Townsend ground squirrels have prospered in sagebrush-free rangelands, especially in crested wheatgrass seedings. Their abundance seems to be paralleled by that of ferruginous hawks and other raptors.

under these seemingly ideal conditions the population "peak" persisted for 14 years. Ground squirrels afford an excellent prey base for many carnivores, including raptors. A population of ferruginous hawks (a species of concern due to comparative rarity) became breeding residents and fledged more successfully than heretofore observed by avian biologists (Lardy 1980). Eventually, in 1982, disease (most likely plague) decimated the squirrels. The hawks and other predators thinned correspondingly to areas of better foraging. The point is that successional change in vegetation due to fire and, in part, to the introduction of an exotic perennial grass, set the stage for a prey species which ultimately benefitted a favored predatory species.

Sage grouse may locally be a part of a more complex successional interrelationship of plants and animals. Researchers have documented repeatedly that the most prevalent problem with sage grouse is a lack of recruitment. The adults breed but young do not survive to replace the normal mortality of aged adults. Predation is highly suspect as the principal cause of this juvenile loss. Some predation by hawks, eagles, crows, ravens, magpies and other avian species has been recorded. Mammalian predation may also play a role from coyote, bobcat, badger, and other species. Why is this? What has changed to cause this increased impact of predation on sage grouse? In our area of southeastern Oregon the population of blacktailed jackrabbits has been very low to almost absent since the completion of the Vale Project and the intensive range management which all the seedings, fences, water developments, and related management facilities enabled. The range has definitely experienced successional advancement toward climax resulting in more perennial grass and forb species and less brush overstory; coupled with this are the associated zoologic successional changes. Blacktailed jackrabbits are best suited to early successional seres. Their habitat has changed from what had been good to excellent to that which is poor and very restrictive. Dependent predators, however, have shifted to other prey bases, the so-called "buffer species," of which the sage grouse may qualify. It would be interesting to observe sage grouse chick survival at a time when jackrabbits were once again abundant. Everything in the ecosystem is "hooked together"!

Range management has seemingly always professed a singular goal of "improving range conditions". While this is admirable, it surely must be qualified—improved range conditions for what? We can no longer speak of range conditions as being "poor, fair, good or excellent"; rather we must speak of the successional sere or stage as "early, middle, late or climax" or intergradations thereof. This is also politically good. No one would want to design management schemes for a "poor" or even a "fair" condition range. Yet many wildlife species require succession in the "mid" stage. In fact, I believe maximum diversity of habitat and the associated wildlife diversity normally occurs at the mid or mid-late successional sere.

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Evaluation of Resource Values in the Northern Region of the Forest Service

Wendel J. Hann.

A resource value rating is considered to be the value of a unit of land for a given resource. This resource may range from livestock carrying capacity or diet quality to elk habitat value. Rangelands of the National Forest and Grasslands of the Northern Region, which includes northern Idaho, Montana, North Dakota, and northwestern South Dakota, contain a large amount of variability in both vegetation and site characteristics. Variability of the site potential for a given land unit can be stratified by mapping habitat types (Daubenmire 1952). This stratification produces land units that will produce one type of potential natural community and contain relatively uniform physical site characteristics. These land units are further stratified by type of existing vegetation and suitability for the resource use. The ecological status of the land unit is determined by comparing the composition and structure of the existing vegetation with the potential natural vegetation for the habitat type. This comparison is used to rate the plant community into the early seral, mid seral, late seral, or potential natural stage for the habitat type.

The author is ecologist, Range, Watershed, and Ecology Staff Group, Northern Region USDA Forest Service, Box 7669 Federal Building, Missoula, Mont. 59807.

The resource value of the community is rated based on the quality of the plant community for production of various resource products.

Variables sampled within each unit include (1) canopy cover, height, frequency, utilization, phenological stage, and age class distribution by species; (2) production by life form; (3) pellet group counts by animal species; (4) ground cover; and (5) evaluation of soil condition indicators. The sampling methods used to collect this information include intensive plot sampling on benchmark areas and ocular estimate sampling on all other areas. Ecological condition for vegetation in each existing vegetation/land unit is determined by calculating similarity of existing vegetation to the potential natural community and scaling it from 0 to 100.

