



### STATE OF THE PARKS®

More than a century ago, Congress established Yellowstone as the world's first national park. That single act was the beginning of a remarkable and ongoing effort to protect this nation's natural, historical, and cultural heritage.

Today Americans are learning that national park designation alone cannot provide full resource protection. Many parks are compromised by incompatible development of adjacent lands, air and water pollution, skyrocketing visitation, and rapid increases in motorized recreation. Park officials often lack adequate information on the status of and trends in conditions of critical resources. Only 10 percent of the National Parks Service's budget is earmarked for natural resource management, and only 6 percent is targeted for cultural resource management. In most years, only 7 percent of permanent park employees work in jobs directly related to park resource preservation. One consequence of the funding challenges: two-thirds of historical structures across the National Park System are in serious need of repair or maintenance.

The National Parks Conservation Association initiated the State of the Parks® program in 2000 to assess the condition of natural and cultural resources in the parks, forecast the future condition of those resources, and determine how well supported the National Park Service is to protect the parks—its stewardship capacity.

The goal is to provide information that will help policy-makers and the National Park Service improve conditions in national parks and ensure a lasting legacy for future generations.

The National Parks Conservation Association, established in 1919, is America's only private, nonprofit advocacy organization dedicated solely to protecting, preserving, and enhancing the U.S. National Park System for present and future generations. NPCA identifies problems and generates the support needed to resolve them.

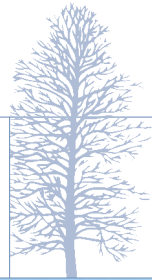
- \* 300,000 members
- \* 9 regional offices
- \* 32,000 local activists



Cover photo: Laurence Parent

## CONTENTS

N			
	S		
		SUMMARY AND RECOMMENDATIONS	2
		I. PRIDE OF THE BLUE RIDGE	7
		II. THE SHENANDOAH ASSESSMENT	9
		<i>Natural Resources</i>	
		Native Biodiversity	
		Terrestrial Communities and Systems	
		Freshwater Communities and Systems	
		<i>Cultural Resources</i>	
		Peoples and Cultures (Ethnography)	
		Archaeological Sites	
		History and Historic Structures	
		Cultural Landscapes	
		Museum Collections and Archives	
		<i>Stewardship Capacity</i>	
		Funding and Staffing	
		Park Plans	
		Interpretation	
		External Support	
		APPENDIX	24
		State of the Parks® Assessment Process	



## SUMMARY AND RECOMMENDATIONS



### REPORT SUMMARY—WILDLANDS AND HISTORY THREATENED

Born from a desire in the 1920s to establish additional national parks in the East, Shenandoah National Park initially consisted of a collection of properties that seemed to hold promise. Today, the park is a remarkable slice of southern Appalachian natural history and natural beauty. Shenandoah supports a rich mix of mountain forests and streams, outstanding wildlife habitat, artifacts that testify to prehistoric and more recent cultures, a wide range of historic buildings as well as those built by the Civilian Conservation Corps, and a dazzling array of recreation opportunities. It is the destination of choice for 1.5 million people each year.

But beneath its magnificence, Shenandoah is a park in jeopardy. Years of inadequate funding coupled with serious threats to the park's resources are taking a toll. The challenge is to conserve what exists now, and in some cases to restore degraded resources, to ensure that the park remains healthy.

The most significant challenge is that rising costs

are outpacing budgets, eroding the National Park Service's purchasing power and constricting its ability to conserve and manage Shenandoah. As one example, despite abundant archaeological sites, park staff have not completed even a baseline study and have no money to hire an archaeologist.

Shenandoah also faces increasingly serious effects from poor air quality and invasions of aggressive non-native species—threats that arise in large part from outside the park. Ground-level ozone pollution threatens the health of flora, fauna, park visitors, and staff. On many days, the air in the park is no different than the air in Richmond, Virginia, or Washington, D.C. Acid rain threatens trout species, and haze caused by air pollution has reduced average annual visibility at scenic overlooks from about 115 miles to less than 25.

Non-native plant species now account for an estimated 20 percent of all those documented in the park. Many non-native species have out-competed natives and are well established including destructive insects. Two of the most destructive, the non-native gypsy moth and hemlock wooly adelgid, are having a pro-

found effect on the park's forests. In fact, the wooly adelgid has killed a majority of the towering hemlock forests throughout the park.

Shenandoah is also feeling the effects of land development adjacent to its long, highly irregular, and largely unbuffered border. Originally envisioned as a much larger park surrounded by farms, development is now up against the park's boundary. This has fragmented vital wildlife habitat, severing natural travel corridors and hindering access to food.

### STATE OF THE PARKS® ASSESSMENT

The State of the Parks assessment describes a variety of threats to Shenandoah. In the chart on page 4, up arrows indicate conditions will likely improve over the next ten years, down arrows indicate conditions will likely deteriorate during that time, and flat arrows indicate no change is likely.

The findings in this report do not reflect past or current park management. Many factors that affect resource conditions are a result of both natural and human influences over long periods of time, in many cases before a park was established. The intent of the State of the Parks® program is to document the present status of park resources and determine which actions can be taken to protect them into the future.

### RATINGS

Current overall conditions of Shenandoah's known natural resources rated 65 out of a possible 100 as based on 80 percent of the information requirements of the assessment methodology (see Appendix). Ratings were assigned by a panel of three NPCA employees based on an evaluation of park research data. The negative ten-year outlook is based on the severity and pervasiveness of the air pollution and invasive non-native species problems.

The greatest threats to Shenandoah's natural resources include ground-level ozone pollution and acid deposition, both arising almost entirely from outside the park. Air quality, specifically ozone and acid deposition, is a dominant driver for the low ratings because the effects influence more than one category. Emissions from cars, trucks, and industrial sources

## SHENANDOAH AT A GLANCE

- More than 100 nationally significant archaeological sites provide evidence of about 10,000 years of human occupation
- Established in 1935 on land that was home to early settlers and formerly grazed, farmed, and logged
- Preserves Rapidan Camp, a National Historic Landmark, and summer retreat of President Herbert Hoover
- Rated globally outstanding for its biological distinctiveness and recognized as one of the world's richest broadleaf temperate forests
- Nearly 200,000 acres provide habitat for more than 2,000 native species, estimated to be more than in all of Europe
- Gone: bison, elk, river otter, eastern timber wolf, cougar, red fox, gray fox
- Restored: white-tailed deer, black bear, wild turkey, bobcat

### KEY CHALLENGES:

- Air pollution: Average visibility reduced from 115 to 25 miles with visibility as low as one mile; third worst summer visibility of any national park monitored
- Non-native species: The wooly adelgid, an Asian beetle, is destroying the park's hemlock forests; 20 percent of plant species are non-native
- Peoples and Cultures: Collaboration of park staff with NPS ethnographic personnel is needed to improve understanding of local peoples and resource issues
- Unfunded annual operating needs: \$6,700,000



