Ecological Site Classification Activities in Oregon and Washington

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Abstract

Major ecological site classification programs in Oregon and Washington are briefly described. Federal agency programs are most important the largest being the U.S. Forest Service effort in community classification. Programs emphasize manager recognition of types and include only limited mapping.

Résumé

L'auteur décrit les programmes de classification des plus importantes stations écologiques des états de l'Orégon et de Washington. Les programmes des agences fédérales sont très importants, le plus vaste étant celui du "U.S. forest service" entrepris pour la classification des communautés végétales. Ces programmes vont ressortir la reconnaissance des types et ne comprennent cependant que quelques cartes.

Introduction

Classification of ecological sites in Oregon and Washington has been underway for at least 30 years. Spilsbury and Smith (1947) and Becking (1954) deserve credit for early, comprehensive efforts. Managers have only recently accepted the utility of such classifications, however, especially west of the Cascade Range. The work of R. Daubenmire (1952) has been the most influential in this acceptance and current classification programs are heavily based on his habitat type concept.

The major efforts at ecological site classification in Oregon and Washington are outlined in this paper. Emphasis is on the larger programs funded by major federal agencies. Other, intellectually interesting efforts are underway in academic institutions, but they typically do not have as much support or application by resource managers.

U.S. Forest Service, Region 6

The largest ecological site classification program in Oregon and Washington is being conducted by Region 6 of the U.S. Forest Service under the leadership of Dr. Frederick Hall. The overall objective is the development of management-oriented plant community classifications for all the National Forests within this Region. Ecologists assigned to each of six National Forest "areas" within Oregon and Washington carry out the actual sampling with regional-level coordination and assistance in data analysis. Standard analytic programs have been developed.

The Region 6 program identifies and recognizes all mature communities. Although early successional stages are not defined, near climax and stable seral communities are covered in the classifications. Consequently, the units are referred to as plant community types, not habitat types. Actually, many of the criteria used in developing the community classifications are the same as those used in habitat type classification; e.g., reproducing tree species and more environmentally sensitive shrub and herb species. The end result is that many plant community types are virtually identical with habitat types that would be recognized in the same area.

Emphasis in the Region 6 program is on using vegetation-plant communities to stratify areas for land management. The plant community types are used to determine productive potential and appropriate cultural practices. Examples would be use of community types in selecting species for reforestation, forest stocking levels, and harvest cutting techniques.

The classifications are used daily by resource managers. For this reason problems of type recognition or identification are considered during both the construction of the classification and its formal presentation. The range of biological and environmental conditions expected for a type are given as much attention as average conditions. Another consequence of the strongly practical orientation of the program is the collection and presentation of substantial management-oriented data; e.g., site index, basal area, growth basal area, current height growth, occurrence of pathogens, etc.

The Region 6 program has made substantial progress but still has a long way to go before classifications cover all 10 million hectares of National Forest land in the two states. Currently, six to eight Forest Service ecologists devote a large proportion of their time to this effort. Classification and development of management interpretations are most advanced in eastern Oregon and southeastern Washington. Current work also focuses on southwestern Oregon, the Okanagan Highlands, and the crest of the southern Cascade Range. Results are generally made available only in the form of limited distribution reports, maps, and publications (e.g., Hall 1973, Hopkins 1976, and Volland 1976).

National Park Service

National Park Service units in Oregon and Washington have recently begun to develop ecologically based resource inventories for the National Parks and Monuments. Local resource managers have become intensely concerned over the lack of basic information about existing ecosystems and their dynamics. Few of these properties have had systematic inventories of vegetation and soils, most available materials consisting only of fragmented or academically oriented studies. In the last three years major efforts to classify ecological sites by vegetation have been initiated at Mount Rainier (Wash.), Olympic (Wash.), and Crater Lake (Oreg.) National Parks, along with smaller efforts at John Day (Oreg.) Fossil Beds and Lava Beds (Calif.) National Monuments.

The largest forest ecosystem classification project is currently at Mount Rainier. The project is following a general pattern developed at the H. J. Andrews Experimental Forest in Oregon. The initial step was extensive sampling of forest stands to develop a habitat type classification. Several extensive areas of young (< 150-year-old) forests led to recognition of five seral forest community types as well as 16 habitat types. When the type classification was completed, emphasis changed to: (1) mapping the habitat and community types in the park; (2) analysis of the disturbance history in park forests — mainly by fire, snow

avalanche, and mudflow — and rates of successional change on different habitat types; and (3) studies of environment-vegetation relationships, such as temperature and moisture regimes in a series of exemplary stands (following the pattern of Zobel et al. 1976).

The ultimate objectives at Mount Rainier are to provide the park staff with: (1) in-place information on the existing forest ecosystems and their characteristics and (2) an ability to predict rate and direction of future ecosystem changes under different management strategies. A community type classification and generalized map are already available for the subalpine meadow communities (Henderson 1973).

