

Vegetation Inventory and Monitoring Program revisited at Shenandoah National Park

The National Park Service is committed to inventorying and monitoring the natural resources under its stewardship. Effectively meeting this commitment is a complex challenge. The Long-Term Ecological Monitoring System at Shenandoah National Park, Virginia, has been in operation for more than a decade. However, in 1999 the natural resources staff decided it was time to reassess both the objectives and the design of their vegetation inventorying and monitoring programs.

Staff needed to address fundamental questions about how to determine which data are statistically relevant. How much change in the canopy composition, for example, is important to detect? How much change is significant? The original program objectives were very broad. Staff wanted to clearly define what level of change sampling should detect and then design a protocol that would provide that information.

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Technicians sample herbaceous vegetation within a newly installed (upgraded) forest long-term monitoring plot in Shenandoah National Park.

In March 2000 staff at Shenandoah National Park hosted a one-day workshop for the purpose of developing statistically precise objectives for the Vegetation Mapping Program. There were 17 participants including park staff, and scientists from Virginia Tech, Virginia Department of Forestry, Virginia Natural Heritage Program, Penn State, the Nature Conservancy, the U.S. Geological Survey, and the USDA Forest Service. Participants broke up into three working groups, each

focusing on an area of interest previously identified by resource managers at the park.

The group focusing on general forest trends recognized the need to follow changes in vegetation composition and distribution. From this need the group developed three management objectives. One of these, for example, was to detect a 50% change in density of any one species of tree (dominant or codominant) within any one forest cover type over a five-year period. The related sampling objective required 90% assurance of such detection, accepting a two-in-ten chance that a change may be inferred when it really did not occur.

Another group focused on forest health. This working group addressed threats to the forest, such as air pollution, invasive exotics, white-tailed deer, and visitor trampling. The group recommended the management objective: to see a 20% decrease in the acreage of a specific exotic plant species parkwide from 2002 to 2005. The sampling objective required 80% assurance of detecting a 20% change in coverage of an exotic species over those years with a two-in-ten chance that a change may be inferred that did not occur.

The third group, focusing on special and unique ecosystems and species, identified several community types and species that are extremely rare at the park. For each of these, the group developed management and sampling objectives similar to those from the other working groups.

Having defined objectives at the workshop, the next step was to evaluate the current sampling process at Shenandoah and determine whether it could meet the objectives. Duane Diefenbach, USGS Biological Resources Division Cooperative Research Unit at Penn State, performed this statistical analysis. His results indicated that few of the newly defined program objectives could be met with existing data under the current sampling design. He recommended modifying factors such as the timing of sampling, the choice of strata for randomizing, and sample size. Diefenbach worked with natural resources staff at the park during the summer of 2002 to develop a sampling design that can meet or reevaluate the objectives, as needed.

This project is a work in progress. In summer 2003 staff began sampling according to the new design, and several more years will pass before managers at Shenandoah National Park can evaluate its success.

Information about the Vegetation Mapping Program at Shenandoah is available from Wendy Cass at 540-999-3432 or wendy_cass@nps.gov. The technical report of the workshop and statistical evaluation is available at www.nps.gov/phso/science/FINAL/SHEN_sampling_design.htm.

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