EVALUATION

RESOURCE CATEGORY

CURRENT

TEN-YEAR OUTLOOK

NATURAL RESOURCES

Overall conditions

Environmental and Biotic Measures

Air

Water

Soils

Climate

Biota

Ecosystems Measures

Ecosystem Extent

Species Composition and Condition

CULTURAL RESOURCES

Overall conditions

Peoples and Cultures

Archaeological sites

Historic structures and history

Cultural landscapes

Museum collections and archives

STEWARDSHIP CAPACITY

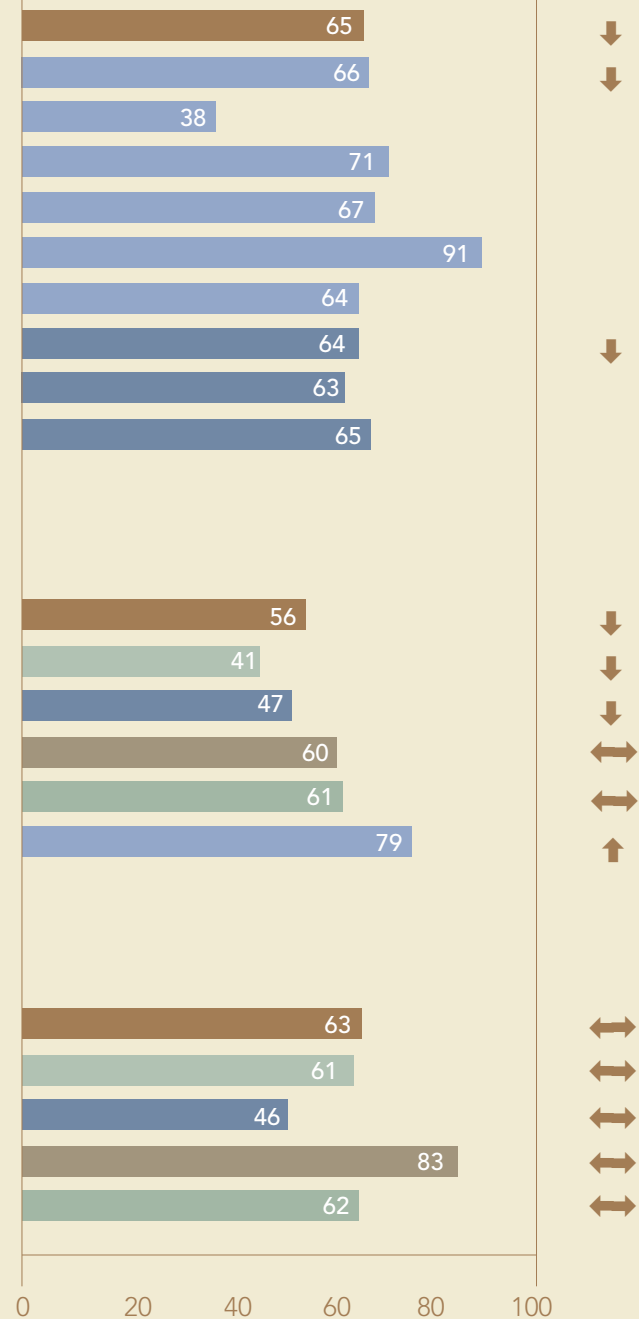
Overall capacity

Funding/staffing

Park Plans

Interpretation

External support



including power plants are the source of the high levels of ozone found at Shenandoah. Some of the park's plant species are especially sensitive to ozone, and exposure is greater for forests growing on ridge tops.

Acid deposition has significantly affected soils and aquatic resources in the park and remains the number one known threat to overall water quality. Acid levels have risen so high in some streams that even the native brook trout, an acid-tolerant species, is at risk.

Invasions of aggressive non-native species have also taken a toll on native plants and wildlife. It is clear that some of these species are so well established that they cannot be eradicated. Limiting the spread of these existing species will require significant financial resources and personnel. Additional invasions may occur, especially as land along the park's borders is increasingly developed.

Current overall conditions of the park's known cultural resources rated 56 out of a possible 100.

Management of the park's rich storehouse of cultural and historic resources suffers greatly from lack of adequate funding and sufficient staffing. Park staff make decisions based on incomplete data because they do not have information from baseline archaeological and historic preservation studies.

No money is available to hire additional permanent staff to guide proper management of many of the park's historic and cultural resources. Consequently, the park has difficulty meeting its goals and objectives.

The park's current overall stewardship capacity—the ability of the National Park Service to protect resources in the park—rated 63 out of a possible 100.

The low score for stewardship capacity reflects the erosion in park funding that is affecting management of natural, cultural, and historic resources and visitor services. The park's most important planning document, the General Management Plan, is also significantly out of date.

KEY RECOMMENDATIONS

NPCA believes it is essential that the Park Service, its Shenandoah partners, and local supporters join with decision makers and legislators to overcome funding



The hemlock woolly adelgid is one of the most destructive invasive species at the park.

and staffing shortfalls at the park. It is clear that additional funds and staff expertise are required to supplement ongoing efforts to protect Shenandoah for the benefit of present and future generations.

NPCA also recommends that efforts be directed at the following priorities:

Natural Resources

- Build on the exceptional ongoing monitoring program by increasing its overall scope to include monitoring the park's only endangered species, the Shenandoah salamander, and the park's soils. Congress should provide funding and staffing increases to support these enhancements.
- Continue to monitor the park's plant and fish species that are sensitive to ozone and acid.
- Incorporate information obtained from air, water, soils, and species monitoring into an independent, scientific assessment of the effects of existing and proposed power plant pollution on Virginia's natural resources and human health. The Commonwealth of Virginia must establish a moratorium on permits for new power plants, including one proposed five miles from the park's northern gateway, until a comprehensive impact assessment is completed and analyzed.
- Complete the draft plan to combat invasive non-

ACID DEPOSITION HAS SIGNIFICANTLY AFFECTED SOILS AND AQUATIC RESOURCES IN THE PARK AND REMAINS THE NUMBER ONE KNOWN THREAT TO OVERALL WATER QUALITY

- native species and preserve native ones and secure the appropriate level of funding for this effort.
- Join with a community group for a “good neighbor” campaign that provides information and educates residents about the effect on park resources of new and potentially incompatible land development.
- The Virginia Department of Environmental Quality and the U.S. Environmental Protection Agency must strictly enforce existing emissions and air quality standards. Congress and the General Assembly must support timely and significant reductions in power plant pollution.

**Cultural resources**

- Congress should provide funding for the park to hire a staff archaeologist and make the Archaeological Technician position permanent.
- Establish a historic preservation maintenance team.
- Initiate with NPS headquarters and regional offices an internal partnership to identify needs and further the park’s ethnography efforts.

- Congress should provide sufficient funding to complete the nomination of cultural landscapes to the National Register of Historic Places.

**Stewardship capacity**

- Initiate the process to produce a General Management Plan.
- Secure funding for a full-time volunteer program coordinator to increase the effectiveness of the volunteers.
- Continue community outreach activities, especially for local planning and zoning issues.
- Congress should provide sufficient funding for the eight full-time equivalents (FTE) interpretive staff positions needed to carry out work under existing plans.



LOCATED ASTRIDE THE BLUE RIDGE MOUNTAINS, SHENANDOAH IS AN EXCELLENT EXAMPLE OF THE CENTRAL APPALACHIAN BIOREGION AND A WINDOW INTO A LANDSCAPE IN THE MIDST OF CHANGE.

