or stolons is a measure of their adaptability to the site and hence enters into the rating. Likewise, damage by disease and insects affects adaptation and hence the rating.

Species characteristics, site productivity, stage of plant development, and climatic and other factors must be known and taken into account when making relative ratings. A good way to obtain this information is to observe and measure plant numbers, basal area, height, vigor, spread, etc. of established stands on seeded areas. Training helps to secure uniformity of ratings between areas, species and years.

By using as a standard the best possible stand of the species at the stage of development, on the site and during the year in which the ratings were made, it is possible to compare species growing on different areas and rated in different years.

Advantages of the Rating System

This rating system is a simple and fast method of evaluating a large number of species or methods of seeding. Because the method of rating is fast, one technician can rate several thousand plots a year and thus have an annual record of the performance of each species or treatment from the seedling stage on.

The outstanding contribution of this rating system is that all factors which make for successful stands are brought together into one number which evaluates the success of the species or treatment and which can also be used for compilation, summaries and averages. For example, Robertson and Pearse (1945) averaged relative ratings from a large number of plots of several seeded species in a study of the effects of plant competition. Ratings were subjected to statistical analyses to determine significance of results. If desired, the ratings may be used to rank species in the field and the data thus obtained may be subjected to statistical analyses for evaluations of degree of success as suggested by Wilcoxon (1943, 1946).

Summary

A rating system was developed which brings together into one numerical rating (from 0 to 10) all

criteria for evaluation of success of seeded stands. Ratings made by this system may be used for compilations, summaries and averages. The method is rapid and gives qualitative results which may be used for comparison.

Plot ratings are not to replace but to supplement records of herbage yields. Ratings provide a year by year record of seeded plots.

LITERATURE CITED

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INTERRELATIONS OF VEGETATION, SOILS AND RANGE CONDITIONS INDUCED BY GRAZING

(Abstract of thesis submitted in partial fulfillment for an M.S. degree, Colorado A & M College, School of Forestry and Range Management, 1953.)

A study was conducted in Western Colorado to determine the changes in vegetational cover and physical conditions of the soil that occur with declining range condition in the high mountain park type. Data were obtained by sampling with a modification of Parker's three-step method and by laboratory analysis of soil samples.

Plant density decreased progressively with declining range condition. The decrease in density was proportionately greater with a decline from fair to poor condition than from good to fair condition. Uniform trends in plant composition were noted under deteriorating range conditions; a decrease occurred in desirable species and a corresponding increase was evident in both intermediate and undesirable species. Dominant plant groups included Thurber fescue (*Festuca thurberi*) on good condition ranges, mixed grasses and weeds on fair condition ranges, and perennial weeds, chiefly orange sneezeweed (*Helenium hoopesii*), on poor condition ranges.

Physical conditions of the soil deteriorate with declining range condition. Primary indicators of soil instability and erosion including erosion pavement, pedestalling of plants, bare soil and scanty litter cover were more pronounced as the range deteriorated. Less noticeable indicators of soil erosion such as alluvial deposits, orientation of litter, rock pedestals and soil washing and crusting furnish supporting evidence of declining condition and reveal current happenings. The physical condition of the soil deteriorated with change from good to poor range condition, as revealed by infiltration studies, and measurements of soil organic matter, volume weight and pore size distribution.

The study indicates that the "state of health" of the physical phase of the range complex may be determined by practical methods for application in management. Indicators of soil disturbance show the relative degree of soil stability and may be readily observed and evaluated by ordinary reconnaissance techniques. Accurate determinations of the physical condition of the soil may be made only by laboratory analysis. However, for management purposes, the relative physical condition of the soil may be estimated indirectly by an evaluation of certain indicators. In the mountain park type examined, soil deterioration lags behind deterioration in vegetation and may continue after the vegetation has apparently become stable. A two-fold classification of the vegetational and soil phases is suggested for making more accurate analyses of range conditions.—JAMES O. KLEMMEDSON.