It is apparent that there are many different types of resource value ratings that can be made for various ecosystem units including (1) forage ratings for elk, cattle, deer, grizzly bear, sheep, and other herbivores; (2) ratings of habitat suitability for wildlife relative to cover needs; (3) visual ratings; (4) water production; and others. When we have a fairly complete successional classification of community types for each habitat type, as described by Huschle and Hironaka (1980), Hann (1982), and Arno et al. (1985), actual production values can be determined for each resource by community type. For instance, a forage production value of 5 animal days use per acre can be determined for cattle in the arrowleaf balsamroot/silky lupine community type, of the Idaho fescue/bluebunch wheatgrass habitat type, on southerly aspects, 10-35% slopes, 18-22 in precipitation zone, loamy-skeletal, mixed Typic Gryocrepts and Cryoborolls on noncalcareous quartzite parent materials. Using the summary information of species composition, height, soil surface cover, animal use, and production, resource value can be determined for this community type for almost any resource use. The value for a given resource use can then be compared to the highest value for a community type within the habitat type. If the management objective is to maximize this resource product then the present vegetation should be managed to produce the vegetation with the highest rating.

For habitat types without a successional community type classification, it is much more difficult to place a "real" value on a given resource. General suitability models are often used that produce a relative rating for existing vegetation. For instance, the preferred diet composition of elk or cattle could be compared to the existing plant composition. Equal similarity would produce a relative rating of 100, in contrast to total dissimilarity, which would produce a relative rating of 0.

In order to develop the successional community type classifications by habitat type and the associated summaries and models for various resource products and values, a large amount of data is required. There are two types of methods that can be used to develop these summaries and models. One is to sample all attributes on all lands to a standard confidence level. A model is then developed and predictions are tested. This is a very sampling-intensive process, but results in precise model output for all attributes on all lands. The second method is to gather minimal data to develop model coefficients. The model is developed and predictions are tested. If the level of predictability is acceptable for management recommendations, even though this could be as low as 60% in some cases, then there is no need for more sampling. If the predictability is not acceptable for making management decisions, then additional sampling is required. In many cases the initial model using this method can be developed based on the experience of managers and researchers and data that already exist in the literature. Considering the shortage of resources for intensive sampling, it is likely that most of the initial models will use the second approach.

This type of approach fits well with the view that the need for high predictability depends on the type of resource relationship, time for response or implementation, and the geographic location of the unit being evaluated. In many cases we can accept a fairly high risk of a wrong prediction early in a planning period, but the predictability must be improved over time in order to meet long range goals. In other situations, the acceptability, of a level of risk of a wrong prediction may remain the same over the planning period. The evaluation of risk relative to the resource and management area should be a key factor used in setting standards for monitoring and predictability. By making this evaluation, the availabile resources for monitoring can be allocated to the resource evaluations that are most critical for good land management.

To obtain the amount of data needed to develop multiple resource relationship models, the Forest Service will need to coordinate the various inventory data bases. The key to coordination of this data is in the use of the same site and vegetation classifications and in development of reliable treatment history and vegetation response over time.

This can be accomplished by using computer resource data bases with relational programs and by setting standards for collection of common data using the same methods. Forest Service data bases include information on timber stands, land management planning capability areas, wildlife, range, and landtypes. Data can be accessed from these different computer files, entered into a resource relationship model and output can be determined for a vegetation/land unit. A geographic information system can then be used to synthesize the predictions for vegetation/land units into output by map unit, compare and integrate adjacent map units, and summarize resource predictions for a given management area.

In summary, the continued development of successional community type classifications by habitat type will produce a valuable information storage and retrieval system for evaluating resource values. The data from these systems can also be used to model vegetation response to treatment and resource production. By efficiently utilizing the experience of professionals, existing data and models, and coordinated inventory data from various resources, we can produce the kind of predictions and summaries that will meet the needs of land management decision makers.