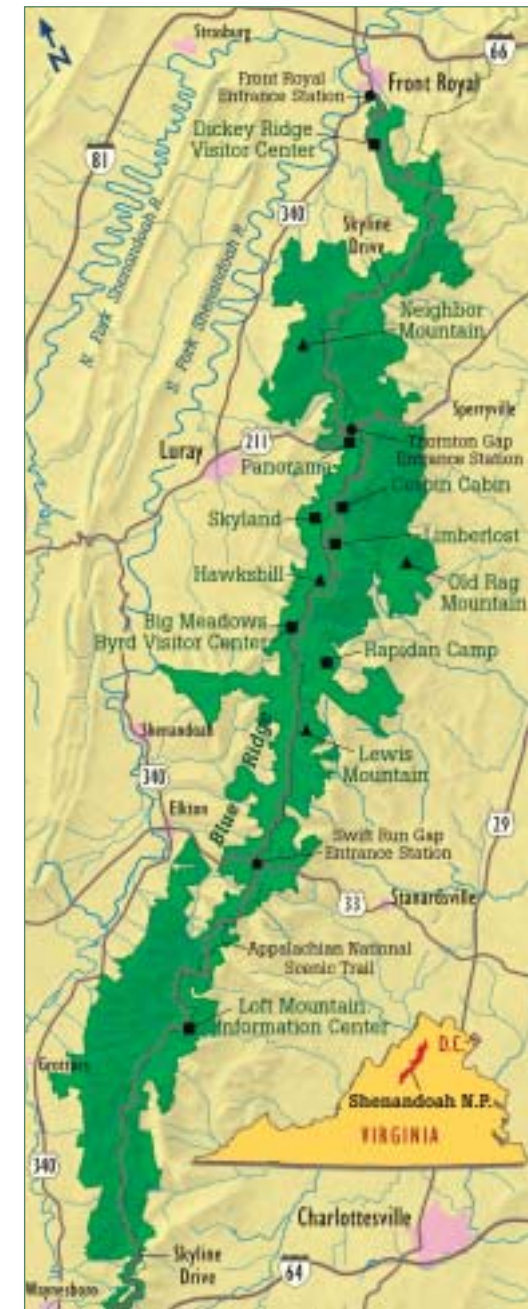


PRIDE OF THE BLUE RIDGE

Magnificent broadleaf forests, tumbling mountain streams, rare wildlife and plant species, artifacts reminiscent of times gone by, 101 miles of the famed Appalachian Trail—all are among the diverse array of natural, historical, and cultural treasures protected within the boundaries of Shenandoah National Park. Located astride the picturesque Blue Ridge Mountains, this narrow strip of land, no more than a mile across in some places, is both an excellent example of the Blue Ridge/Central Appalachian bioregion and a window into a landscape in the midst of change, where old farmsteads giving way to renewing forests face the pressures of land development.

As one of the first national parks established in the eastern United States, Shenandoah was viewed as an opportunity for restoration of a spectacular blend of forest types. Today, the park is a veritable ecological mixing bowl, where more than 100 northern and southern species of trees coexist. The forests combine with mountain streams to provide much-needed habitat for black bears, bobcats, wild turkeys, native brook trout, and nearly 200 species of neotropical migratory birds. All told, scientists have recorded approximately 2,000 different plants and wildlife in the park, some of which are exceedingly rare or, like the endangered Shenandoah salamander, exist only in the park.

When the park was established in 1935, it was far from untouched by human hands. People have long helped shape this landscape, beginning about 10,000 years ago with hunter-gatherers and continuing through American Indian occupation and European settlement. Intense resource exploitation characterized late 19th and early 20th century uses in the region. Much of what became parkland was grazed by live-



Shenandoah is 105 miles long and no more than a mile wide in some places.

Credit: Matt Kania

THE UNITED NATION'S EDUCATIONAL, SCIENTIFIC, CULTURAL ORGANIZATION HAS PROPOSED THAT SHENANDOAH NATIONAL PARK BE DESIGNATED AN INTERNATIONAL BIOSPHERE RESERVE BECAUSE OF ITS HIGH SPECIES RICHNESS.

stock, logged, reforested, and farmed.

Congress authorized establishment of Shenandoah in 1926, but it took nearly ten years before land for the park was secured. Unlike many western national parks that were carved from existing public lands, Shenandoah was pieced together from parcels of private property that were donated, sold to, or condemned by the Commonwealth of Virginia before being turned over to the Department of the Interior. To this day, a few people still resent the park because some families were involuntarily resettled to communities outside park boundaries.

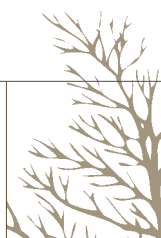
Private contractors began constructing the 105-mile Skyline Drive in 1931. The Civilian Conservation Corps (CCC) sculpted the landscape of Skyline Drive, built overlooks and comfort stations, and planted

thousands of trees, shrubs, and flowers—sometimes replanting relic shrubs in careful configurations to mimic the natural landscape.

In 1976, Shenandoah received additional protection when Congress designated 40 percent of the park as wilderness in tribute to its remarkable wildland and recreation values. The United Nation's Educational, Scientific, Cultural Organization has proposed that Shenandoah National Park be designated an International Biosphere Reserve because of its high species richness. World Wildlife Fund includes the park as part of the Appalachian/Blue Ridge Forests Ecoregion, rated as Globally Outstanding for its biological distinctiveness and recognized as one of the world's richest temperate broadleaf forests.



The Civilian Conservation Corps sculpted the landscape of Skyline Drive, building overlooks and comfort stations and planting thousands of trees.



## THE SHENANDOAH ASSESSMENT



### NATURAL RESOURCES— SPECIES AND ECOLOGICAL INTEGRITY AT RISK

The relatively low scores associated with Environmental and Biotic Measures (66)\*, and Ecosystems Measures (64)\* reflect historical use and invasive degradations, the significant risks that the park's natural resources face from poor air quality and acid deposition, the pervasiveness of non-native species, and incompatible land development along the park's border, which is largely unbuffered by protected areas. Although the park has undergone substantial changes, Shenandoah has demonstrated its resilience through its exceptional species richness. However, the ability to tolerate ongoing threats is suspect as fish kills, hybrid species, susceptibility to invasives, and losses of state-designated rare species attests.

NATIVE BIODIVERSITY— ENDURING OLD LOSSES, FACING NEW ONES  
Shenandoah, where north meets south, represents a fine example of central Appalachian biodiversity. The

park's varied topography, geology, exposure, and moisture conditions create a landscape of diverse habitats suitable for a wide variety of species, including many rare plants and animals. According to some accounts, the total number of native species found in Shenandoah exceeds that in all of Europe.

Although the park's species list is not complete, scientists have identified about 2,000 native and non-native plant and animal species (not including varieties or subspecies) within park boundaries. Because invertebrates and non-vascular plant species have yet to be systematically inventoried, it is likely that the list, including rare species, will grow. As recently as 1998, three vascular plants—Bush's sedge, smooth blackberry, and nut rush—were added to the list.

The Virginia Department of Natural Heritage found that 59 native species considered rare by the state have been recorded in Shenandoah, but recent survey work indicates that only 56 remain. Two state-endangered species, variable sedge and small whorled pogonia, exist at the park; the latter is also listed as threatened by the federal government. The endemic sword-leaved phlox was recorded at two places in the

\*66 out of a possible 100 as based on 76 percent of the information requirements of the assessment methodology and ecosystems measures 64 out of a possible 100 as based on 86 percent of the information requirements of the assessment methodology (See Appendix).

park but is now found at just one of those sites.

