



# PARK SCIENCE

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### Window to the Past: Providing a Framework for the Future

By Carol McNulty-Huffman

Historians are fond of saying that those who forget the past are doomed to repeat it. Such thinking can be valuable for park natural resource managers as well. Taking the time to look at where you have been and what has happened in your park in the past can provide a valuable framework for determining future direction. Often, however, with daily activities demanding your attention, it is difficult to find the time for reflection and research.

In choosing a topic for my master's thesis, I looked for something the park staff would find useful but probably would not have time to do on their own. Dave Haskell, Chief of Natural Resources and Science at Shenandoah NP (SNP), expressed a desire for a comprehensive record on the evolution of resource monitoring activities in the park. I jumped at the opportunity to dig through park files, old research reports, journal articles, and anything else I could find that might prove useful. With the help of John Karish, Mid-Atlantic Regional Chief Scientist, the park staff and I developed this project.

My thesis objective was to document monitoring activity between 1978 and 1988 in 5 areas of the natural resource management program at SNP--air quality, fisheries, integrated pest management, vegetation, and wildlife. I spent 2 years reviewing and synthesizing information, and completed a thesis that the park staff has found useful.

A separate thesis chapter addresses each of the 5 subject areas by (1) presenting a synopsis of research efforts, (2) identifying management objectives, (3) reviewing monitoring programs and presenting a chart of the results or the parameters monitored, and (4) discussing the relationship between monitoring data and management concerns. Following are the highlights of my research.

#### Research Highlight

SNP, a crown of forested peaks and hollows, lies along the crest of the Blue Ridge Mountains in Virginia. The blue haze for



**Big Meadow**, an ecologically diverse open area at Shenandoah NP, is both a cultural and a natural resource. (Photo by Dan McNulty-Huffman)

**Using a flame thrower** to selectively kill black locust trees was one of the techniques used for meadow management at Shenandoah NP in August 1983. (Photo by Dan McNulty-Huffman)



which these mountains were named occurs naturally; it is a combination of dust particles, water vapor, and organic compounds given off by the vegetation, and it is deepening as air pollution increases in the eastern United States.

Air pollution is recognized as one of the most serious threats to the natural resources of SNP. The park is designated a Class I airshed, with special attention to protecting visibility values; thus it has maximum protection under the Clean Air Act from future air quality degradation.

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Air quality research in the park has been extensive; scientific projects have ranged from acid rain research to studies about pollution effects on vegetation. Ozone damage has been found on several plant species, with widespread damage on milkweed. High levels of sulfur were found in lichens.

In 1983 the park staff began a program to monitor ozone and sulfur dioxide levels. Air quality monitoring has indicated that levels of ozone and sulfur dioxide in the park between 1983 and 1988 were just barely acceptable according to standards established by the EPA. For 2 days in 1988 ozone levels exceeded the standards that were established to protect public health.

### **Visibility Cut in Half**

Acid deposition monitoring has showed that precipitation in the park is more than 10 times as acidic as natural precipitation. Visibility monitoring has determined that SNP visibility is among the worst reported at any of the NPS visibility monitoring sites. Comparison with historical records indicates that visibility in the area has decreased more than 50 percent since 1948.

As early as 1936, work focused on the study and management of native brook trout populations so that these fish could be harvested by recreational anglers without negative population impacts. Much of the early fisheries work was accomplished by USFWS and the state of Virginia. The NPS expanded its involvement in fisheries management in 1981 and began a comprehensive monitoring program. In addition to providing opportunities for the public to fish, the fisheries management plan adopted in 1987 aims at preserving native brook trout as an essential element of the aquatic ecosystem.

The essence of this philosophy of management is demonstrated by the new fishing regulations developed for the park. Under the old regulations, all waters in the park were open to trout fishing unless specifically closed. Under the new regulations, all streams in the park are closed to fishing except those specifically designated as open. Unless the brook trout population in a stream is consistently adequate to sustain harvest, the stream will be closed to fishing. These regulations are based on the concept that brook trout have value in the ecosystem beyond their contribution to angler harvest.

### **Gypsy Moth Management History**

The third monitoring program I reviewed in my thesis was integrated pest management which, at SNP is predominantly gypsy moth management. The earliest record I could find of gypsy moths in the park described the capture of a male moth in 1969. It was not

until 1984 that gypsy moth infestations became a regular occurrence and the park staff began a comprehensive monitoring and management program. The heaviest defoliation documented in my research was in 1988 and encompassed 16,000 acres (8% of the park). By 1990 defoliation had reached 40,000 acres. Repeated use of insecticides for gypsy moth control is considered only in developed areas that represent about 4 percent of the park land.

Vegetation management has been extensive and includes I&M and management of meadows, vistas, backcountry, and fire. Botanical work at SNP began in the early 1900s, before creation of the park. Much of this early work involved collecting plants and documenting the park's flora.

Big Meadow, an ecologically diverse open area in the center of the park, has attracted the interest of scientists and park staff alike. A fascinating evolution of thought about the meadow, as well as the evolution of management actions taken to protect the meadow, can be traced. Early park management practices to keep the meadow open and similar to the way it appeared in historic times involved mowing the area every fall. Between 1935 and 1969, the meadow went through successional changes that turned the area from a meadow where grasses, sedges, and a few forbs were dominant, to an area that contained about 12 different plant communities, including extensive black locust thickets.

### **Meadow Mosaic Achieved**

Because mowing seemed to encourage the sprouting of black locust trees, park staff investigated other management techniques such as repeat mowing, fire, cutting of individual trees, and treatment of stumps with an herbicide. By 1988, a combination of these methods produced a meadow that appeared to be stabilizing into a mosaic of grass, herbaceous, and shrub communities. Currently, annual maintenance of the meadow involves cutting black locust stems by hand and treating the stumps with an herbicide.

Wildlife management at SNP has focused on bears and deer. Extensive research has been conducted on both of these species. Park staff is working to develop a comprehensive monitoring and management program for deer.

An annual black bear population survey was begun in 1983 and indicates that bear population levels through 1988 were relatively stable. The evolution of bear management in the park, from the time of numerous bear/human conflicts to a time when it is uncommon to see a bear in the park, reflects

an emphasis on controlling visitor activities rather than taking action against offending bears.

### **To Sum It Up...**

Taking time to review the monitoring program at SNP was a valuable learning experience for me, and provided the park staff with a useful document. For parks that have not yet taken the time to synthesize and document past resource management activities, Dave Haskell, John Karish, and I highly recommend it. The process provides insights for new directions, reminds you not to repeat past mistakes, and helps reinforce the things you're doing right.

Maybe you can even find a naive grad student like me to do most of the work for you.

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