

## DIVERSITY AND RECLAMATION: SOME ECOLOGICAL CONSTRAINTS<sup>1</sup>

Robyn W. Tierney<sup>2</sup>

**Abstract.** Revegetation success standards continue to be challenged by a general lack of agreement between regulators and mine operators on appropriate scales and forms of measurement. Diversity standards and their measure are contentious because they are usually established after the standards for percent cover and annual production have been set and with little regard to the basic relationships between a site's diversity, cover, and productivity. Most reclamation success standards are in fact based on historic records or baseline data collected over very short periods of time. Although reclamation attempts to "jump-start" successional processes and to produce later seral stages in shorter periods of time, establishing appropriate and achievable revegetation success standards requires a more predictive understanding of how different vegetation communities develop, change, and are structured over a range of spatial and temporal scales. Such an understanding is perhaps best served by integrating what is presently known about succession and reclamation into a larger framework similar to that of Eugene Odum's "trends to be expected." In this paper, such a framework is presented then discussed in the context of current regulatory requirement and reclamation practice. Examples of where regulatory requirements and reclamation practices have either enhanced or compromised diversity, stability, and productivity on surface coal mine reclamation are also presented. A database assembled from reclamation literature and several surface coal mine permits was then used to test the validity of some of the framework's predictions. The results of this test suggest that while certain functional groups such as legumes, or warm and cool season grasses are important elements at some stages of succession in some plant communities, their presence is inappropriate in others because they influence species diversity by altering nutrient cycling, patterns of soil development, and the outcomes of competitive interactions among other plant species. Results from the validation also indicate that the original premine vegetation composition of a site remains the strongest determinant of what species will persist in reclamation and will ultimately influence diversity.

Additional Key Words: diversity measurement, success standards, succession, ecological trends

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<sup>2</sup>Robyn W. Tierney, Dept. Natural Resources Management, New Mexico Highlands University, P.O. Box 9000, Las Vegas, New Mexico 87701