The Shenandoah salamander, a federally endangered species, occurs in the park. The smooth green snake, listed by Virginia as rare, inhabits Big Meadows, and the state-threatened wood turtle also lives in the park. Shenandoah provides habitat for nearly 200 neotropical migratory bird species, both as a nesting site and as a flyover corridor. Virginia considers several of these species rare.

As settlers moved into the area, an unknown number of native mammal species were extirpated, and many more saw their population numbers dwindle dramatically. The American bison, elk, beaver, river otter, eastern timber wolf, eastern cougar, gray fox, red fox, and white-tailed deer were all gone from the area by the time the park was established, while wild turkey, black bear, and bobcat numbers were near zero.

Since the park's establishment, some of those species have been successfully reintroduced or have recovered naturally. White-tailed deer, black bear, wild turkey, and bobcats now maintain fairly healthy populations. Beaver and otter are both occasionally seen in the park, although neither species maintains a permanent residence, and there have been unconfirmed sightings of cougars. Confirmed sightings of the non-native coyote could spell trouble for the bobcat, since research indicates downturns in its populations when coyotes are present.

#### TERRESTRIAL COMMUNITIES AND SYSTEMS—INVASIVE SPECIES TAKE A TOLL

The landscape of Shenandoah has changed significantly over time. When the park was established, some lands had been heavily logged or used for marginal agriculture. Since then, the Park Service has allowed the forest to recover a more natural character. Visitors to Shenandoah now walk under a near-continuous canopy of trees. The park is a land of constant change, where both human and natural impacts continue to alter the ecology.

Non-native invasive species have taken a toll on the park's terrestrial systems. These invaders can dramatically change the systems in the park by outcompeting or damaging natives. One of the most signifi-

cant events in the history of American forests was the invasion of the non-native chestnut blight, a fungus from Asia. In a matter of a few years, this alien species reduced the magnificent American chestnut from a large canopy species dominant throughout eastern U.S. forests to the morphology of a small understory shrub by killing the chestnuts before they can fully mature. Along the Blue Ridge, five insect species went extinct with the demise of the American chestnut, bears and other foragers lost an important food source, and local communities saw the end of the chestnut economy.

Non-native invasive species, such as Tree-of-heaven, continue to alter the make-up of plant communities. Although the park has made great strides in combating these encroachers and has managed to eradicate several, these species remain one of the top threats to park resources.

A visitor from 1940 would hardly recognize today's Shenandoah National Park. Surveys conducted at that time describe a dramatically different landscape where American chestnut and red oak stands dominated, while cove hardwoods and pines each accounted for just 6 percent of the forest mix, and yellow poplar stands were absent. Today's blend includes chestnut oak and northern oak at 59 percent, yellow poplar at 16 percent, cove hardwoods at 15 percent, and pitch pine at 3 percent.

Eastern hemlocks are found in Shenandoah too, mostly in pure stands on moist sites. The hemlocks are now severely threatened by a non-native, invasive beetle, the hemlock wooly adelgid, which is capable of killing a hemlock within just four years of infestation. All hemlock-dominated stands in the park are infested. It appears that except for remnant trees in isolated areas and a few places where park staff are attempting to control the adelgid, the hemlock stands soon will be gone from the park.

The park boasts a number of rare community types at places such as Big Meadows, Hawksbill, and Neighbor Mountain. Limberlost, site of the oldest and largest red spruce stands in the park and home to the only population of alder-leaved buckthorn in Virginia, is losing a significant piece of its majesty to the wooly-

adelgid, which has infested its towering hemlocks.

Fire has always been a part of Shenandoah's natural landscape, limiting the growth of some species while encouraging others. Fire plays a critical role in nutrient cycling and the maintenance of a healthy forest ecosystem, but decades of active fire suppression have left the park with high fuel loads and a larger proportion of older class vegetation. Recently, park staff developed a new Fire Management Plan that uses prescribed fire as a tool. The most notable result thus far is successful species regeneration of rare plant species at Big Meadows.

#### FRESHWATER COMMUNITIES AND SYSTEMS—SOURCE OF CLEAN WATERS AND VALUABLE HABITAT

Freshwater communities are important to park health and visitor experiences. Most of the popular hiking trails are near cool mountain streams, and on any number of hot summer days, park visitors enjoy the cool trails of White Oak Canyon or fish for native brook trout in the upper reaches of the park's streams.

About 95 percent of Shenandoah's freshwater communities are mountain stream habitats. Approximately 850 springs combine to flow downhill and form many highly oxygenated streams that are home to 30 species of fish, including the native brook trout, which is especially well adapted to the park's naturally acidic, higher-elevation mountain streams, and the abundant blacknose dace, which is sensitive to acidic waters. Two species of non-native trout, the brown and the rainbow, are present in the park and may be adversely affecting native brook trout in several streams. As one example, the tiger trout, a hybrid between a female brown trout and a male brook trout, has been found in several streams that are habitat for brook trout.

A freshwater community of particular note is Big Meadows swamp, a representative of a globally rare wetlands type. The swamp is home to rare plant species that are found nowhere else in the park. Included are the gray birch, which reaches the southernmost terminus of its range in the swamp, and the pale green orchid.

#### COOPERATIVE SCIENCE AT WORK

Shenandoah National Park has a long-standing cooperative agreement with the University of Virginia to conduct watershed monitoring and research as part of the Shenandoah Watershed Study. Under this program, precipitation quantity and chemical composition are measured at two sites, the chemical composition of stream water at 14 sites, and stream water discharge at five sites. Data and analysis have concluded that nitrate concentrations in stream waters increased dramatically following defoliation caused by the gypsy moth infestation of the late 1980s and early 1990s, indicating that the efficient use of nitrogen as a nutrient by the park's regenerating forests has been disrupted. The effect of the nitrate release was an episodic increase in stream water acidity and an inability to neutralize it. As of 1999, the affected stream's chemistry had not returned to pre-defoliation levels, but monitoring continues. The Shenandoah Watershed Study enabled this rapid assessment of gypsy moth effects and continues to make important contributions to the park's science program.



#### FORECAST

The assessment's low scores for the current condition of the park's natural resources and the forecast that conditions are likely to decline over the next ten years reflect the serious nature of threats to those resources. Research at Shenandoah suggests that the park's ecological integrity is in jeopardy from threats that arise largely outside the park. Many of these threats, such as air quality degradation, require action from Congress, states including Virginia, and nearby communities. For example, since deregulation in 1998 Virginia has approved permits for 16 new power plants. The state is con-

tinuing to accept new proposals, including one for a power plant five miles from the park's Front Royal gateway. Without external support, the challenges facing the park will never be adequately addressed. The major threats are briefly described below.

**Air quality affects on visibility.** Since its establishment, Shenandoah's spectacular views have been recognized as a key resource and visitor attraction. In 1924, surveyors of the then-proposed national park reported:

The single greatest feature is a possible skyline drive along the mountaintop...looking down westerly on the Shenandoah Valley from 2,500 to 3,500 feet below, and also commanding a view of the Piedmont Plain stretching easterly to the Washington Monument, which...may be seen on a clear day.

Today, the views from Skyline Drive and other points of interest in the park are not what they once were. Some haziness caused by photosynthesis is nat-



A hemlock dying from the effects of insect infestation, and a tulip poplar showing signs of ozone damage.



ural to the Blue Ridge Mountains. However, regional and local haze dominated by fine sulfate particles from power plants and other industrial sources has reduced natural visibility—from an estimated range of 115 miles to an annual average of less than 25 miles. In summer, the average visual range is now 15 miles compared to the historic average of 77 miles and can be less than one mile on particularly hazy days.