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Rating Ecological Status and Resource Values

E. William Anderson

As early as the 1960's there was some localized recognition of the need to correct several conceptual problems that existed in the current procedure for rating range condition class. For example:

1. There was the need to measure species occurrence in the plant community by a quantitative method instead of by composition. While composition is a useful term, it is strictly a relative comparison and, when used as a measurement, a number of erroneous interpretations can be involved. Unfortunately, composition is still being used as a method of measurement in some instances.
2. Although the concept of Decreaser, Increaser and Invader species is meaningful, the use of these terms as criteria for determining how much of each species to count toward ecological status is an erroneous procedure. Range condition based upon the manipulation of the Decreaser-Increaser-Invader ratings was actually a resource value rating. As a result, many were led into equating range condition class not only with ecological status, but also with resource values, stocking rates, and other interpretations.
3. A procedure for making practical value ratings for various uses of the resource was needed. The current procedure, which required dependency upon experienced judgement, should be replaced with a procedure that could be checked and used by others with acceptable uniformity and consistency, thereby lending credibility to the process.

Toward this purpose, a procedure for quantitatively rating ecological status and resource values had been tested in Oregon prior to 1968. It has since been modified slightly to conform with suggestions made in the 1983 report of the S.R.M. Range Inventory Standardization Committee (RISC). For rating resource values, the purpose of this procedure is to quantify the relative value of the present plant community, per se, as a factor in watershed quality and as a source of food for selected herbivores. This is NOT a habitat nor watershed evaluation. The value of a habitat involves evaluation of such factors as the availability of water, steepness of slope, nearness to and kind of cover in addition to the forage value of the current vegetation. A watershed evaluation includes such factors as surface geology, soils, climate, topography, and land use as well as the vegetation.

Although much thought and testing has been involved to date, this procedure undoubtedly can and should be improved. Hopefully, it will provide a starting point for those who are interested in developing a practical field procedure.

The author is Certified Range Management Consultant, 1509 Hemlock Street, Lake Oswego, Ore. 97034.

Guide to Rating

The first step is to develop a guide sheet for rating ecological status and resource values for each ecological site (Figure 1). Plant species usually found on each site are listed (column 1) and the approximate amount of each in the potential natural plant community (PNC) is shown (column 2) and totalled at the bottom of the column. The method of quantitative measurement represented by the guide must be indicated because the same method must also be used in measuring the present plant community in order to rate ecological status and resource values.

The rating procedure developed in Oregon uses percent canopy cover as the method of quantifying the plant community (column 2) because this method is equally adapted to grassland, shrubby, savannah, woodland and forest ecological sites. Furthermore, all species of gramineae, forbs, shrubs and trees, as well as mosses and lichens, bare ground, gravel and stones, litter and mulch can be measured by the same method of quantification. This enhances the value of the data for ecological interpretation.

In the guide to resource value ratings (RVRs), each species is ranked High (H), Medium (M) or Low (L), or not present (dash) as to its watershed value (column 3) and as food during spring (column 4), summer (column 5), fall (column 6), and winter (column 7) for a specified animal. Ratings for cattle and mule deer are illustrated in Figure 1, however, additional columns can be added to provide ratings for other herbivores such as horses, sheep, antelope, and sagegrouse. Interdisciplinary input to this process is essential and should involve the best expertise available, therefore necessitating the involvement of scientists and practitioners.

An RVR for watershed (column 3) is important because of the tendancy to overlook watershed values of the current vegetational cover. Water is a very valuable product and this fact needs constant emphasis so as to improve the degree to which it is recognized by resource users. Improving watershed quality should be emphasized as a primary objective in resource management programs.

Rating Sheet Instructions

The following step-by-step instructions for using the rating sheet (Figure 2) to rate ecological status and resource values for watershed and forage should be printed on the reverse side of the rating sheet for convenience in the field.

General

1. Identify the ecological site being rated and complete the information block at the bottom of the Rating Sheet.
2. Record the type of measurement used, i.e., % canopy cover, herbage weight, frequency hits, in the space provided above the columns. The type of measurement used in rating the present plant community must be the same as used in the Guide.