At Crater Lake, research on plant communities is being carried out in phases. Initial research was on a limited area (the "panhandle") which contains *Pinus ponderosa* and *P. lambertiana*. Specific objectives were management direction for pine perpetuation (McNeil 1975). Current efforts are directed to *Pinus contorta, Tsuga mertensiana,* and wetland ecosystems. Although classification of ecological sites is not a specific objective of any of these projects, it is inevitably one product.

Ecological site classification is the specific objective of a two-year program just initiated in two river drainages on opposite sides of Olympic National Park. The approach emphasizes vegetation but includes correlations between plant communities and soils and landforms.

Southwestern Oregon Environmental Classification

Waring (1969) pioneered the use of environmental factors and selected plant indicators in southwestern Oregon. Don Minore of the Pacific Northwest Forest and Range Experiment station has recently used similar techniques to provide foresters with procedures for indexing environmental conditions at specific locations. The initial study in the South Umpqua basin (Minore 1972) utilized a series of plant indicators for calculating temperature and moisture classes for the site. Classes for elevation, solar radiation (based on slope and aspect), and soil series were added to these indices. The result is a systematic way of indexing the environmental regime of a site. The temperature and moisture indices also allow site comparison within the study area. The system is used to rate regeneration potential on sites (see, for example, Carkin and Minore 1974) and can be used to estimate site index (Minore 1972).

Minore is currently developing methods for rating regeneration potential on Bureau of Land Management lands in southwestern Oregon. Large numbers of data are collected on environmental variables (typically including indexes to moisture and temperature regimes derived from plant lists) and on dependent variables of interest (such as number of conifer seedlings). The most significant environmental variables are identified by multiple-regression techniques and used to construct a predictive equation. Final equations are generally confined to five variables for ease in field use.

Minore's research does not provide ecological classification but does provide an indexing procedure for predicting a specific response, such as regeneration following cutting. Plants are used in construction of the moisture and temperature indices even though plant communities are not recognized or utilized.

H. J. Andrews Experimental Forest

An intensive effort at ecological site classification is centered on the H. J. Andrews Experimental Forest, a 6,000 hectare site in the Western cascades of Oregon. This effort is philosophically based upon the habitat type concept (Daubenmire and Daubenmire 1968), but with several significant modifications. Field and analytic procedures utilize quick field sampling procedures and computer programs in data analysis and in the definition of community types (Franklin et al. 1970). Increased attention is given the entire forest mosaic; i.e., dependence on a relatively few, near climax typal stands is decreased. Habitat types are developed from data on mature to old-growth stands (> 200 years old); reproduction of tree species and dominant herbs and shrubs are emphasized in classification (Dyrness et al. 1974). In addition to the habitat types, extensive seral forest types common within the study area are recognized as separate community types. Most of these modifications have been generally adopted in classification work elsewhere in the region.

With development of the classification at the H. J. Andrews, hypotheses were formulated on relationships between habitat types and environment. Primary axes on the computer ordinations were inferred to be moisture and temperature gradients. Environmental measurements were initiated on an exemplary series of stands to test these hypotheses. The results of the first three years of study were reported by Zobel et al. (1976) and generally show good correlations between the inferred and measured environmental gradients.

Current work at H. J. Andrews includes refinement and extension of the classification through the northern Oregon Western Cascades; development of data on regeneration after cutting (Sullivan 1976) and potential productivity; and mapping of habitat and community types. Related research includes detailed analyses of the age structure of mature forests.

Other Research Programs

Much research is being carried out by professors and graduate students at universities in Oregon and Washington that sometimes leads to development of community types. Examples are the work of Hawk and Zobel in the *Chamaecyparis* forests of the Klamath Mountains (Hawk 1976) and of Long (1976) in the Cedar River drainage of Washington. Del Moral has used several mathematical techniques in constructing plant community classifications (e.g., Del Moral et al. 1976).

Operational programs for ecological site classification by federal agencies have been described; there are few state- or industrially-sponsored programs. The Washington State Department of Natural Resources is instituting a habitat type classification program on its lands.

Conclusions

In Oregon and Washington the largest programs in ecological site classification are aimed at development of community types for resource managers. Most approaches have their philosophical basis in the habitat type concepts of R. Daubenmire, although modifications are numerous.

Classifications of community and habitat types are sufficiently widespread and well known that resource managers increasingly seek out and use such systems in making management decisions. Scientists are also making greater use of community classifications as a basis for selecting study sites and extrapolating results. Both managers and scientists generally agree that detailed studies are necessary to adapt or "fine tune" community and habitat types to local conditions if they are to have high predictive value.

The appearance of numerous classifications creates a problem for individuals interested in a total regional perspective and, more specifically, community analogues. Philosophy and methodology often differ. In my opinion, the differences in names of classification units are generally far

greater than the differences in types actually recognized; the detailed descriptions of the associations, community types, or habitat types are often quite comparable. Collation of the various classification units will be a major job for plant ecologists during the next few years.

A philosophical difference between the U.S. and Canada appears to be in the area of mapping. U.S. programs emphasize development of classifications that must and can be applied by the managers; maps are generally not available so the manager must be able to recognize the ecological site types in the field. Canadian programs generally include mapping and classifications are not oriented toward on-the-ground recognition of types by managers.

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