This impairment ranks Shenandoah as the third worst park for visual range after Great Smoky Mountains and Mammoth Cave national parks among those parks that conduct visibility monitoring.

**Acid deposition.** Wet and dry acid deposition is a major, pervasive threat to the health of Shenandoah's ecosystems. The rate of acid deposition in Virginia's mountains is among the highest in the country, and Shenandoah National Park has one of the highest wet and dry deposition levels in the entire National Park System. Despite national reductions in sulfur pollution as a result of the 1990 Acid Rain Program, streams in Shenandoah continue to become more acidic and less able to support fish.

Nitrogen oxide and sulfur dioxide, primarily from power plants, are the dominant emissions contributing to acid deposition. Soils in Shenandoah's watersheds tend to retain acid deposits, eventually leaching the acidity once they have become acid-saturated. Increased soil acidity causes the release of more soluble forms of aluminum, which kills a tree's fine roots reducing its uptake of nutrients.

Acid deposition has significantly affected aquatic resources in the park and remains the number one known threat to overall water quality. Acid levels have risen so high in some streams that even the native brook trout, an acid-tolerant species, is at risk.

**Ozone pollution.** Ground level ozone, distinct from the ozone layer in the upper atmosphere, can adversely affect the health of both humans and vegetation. High levels can cause lung damage and trigger asthma attacks in humans.

Ozone levels are particularly high in the eastern United States during the summer months when outdoor recreation is at its peak. Most people are surprised to learn that occasionally in some parks,

## RECOMMENDED ACTIONS

While there are some actions the park can take to mitigate resource threats, action is not the responsibility of the Park Service alone. Most of the major resource threats arise from outside the park's borders. It is incumbent upon local, state, and national decision makers to ensure that this natural treasure exists for future generations to study and enjoy. NPCA recommends the following:

- Continue and enhance monitoring of air, soils, and stream water to track and address acidification and its related effects. Sulfates, nitrates, pH, and metals (especially aluminum and mercury) should be regularly measured at representative sites.
- Monitor plant and fish species that are sensitive to ozone and acid.
- Incorporate information obtained from this work into an independent, scientific assessment of the impacts of existing and proposed power plant pollution on Virginia's natural resources and human health. The Commonwealth of Virginia must establish a moratorium on permits for new power plants, including one proposed five miles from the park's northern gateway, until an impact assessment is completed and analyzed.
- Congress must require significant and timely reductions in sulfur, nitrogen, mercury, and carbon pollution from power plants. In the absence of congressional action, states must adopt similar requirements.
- Continue the aggressive plan to combat invasive non-native species and preserve native ones. Although the new regional invasive plant management team is a good start, Congress must allocate funding sufficient to fight all invasives in the park.
- Work cooperatively with a partner to inform and educate park neighbors regarding the effects of incompatible land development on park resources and present alternatives to development, including conservation easements and land trusts.
- Conduct inventories for non-vascular plants and invertebrates; monitor wildlife species, particularly deer and bear; conduct a comprehensive soil survey; and improve methods to investigate poaching and enforce anti-poaching regulations. All of these items require additional funding and staff.

Shenandoah included, the same harmful ozone levels found in cities are present. Recent ozone measurements for Shenandoah indicate the park is comparable to Richmond, Virginia, and some northern Virginia suburbs of Washington, D.C.

Shenandoah is vulnerable to the effects of ozone pollution because of its proximity to large nitrogen oxide and volatile organic compound sources. In addition, ozone exposures are greater for forests growing on ridge tops. Three major forest types—cove hardwood, chestnut oak, and yellow poplar—cover

nearly 80 percent of the park and are particularly sensitive to ozone. Forty of the plant species in the park are sensitive to ozone, including the tulip poplar and milkweed, and 25 percent of those plants are exhibiting visible foliar injury, decreased growth, and/or early leaf drop, symptoms of ozone pollution.

**Invasive non-native species.** Invasive non-native species—including plants, insects, and fungi—have had significant adverse effects on the park's native biodiversity and land and water communities, especially the American chestnut and hemlock. Currently,



MOST PEOPLE ARE SURPRISED TO LEARN THAT ON SOME DAYS, THE PARK SUFFERS FROM THE SAME HARMFUL LEVELS OF GROUND OZONE THAT ARE FOUND IN RICHMOND, VIRGINIA, AND SOME NORTHERN VIRGINIA SUBURBS OF WASHINGTON, D.C.

300 documented plant species in the park are non-natives, and many of those are considered invasive; that is, capable of successful and often rapid establishment. Some are extremely aggressive and can quickly crowd out, kill, or out-compete native species. Tree-of-heaven, for example, produces toxins that prevent the establishment of other species.

The results of successful invasions are often far-reaching and can include massive changes in natural settings and ecosystem functions. In Shenandoah and elsewhere, areas defoliated by the gypsy moth caterpillar created openings that aided in subsequent invasions by non-native species. Researchers predict the same for the hemlock stands that have fallen victim to the woolly adelgid. Other predicted effects of the hemlock loss include decreases in both native insect populations and habitat for songbirds.

Park staff face an overwhelming task in the fight against non-native species. Control now focuses on small or new invasions that pose the greatest threats to native species and their habitat. Shenandoah is part of a cooperative effort to assess and control invasive species, and for 2003, the park received funding through the regional NPS office to house a regional

#### CULTURAL RESOURCES— A WEALTH OF TREASURES IN PERIL

Shenandoah National Park received an overall rating of 56 on a scale of 0 to 100 for cultural resource conditions, including ethnography, archaeological sites, history and historic structures, cultural landscapes, and museum and archival collections. The Park Service faces many challenges in attempting to correct the deficiencies that led to the low score, particularly if funding continues to erode.

#### PEOPLES AND CULTURES—STRONG TIES BETWEEN PEOPLE AND PARK RESOURCES

##### Current Conditions = 41

For approximately ten thousand years, people have occupied the lands of Shenandoah National Park and

exotic plants “SWAT” team that will also serve ten other parks. However, overall funding and staffing to combat non-native species remain insufficient.

**Development of adjacent lands.** Expansion of towns and communities on both sides of the park is incrementally encroaching on park boundaries. Shenandoah was originally authorized to include 512,000 acres, significantly larger than its current size of 199,017 acres. As more forests and farm land are developed for commercial or residential use, the consequences for the park become more severe. As suitable wildlife habitat and, especially, migration corridors, are eliminated, the park’s overall biological integrity is further threatened. In particular, as forested land around the park is developed, the resulting “edge” habitat tends to attract non-native species that often invade the park. Native species such as black bear find fewer opportunities to forage and run into problems when they seek out human-based foods. In addition, road expansion projects, such as the one proposed for widening Route 340 in the Shenandoah Valley, have the potential to attract new residential and commercial development.

used its resources for food, shelter, commerce, and pleasurable pursuits. This rich human influence is sporadically recorded through oral histories, independent academic research, and interpretation of both the park and the CCC’s contributions.

But Shenandoah lacks funding and staff for a formal ethnography program—an assessment of places and natural and cultural resources that are valued in different ways by various groups affiliated with the park. This gap is especially evident in relation to the park’s associations with former mountain residents and their descendants. Although pre-historic American Indian artifacts are in the park, no modern tribe claims affiliation with parklands.

