

Shenandoah Science Symposium Features Air Pollution and Gypsy Moths

"Clearing the Air," appropriately, was the theme of the 11th Shenandoah Research and Resource Management Symposium, held in the park May 5-6. It was appropriate not only because this is the kick-off year for increased interpretive focus on air quality/acid rain, but also because Shenandoah NP is the focus of some of the Service's most important research on air pollution effects.

Some 70 attendees, including university scientists, members of state agencies, NPS staff, and assorted friends of the park, heard talks on the air quality monitoring program, the University of Virginia's mountain cloud study, the Virginia trout stream survey, and the legal side of air pollution, as well as an interesting mix of reports on gypsy moths and other important work underway in the park.

The messages on air pollution were not encouraging. Jim Watkins, a park staff resource management specialist, said that average hourly ppm for ozone and sulfur dioxide has remained stable over the past 5 years, but ozone measurements have twice reached .12 ppm, the maximum allowable under federal law, and ozone damage is evident on milkweed and white pine. Fifty percent of the time the visual range is under

39 km — a sad state in a park where long-distance views from Skyline Drive have been one of the most inspiring features.

John Sigmon, director of the Mountain Cloud Water Chemistry/Forest Response Study in Shaver Hollow, reported cloud moisture pH values averaging about 3.8 and reaching as low as 2.9. This ambitious project, one of several mountain cloud studies sponsored by EPA along the Appalachian chain, aims ultimately at an understanding of cloud water and precipitation chemistry and its effects on the forest.

The Virginia trout stream survey, managed by Rick Webb of the University of Virginia, sampled some 360 streams in April 1987 and found 11 percent of them acidic (zero or less acid neutralizing capacity). Modeling predicts a sizable increase in this percentage and pH levels in many streams below the tolerance of brook trout before a steady state is reached. Seventy streams, 10 of which are in Shenandoah NP, will continue to be monitored on a quarterly basis.

How can the Park Service deal with such problems? Banquet speaker Molly Ross from the WASO Air Quality Division counseled additional scientific evidence, better use of the many existing federal, state,

and local laws, and expanded education of the public, which is the ultimate base of action.

Gypsy moths, steadily eating their way south, are another major park concern. Alison Teetor of the Shenandoah staff described the park's gypsy moth risk assessment. A map showing four forest susceptibility classes was created by combining map overlays of forest cover types, which indicates distribution of preferred food species, and elevation classes, which roughly correlate with environmental stress on trees (see **Park Science**, Winter 1988). Corrections in the susceptibility map will be made as the mapping of actual defoliation proceeds. Thus far, more defoliation than expected has occurred in the lower susceptibility classes. Since oaks, a preferred gypsy moth food, dominate in the park, it appears there will be significant changes in forest composition and ecology. Defoliation, which amounted to 1300 acres in 1986 and 6800 acres in 1987, is expected to continue to increase.

