New England Botanical Club – Minutes of the 963rd Meeting

1 December 2000 Prepared by Don Hudson, Recording Secretary

The 736th meeting of the New England Botanical Club, Inc., being the 963rd since the original organization, met in the Main Lecture Hall of the Biological Laboratories, Harvard University, Cambridge, Massachusetts, on Friday, 1 December 2000. President Lisa Standley called the meeting to order at 6:59 PM with 39 members and guests present. Guests were introduced, followed by the announcement of two new family members, Melissa Dow and Bill Cullina. Lisa Standley announced that NEBC was presented the Centennial Conservation Award by the New England Wild Flower Society "for more than a century of outstanding commitment to native plant conservation." The recording secretary then stood to read the minutes of the previous meeting. Karen Searcy announced that copies of the *Flora of Worcester* were available for sale to members. Lisa Standley advised those gathered that January's "Show & Tell" would be preceded by a potluck supper.

Paul Somers rose next to introduce the evening's speaker, Dr. Maile Neel, currently working as a Visiting Investigator at the Marine Biological Laboratory in Woods Hole and a Postdoctoral Researcher in the Department of Botany and Plant Sciences at the University of California, Riverside. Maile is also working on the mysteries of the sandplain Gerardia (*Agalinis acuta*) with her colleagues in Massachusetts. "The structure of diversity:Implications for reserve design," was the focus of her doctoral and postdoctoral studies and her topic for this evening's presentation.

Maile Neel said she is interested in preserving ecosystem composition, structure, and function and in the consequences of using different approaches to meet this goal. Land managers can focus their conservation efforts on individual rare species, overall species diversity (*i.e.* species richness hotspots), or community diversity. Dr. Neel's research focuses on how well focusing on one of these levels serves to simultaneously conserve other levels of diversity. This work was conducted in the San Bernardino Mountains of southern California. These mountains are good candidates for such an investigation as they support a high level of plant endemism (~ 40 species), have a high level of plant and vegetation community diversity in general, and are under constant pressure for surface and near-surface mineral extraction. The Mining Law of 1872 allows access to mineral resources on federal land, and 90% of the National Forest land in the San Bernardino Mountains is under claim by limestone mining companies. A handful of endemic species is at risk of extirpation, including *Astragalus albens, Erigeron parishii, Eriogonum ovalifolium* var. *vineum, Lesquerella kingii* subsp. *bernardina,* and *Oxytheca parishii* var. *goodmaniana*. Because of habitat loss and degradation as well as the risk of future losses, these species were listed under the Endangered Species Act. The U.S. Forest Service, U.S. Fish and Wildlife Service, and others are interested in developing a conservation plan that will identify sites to be protected from mining to ensure the persistence of these taxa and the habitats on which they depend.

Maile set about her fieldwork by establishing 669 sampling plots, including 250 on carbonate soils, 245 on non-carbonate soils, and 174 with known populations of the species in question. Data collected helped to elucidate the composition of plant communities, species richness, the distribution of endemics, as well as genetic diversity (by the investigation of isozymes). Standard ecological parameters were measured at every plot, including slope, aspect, elevation, and soil characteristics (pH, %Ca and %Mg). Isozyme sampling was conducted on subsets of the plots, and included 4 species: *Astragalus albens, Erigeron parishii, Eriogonum ovalifolium* var. *vineum,* and *Oxytheca parishii* var. *goodmaniana.*

The data support a picture of composition that includes 13 vegetation types, 8 of those widespread. Elevation plays a key role in distinguishing the sample plots, although slope angle, outcrop, % Ca, and % litter are not far behind, as revealed by canonical correspondence analysis . Of the 502 taxa, 90% were identified in 90 or fewer of the nearly 700 plots. Species richness increases with low elevation and less carbonate in soils. The results of isozyme analysis reveal the four San Bernardino endemics in question to have levels of genetic diversity that are more similar to widespread species than to typical endemics. Only *Oxytheca* displayed a %-polymorphism, number of alleles/locus, and expected heterozygosity of classic endemic species. Maile asked, *"How well do areas of high species richness represent community diversity, overall species richness, and occurrences of the endemic species?"* She learned that one would miss a good deal of the community diversity by focusing on richness alone. Further, species rich plots did not include significantly more total species than the same number of plots chosen at random. The endemic plants tended to be found in sites with moderately high species richness, but not in sites with the highest

richness. Maile also asked, *"How much do the distributions of the endemic taxa represent the range of community diversity and how well do they overlap with one another?"* When she looked just at *Erigeron parishii* or *Eriogonum ovalifolium* var. *vineum*, for example, she learned that they occupy only about half of the length of the environmental gradients represented by the canonical correspondence analysis. Not surprisingly, the endemics are biased to the carbonate soils and each taxon is limited in the elevational gradient it occupies. Further, the plants are limited in their distribution on carbonate soils, only occurring in 20% of the randomly sampled plots on these soils. In terms of overlap among the taxa, *Erigeron* and *Astragalus* have the most, sharing 97% of their distributions along the environmental gradients, yet they are found in the same plot in less than 20% of the 669 plots. The smallest amount of overlap was between *Lesquerella kingii* subsp. *bernardina*, and the other taxa; *Lesquerella* only overlapped with *Eriogonum* once and never overlapped with the other taxa.. When Maile explored the relationship between total species richness and endemic plant taxa, she learned sites supporting the endemic taxa would include fewer total species than in the same number of plots chosen at random. Areas of high genetic diversity are just as difficult to predict, showing no patterns at all!

Maile concluded that ecological reserves created for one level of diversity would not capture necessarily other levels of diversity. Notably, conserving endemic taxa does not conserve community or species diversity. Community conservation approaches are likely to miss a significant portion of the species diversity and necessarily will not replace detailed species-focused conservation efforts. On the other hand, community level efforts are more likely to conserve individual endemic taxa than single taxa efforts are likely to conserve community diversity. With those final thoughts, the meeting adjourned to questions and refreshments at 8:06 PM.