Park staff collect oral histories covering the CCC period, the Skyland resort, Rapidan Camp, former park superintendents, and mountain residents. However, many of the mountain family histories, collected by an amateur reporter in the 1960s, are insufficient. With limited resources, park staff furthers the understanding of people and cultures associated with Shenandoah through archaeological studies, interpretive exhibits, films, and research.

#### FORECAST

As the assessment score of 41 indicates, Shenandoah rates low in ethnography. Park staff have not completed an Ethnographic Overview and Assessment. Such information could help mountain family descendants and park staff communicate about the sites that hold special meaning. A full-fledged ethnography program will probably not be initiated unless

#### RECOMMENDED ACTIONS: PEOPLE AND CULTURES

NPCA recommends that the Park Service undertake the following actions with regard to ethnography at Shenandoah National Park:

- Meet with NPS headquarters and regional staff regularly until consensus and conclusions about the park’s successes and needs are reached. It may be determined by all levels of the NPS that an Ethnographic Overview and Assessment is not necessary.
- Work with people sensitive to the local community to identify an acceptable ethnographer for the Ethnographic Overview and Assessment project if it is determined necessary by all levels of NPS.
- Continue to resolve tensions concerning access to cemeteries within the park where the descendants’ family members lay at rest.



Civilian Conservation Corps camp at Shenandoah

staff at NPS headquarters and in the regional offices work with park staff to assess the accomplishments and needs at the park.

#### ARCHAEOLOGICAL SITES— ABUNDANT EVIDENCE OF THE PAST

##### Current Conditions = 47

Shenandoah National Park’s archaeological resources are rich and varied, from prehistoric sites to the ten camps set up as the CCC began constructing way stations and picnic grounds. Research points to seasonal camps that early hunter-gatherers established in the mountains. Surveys from the 1970s, while not up to today’s standards, are still used as a basis for studying prehistoric mountain use. A few of these sites are considered highly significant, but because no systematic evaluation has been completed, the extent of the sites’ archaeological value is not fully understood. Despite this, the park continues to make great strides with limited resources. For example, more than 600 sites have been recorded and evaluated in the past three years.

Of the estimated 1,250 to 4,800 archaeological sites in the park, more than 1,200 pertain to historic mountain residents. Included in this count are 460 known historic homestead sites, each with its own story to tell about the people who lived in these mountains before the park was established.

#### FORECAST

Shenandoah’s wealth of archaeological resources is in jeopardy, as reflected in the assessment score of 47. The reasons are many, but they start with the lack of a



permanent staff archaeologist at the park to add an expert voice and attention to the planning and management decisions that affect archaeological resources.

The park also suffers from too little knowledge about its archaeological resources, although initial evaluations of many identified sites have been completed. An Archaeological Overview and Assessment, the baseline study for archaeological resources, was



#### RECOMMENDED ACTIONS: ARCHAEOLOGY

To alleviate deficiencies in management and protection of Shenandoah's archaeological resources, NPCA recommends the following actions:

- Congress must provide funding to hire a staff archaeologist and make the Archaeological Technician position permanent.
- Complete the Archaeological Overview and Assessment.
- Strengthen internal training of rangers and maintenance staff to promote awareness and required protection of archaeological resources.
- NPS and the Potomac Appalachian Trail Club should work together to raise awareness of archaeological resources among club members and hikers on the Appalachian Trail.

started but has not been completed as rapidly as the park would like, in part, because the park does not have a full-time archaeologist. In addition, only ten of the park's estimated 100 nationally significant archaeological sites are listed on the National Register of Historic Places, despite repeated requests by the park for funding to update nominations. Increased funding for this project and an archaeologist will help address these needs.

The park's popularity also presents a threat to archaeological resources. Today's most visited campsites and visitor destinations were historically the destinations for early peoples and their successors. For example, all Appalachian Trail huts in the park are located on flat, level ground near water, the natural choice for past campsites. High foot traffic in these areas damages archaeological resources, often before staff can survey the sites. Damage is also caused by illegal camping in restricted areas and occasional taking of artifacts.

#### HISTORY AND HISTORIC STRUCTURES—BUILDINGS TELL A COMPELLING STORY

##### Current Conditions = 60

Park staff manage 450 extant historic structures, many of which are considered to be in good condition. One hundred and seven of the structures have been determined eligible for the National Register of Historic Places, but they are not yet included on the park's official List of Classified Structures. Of those structures, 95 are awaiting nominations to the National Register. No funding is available to support the work needed to complete the nominations.

Among the many significant historic features of the park is Skyline Drive. This magnificent stretch defines the experience of Shenandoah from the moment visitors enter the park. In addition, Massanutten Lodge, located at the former resort of Skyland, has been restored to its earlier appearance and now boasts a permanent exhibit, "The Women of Skyland," that celebrates the social and historic contributions of five women with connections to the resort.

Potomac Appalachian Trail Club manages six historic cabins in the park as rustic accommodations for guests, available on a reservation basis. Corbin Cabin—

listed on the National Register of Historic Places and managed by the club—is one of the few remaining intact historic structures from the mountain families who lived in the park. In addition to the six cabins, the club manages all of the trailside huts along the Appalachian Trail. The club does an admirable job with upkeep, but having a group focused on recreation manage historic structures poses some challenges for park staff who must protect archaeological and historic remains at these popular sites.

#### FORECAST

Promotion of the park's history and protection of historic structures have evolved greatly since Shenandoah was established. But as the assessment score of 60 reflects, this positive trend is dampened by funding and staffing shortfalls that hinder steps for needed improvement. While many of the historic structures in Shenandoah are in good or fair condition, the park has no formal annual monitoring program. Under the new condition assessment program, all of the structures are scheduled for inspection each year, but not necessarily by someone specifically trained in historic preservation.

Shenandoah also lacks a Historic Resource Study for the more than 100 roads that traverse the park. Aside from Skyline Drive, none of the roads has been evaluated for their significance and contributions to the historic fabric of Shenandoah.

#### CULTURAL LANDSCAPES—WHERE NATURAL RESOURCES AND HISTORY MEET

##### Current Conditions = 61

Cultural landscapes represent a blending of the cultural and natural features in a park. Shenandoah has 18 identified cultural landscapes, ranging from a rustic Appalachian garden on the edge of Skyland to Rapidan Camp, President Hoover's "summer White House."

Big Meadows, where human occupation dates back thousands of years and includes the 1930s era CCC camp, is an excellent example of Shenandoah's mix of cultural and natural resources. Although not known with certainty, research indicates the meadow might have been maintained early on through intentional burning and, later, grazing of domesticated animals.

#### RECOMMENDED ACTIONS: HISTORIC STRUCTURES

Park staff have worked with marked success to improve the condition of many of Shenandoah's historic structures over the past decade. The assessment found, however, that conditions are not likely to continue to improve over the next ten years unless action is taken to correct current shortcomings. In particular, lack of funding and insufficient training in the significance of historic resources and their proper preservation threaten the park's irreplaceable historic structures. NPCA recommends the following:

- Congress must provide sufficient funding to nominate the 95 remaining structures that are eligible for the National Register of Historic Places and evaluate other structures in the park for eligibility.
- Complete a Historic Resource Study for park roads to determine their historic context, keeping in mind the current wilderness character in much of the park.
- Establish a historic preservation maintenance team.
- Strengthen internal training on the significance of historic places and preservation legislation. In particular, make technical training in historic preservation mandatory for appropriate maintenance staff.
- Provide historic preservation training opportunities—and actively encourage attendance—for the Potomac Appalachian Trail Club.

