

- 1) That within the sample all species in the parent population are represented.
- 2) That the parent population exists as a homogeneous entity.
- 3) That the parent population or collection consists of no more than two species.

Pielou (1966) altered the Shannon-Weiner (Weaver) formula to mitigate assumption number 3. His modification is described as follows:

$H' (s) = - \sum_i p_i \log_s p_i$; where s = the number of species.

However, as such, $H' (s)$ no longer measures diversity as typically defined. Instead, it provides a measure of evenness, or how individuals are portioned among the species in the entire community.

Finally, and most importantly, one must be aware that to compare a portion of an undisturbed, natural and relatively stable community (permanent reference site) against what will be a changing community (at least for most of the liability period) by a standard which is subjective in design and intent, is extremely statistically and legally questionable. As it now exists, the diversity index obtained is simply a number that is largely meaningless since it cannot be compared to any known standard for management purposes.

It is important at this point to state what we feel is common ground on the issue of diversity between Trapper Mine and the regulatory agencies.

1. Diversity is ill defined mathematically and controversial.
2. The importance of species or life forms should be considered in terms of the end land use.
3. A meaningful, acceptable, reproducible standard should be used.
4. The standard must be based upon easily obtainable data such as cover, production or density.

In light of the described problems, a technique based on more traditional range analysis methods will be used to determine if a diverse plant community is reestablished. Tables 2.3-3 and 2.3-5 list the percentage that each species contributed to the herbaceous aerial cover on range sites A and B in 1980. On range site A, 6 species (4 grasses and 2 forbs) each comprised greater than 3.0% of that cover (see Table 2.3-3). On range site B, 5 species (4 grasses and 1 forb) each comprised greater than 3.0% of that cover (see Table 2.3-5).

A diversity standard for evaluating success would appropriately include 4 grass species exhibiting greater than 3.0% relative plant cover. In addition, given the desire to include a diverse mixture of forb species that would individually contribute less than 3.0% relative plant cover, setting an overall forb life form standard of 5.0% relative cover would be appropriate.

Therefore, the species diversity standard for Trapper Mine reclaimed rangeland areas is as follows:

- 1) At least four species of cool season perennial grasses shall contribute no less than 3.0% relative cover.
- 2) A minimum of 5.0% relative cover for the forb life form shall be established.
- 3) No single species shall contribute in excess of 50% relative cover.
- 4) No four species in combination shall exceed 80% relative cover.

This approach will ensure a similar diversity of principle species in the reclaimed plant community as existed in the pre-mining plant communities. It will also provide safeguards against establishment of vegetation monocultures involving only a single or a few plant species.