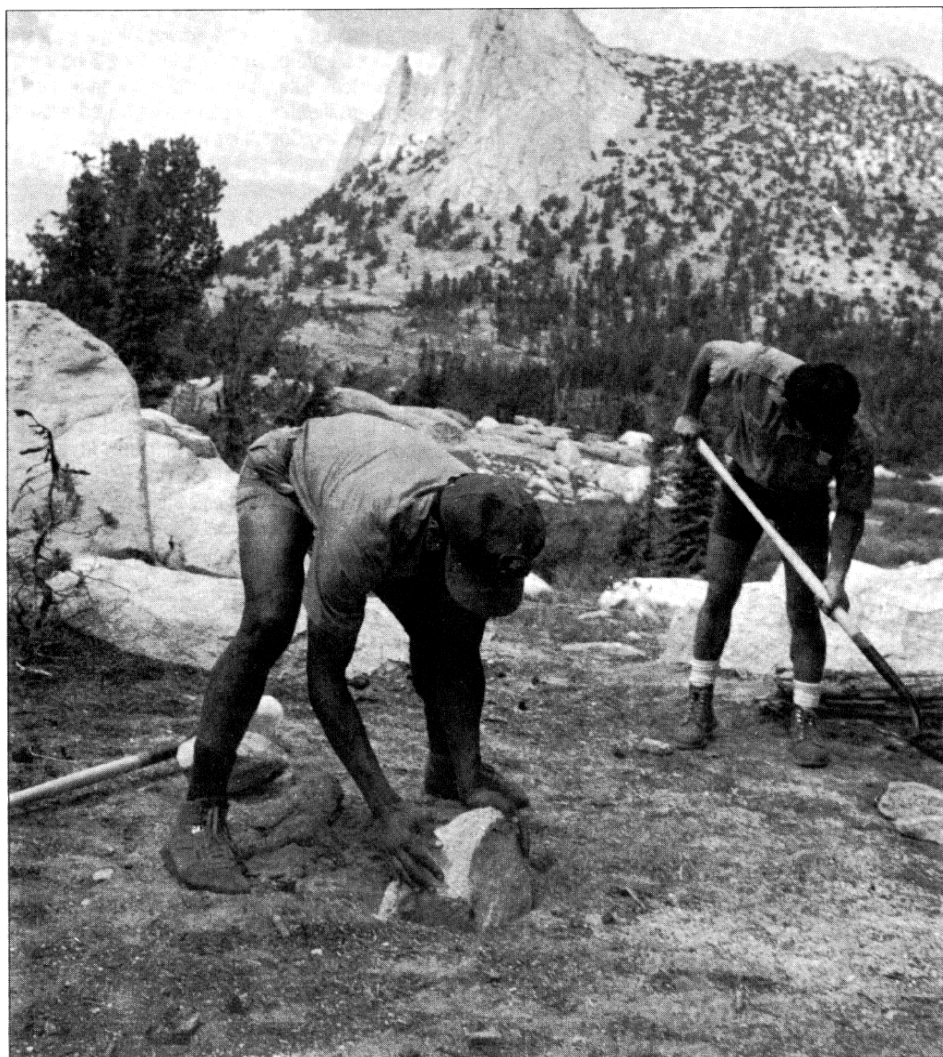
Among probable effects of this defoliation is a decrease in mast production. Researchers from Virginia Polytechnic Institute (VPI), who have been studying Shenandoah's black bears since 1982, will assess the short-term and likely long-term effects of gypsy moth infestation on bears. At this symposium, John Kasbohm described the dens selected by 13 radio-collared bears. The majority were in tree cavities. VPI estimates a population of 400-700 bears in the 300-square-mile park.

In a totally different vein, Michael Fies of the Virginia Department of Game and Inland Fisheries reported on a study of northern flying squirrels (*Glaucomys sabrinus*) in Virginia. The two Southern Appalachian subspecies are both federally listed as endangered, and in Virginia the species had previously been recorded at only one location. Two hundred ninety-two nest boxes installed at 22 high elevation sites in western Virginia, which included Shenandoah NP, yielded 19 northern flying squirrels. None have yet been found in the park, but favorable habitat exists there.

The condition and trends of Shenandoah's natural resources will be much better known when the Long-Term Ecological Monitoring System (LTEMS) designed by VPI is established and operating. Several of those involved described gypsy moth, terrestrial, and aquatic components of the system. The gypsy moth component is based on pheromone traps in each 2 square kilometers. The terrestrial component calls for 24x24m permanent plots within seven forest cover types, three elevational classes and two slope aspect categories, in each of three administrative districts, with three plots at each site. This could give a total of 378 plots, depending on distribution of the cover types. The aquatic component consists of 17 100-meter-long stream plots distributed according to district, geological formation/alkalinity, and elevation. Thus, the LTEMS represents a high percentage of the ecological situations that exist in the park.

The symposium reports demonstrated the truth of Supt. William Wade's opening statement: "Shenandoah has one of the National Park System's strongest resource management programs." The 11th biannual science symposium was organized by Chief Resource Manager Dave Haskell and his crew.

Napier Shelton
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Revegetation site at Budd Lake in Yosemite NP is prepared by Jerome Shaw (left) and Russ Tenka.