This allowed several unique plant communities to take root. The open character of Big Meadows attracts populations of birds found nowhere else in Shenandoah.

This area also illustrates the complexity of managing cultural landscapes. In keeping with the original philosophy of returning parkland to a natural state, Big Meadows was not actively maintained. Encroaching forest and scrub reduced the meadow to 150 of its original 700 acres. Park staff now manage the open landscape by mowing down encroaching saplings and using prescribed burns.

Lewis Mountain, another of the park's cultural landscapes, relates a tale of race relations in the

## RESTORATION OF A PRESIDENTIAL RETREAT

Rapidan Camp, formerly known as Camp Hoover, is of exceptional significance within the many historically important structures at Shenandoah. A National Historic Landmark located at the headwaters of the Rapidan River, this site was President Herbert Hoover's summer retreat from 1929 to 1933. Shadowed by arching hemlocks, Rapidan Camp became known as the "summer White House." It included the President's Cabin, Prime Minister's Cabin, a Marine camp, and several other structures.

Time and neglect led to the loss of several of the camp's structures, and others were modified from their appearance in the 1930s. The wooly adelgid infestation threatens to kill most of the hemlocks that gave Rapidan Camp's landscape its distinctive character. And ice storms in 1998 caused significant damage to the historic landscape and structures of the camp.

The Park Service is restoring Rapidan Camp and its remaining structures to their 1931 appearance, using historic photos and records that provide clues to the original look and layout. Restoration of the historic structures is nearly complete, and the President's Cabin will become a permanent museum. Despite this significant progress, funding to fully interpret and maintain the site remains uncertain.



United States during the time of segregation. This landscape, in the process of being nominated for the National Register of Historic Places, was initially opened in 1939 to serve only African-American visitors to Shenandoah. Harold Ickes, Secretary of the Department of the Interior under President Franklin Roosevelt, ordered the park to integrate the park's Pinnacles Picnic Grounds, but the leading park concessionaire at the time fought integration in the park. It was not until 1950 that visitor facilities at

Shenandoah were fully integrated, more than a decade before other public facilities in the Commonwealth of Virginia.

### FORECAST

The balance between cultural and natural values in cultural landscapes is well illustrated at Shenandoah National Park, where staff have done a credible job maintaining the landscapes. But much remains to be done to protect these landscapes into the future, as reflected in the assessment score of 61.

According to park staff, the condition of cultural landscapes at Shenandoah remains largely unknown; and therefore, is presumed to be deteriorating. The park has had some successes, including stabilization of Judd Gardens and the borders of Big Meadows. But overall, cultural landscape preservation at Shenandoah is inadequately funded and understaffed.

As one result, only a few sites have been documented and subsequently nominated to the National Register of Historic Places as cultural landscapes. Most of Shenandoah's documentation work required for the National Park Service's Cultural Landscape Inventory is done out of the Park Service's Philadelphia Support Office, which carries a huge responsibility for the entire Northeast Region. Noting that a new General Management Plan for Shenandoah has not been completed, the Philadelphia office has not made the park's cultural landscape research a priority. This means that the park will probably not meet its goal of entering research for 12 cultural landscapes into the Cultural Landscape Inventory by 2005.

It also means that staff will not have access to the baseline data needed to make decisions and carry out plans to preserve cultural landscapes. They also will lack resources to initiate training about how to care for cultural landscapes and how to help prevent possible future damage from maintenance workers and visitors who are unaware of their importance.

### MUSEUM COLLECTIONS AND ARCHIVES— CURATORIAL STAFFING SHORTAGE

**Current Conditions = 79**

The museum collection and archives at Shenandoah

earned the highest score, 79, of all cultural resources categories. A new state-of-the-art storage facility allowed staff to move collections and archives out of basements and attics, and most of these items are in good or fair condition. Staff have also reduced the backlog of uncataloged items so that only 24 percent of the collection remains to be cataloged, considerably less than the National Park System average.

The park's collection and archives are extensive. As of May 2002, records indicate the park maintains 468,712 museum holdings. The varied collection ranges from archaeological items to historical objects and extensive archival material.

The bulk of the history collection includes objects such as clothing, furniture, and tools that are related to the exploration of Shenandoah, the CCC, and Skyland. The large archival collection contains documents associated with establishing the park, including resource management records dating back to the 1920s. Of special significance are the personal papers of L. Ferdinand Zerkel, a Virginia businessman who was instrumental in the park's formation.

### FORECAST

The assessment forecasted that the condition of Shenandoah's museum collection and archival material will be consistent in the coming years; only curatorial assistance and more storage space will improve the situation. The park's collection has grown in recent years through increased archaeological excavations and purchases for the CCC museum at Panorama near the Thornton Gap Entrance Station. Park staff have requested funding for a small addition to house the archaeological artifacts. Compressed storage units were installed in December 2002, and a new collection management plan that will include a storage management plan is scheduled for completion in 2003.

Not having enough money to hire the staff needed to keep up with the growing collection and exhibits is the single greatest threat to continued improvements. Staff may be forced to close the new exhibit at Massanutten Lodge in 2003 if money for a ranger cannot be found. In addition, too few employees are available to handle the backlog of uncataloged

materials, catalog new items, respond to requests for information from visitors and the broader public, and staff anticipated new exhibitions.

### RECOMMENDED ACTIONS: CULTURAL LANDSCAPES

It is clear that additional funding, for research, training, and support from the regional office are needed to help ensure the continued integrity and protection of Shenandoah's cultural landscapes. NPCA recommends that park staff take the following steps:

- Renew communications with the Philadelphia office regarding the timeline for completing the research needed for the Cultural Landscape Inventory. Congress should appropriate the funds necessary to complete this much needed work.
- Train park staff in site significance/awareness and horticultural issues and procedures.
- Look into partnerships with neighboring parks or protected areas to share training and resources.
- Reach out to the Potomac Appalachian Trail Club through workshops and training to increase the group's awareness of cultural landscapes.

### RECOMMENDED ACTIONS: MUSEUM COLLECTIONS

The relatively high score for this category is a testament to the park staff's commitment to stewardship in the face of limited personnel and funding. NPCA recommends that the following steps be taken to ensure adequate funding for work needed in the future:

- Congress needs to allocate funding to hire a curatorial technician to manage and maintain the expanding number of park exhibits.
- Analyze projected growth of collections, researcher needs, and exhibit expansions and then use the results to seek funding to add needed curatorial expertise to the permanent staff.
- Ensure that the upcoming storage management plan accurately reflects the anticipated growth in collections over the long term, not merely for the near future.
- Continue work on reducing the catalog backlog even as collection acquisitions increase.

## STEWARDSHIP CAPACITY— CHALLENGES AND POTENTIAL

The third and final step in the resource assessment process examines stewardship capacity—how well positioned the Park Service is to protect Shenandoah's natural and cultural resources. Four categories were considered: funding and staffing, park plans, interpretation, and external support.

Overall, the park's stewardship capacity rated 63. As discussed throughout this report, Shenandoah faces many serious threats that originate outside its boundaries, and the Park Service can not reasonably be expected to address their full scope. Nevertheless, NPCA believes that adequate funding and sufficient personnel can be strategically used to reduce the effects these threats have on the park's outstanding natural and cultural resources.

OVER THE PAST TWO DECADES AS  
THE COST OF MEETING RECURRING  
PARK NEEDS ROSE,  
PURCHASING POWER ERODED.



### FUNDING AND STAFFING—SHORTFALLS RESULT IN LESS PROTECTION FOR RESOURCES AND FEWER SERVICES FOR VISITORS

Rating: 61



At Shenandoah, as at many other national parks, funding is the most significant factor in the staff's capacity to protect park resources. For most national parks, the largest share of budgets is composed of operating funds made available by Congress for recurring needs—basic day-to-day functions such as resource protection, law enforcement, interpretation, management, administration, and routine maintenance. The park's Business Plan, an analysis of operating funds from fiscal years 1980 through 2000, shows that in inflation-adjusted dollars, the park received increases of about 1.2 percent per year, about 24 percent in total. Costs rose about 31 percent over the same time period. Some of this increase includes the cost to meet the requirements of the Clean Air and Clean Water acts, regulations regarding hazardous materials, and other public safety measures.

In other words, over the past two decades as the cost of meeting recurring park needs rose, purchasing power eroded. A serious budget shortfall has resulted, and park officials are increasingly challenged to carry out even basic responsibilities. Other funding sources, such as 80 percent of revenues from fees collected in the park, are targeted for specific projects and cannot be transferred to help cover the budget shortfall for recurring needs.

Current unfunded annual operating needs totaled about \$5 million in fiscal year 2000, rising to \$6.7 million in fiscal year 2002. Nearly half of this funding deficit occurred in the Resource Protection budget, which was short \$2.2 million and 29 full-time equivalents. The Natural Resource management program operated with a funding deficit of nearly \$1.4 million annually. Other funding needs include activities such as improved dissemination of cultural resource knowledge and information (\$265,000), year-round operation of the new visitor/education facility (\$458,000), improved protection of designated wilderness (\$259,000), improved law enforce-

ment response and employee safety (\$614,000), establishment of a historic structures preservation maintenance team (\$490,000), improved emergency medical response time (\$221,000), improved structural fire prevention and response time (\$275,000), and improved maintenance of all facilities (\$771,000) (dollars adjusted to the year 2000).

The funding shortfall has led to serious understaffing at the park. In 2000, Shenandoah reported 219 full-time equivalent employees, 84 fewer than are needed to protect park resources and maintain quality visitor services under existing plans. Lack of adequate funding is also taking a toll on public information, emergency, and protection services provided by park rangers. Without additional funding, park officials cannot ensure basic safety and emergency response for park visitors.

### RECOMMENDED ACTIONS: FUNDING AND STAFFING

In 2000 the park's business plan identified substantial funding and staffing shortfalls that have been exacerbated by budget erosion over recent years. Congress must act to increase base funding and staffing levels to ensure full resource protection and a quality experience for visitors.

### PARK PLANS—OUTDATED GENERAL MANAGEMENT PLAN

Rating: 46



A number of significant park plans are outdated or absent in Shenandoah National Park, including an important guiding document—the General Management Plan (GMP). Shenandoah's existing plan dates back 20 years and is no longer relevant. A new plan may soon be in the works because the Park Service has placed Shenandoah on its priority list.

Shenandoah's Resource Management Plan (RMP), the vision for resource management, was last updated

### SWAT TEAM TO ADDRESS REGION'S PLANT INVASIONS SHENANDOAH MAY LOSE A POSITION TO STAFF IT

A new non-native plant management team will be located at Shenandoah, where controlling invasive, non-native species is one of the park's greatest challenges. The team will serve 11 parks in the region, including Shenandoah. Unfortunately for the park, staffing the SWAT team comes at the expense of another vital position that will not be refilled because of a lack of funds. The new supervisor for the team is currently employed at the park in insect pest management control and environmental assessment and compliance. His current position will go unfilled.



in 1998, the same year that NPS decided to put RMPs on hold system wide.

Other significant omissions in park planning documents, discussed in the cultural resource section of this report, are the Archaeological Overview and Assessment (currently under way but delayed because of funding and staffing shortages), an overall Historic Resource Study, and a Historic Resource Study for the park's roads.

This category received a low score because of the large number of outdated or non-existent plans.

**RECOMMENDED ACTIONS: PARK PLANS**

- Begin revisions of the General Management and Resource Management plans as soon as possible.
- Congress should provide funding to complete a Historic Resource Study for the park as a whole, including the park's roads, as also recommended in the cultural resources section of this report.
- Initiate—with the appropriate regional and National Park Service offices—an internal partnership to further the park's ethnography studies and efforts.
- Congress should provide funding to complete much needed natural resource management plans, such as an exotic species management plan and deer and bear management plans.

*INTERPRETATION—WELL-ROUNDED EFFORTS PRODUCE RESULTS***Rating: 83**

Public understanding of Shenandoah's resources is an important stewardship tool. In a popular park like Shenandoah, which is close to large urban areas and averages 1.5 million visits a year, an effective education program is one of the best ways to reach the public.

The park's interpretive services are in great demand. In 2002, Shenandoah's 14 full-time and eight seasonal interpretive employees contacted 439,000 people through visitor centers, informal and formal interpretation, and the junior ranger and other education programs. Through non-personal services such as publications and audio/visual media, staff made more than 540,000 contacts. Outreach services, which includes giving presentations and loaning materials, accounted for an additional 2,000 contacts. The park's web site registered approximately 1.5 million hits.

The Business Plan estimates that to accomplish the goals and objectives of the Interpretation and Education Division, an additional eight full-time equivalents are necessary. In 2000, \$1.1 million was spent on visitor interpretive services, about \$354,000 less than what was needed, and funding for this activ-

ity has decreased since then. Staff shortages mean the park is not able to offer visitor services, including education programs, to 50,000 wintertime visitors. The park's Loft Mountain Information Center is closed two days a week during the peak park visitation season and closed from fall through spring. Visitor services have been lost each year because of persistent staffing shortfalls, and the park may have to close a visitor center permanently in the coming year because of budget and staffing erosion. The park will take possession of the Panorama building at Thornton Gap in 2004, but will not receive funding to transform it into a year-round visitor center and CCC museum until 2006.

**RECOMMENDED ACTIONS: INTERPRETATION**

- Congress must help to eliminate the \$350,000 shortfall in interpretive funding. The erosion of the interpretation budget has serious implications for the park's ability to meet visitor demands.
- Congress must provide funding for eight full-time equivalent interpretive staff positions needed to carry out work under existing plans.
- Congress must provide funding beginning in 2004 to renovate the Panorama building.

*EXTERNAL SUPPORT—VOLUNTEERS AND PARTNERSHIPS MAKE VALUABLE CONTRIBUTIONS***Rating: 62**

Across the country, volunteers and national park partners make valuable contributions to the protection of park resources. At Shenandoah, volunteerism averages a remarkable 40,000 hours a year, and in years when the park is damaged by events such as hurricanes, volunteerism rises. In 2002, 518 volunteers—300 of them from the Potomac Appalachian Trail

Club—donated 41,735 hours of their time to the park, equating roughly to \$668,000 of service.

Volunteer activities range from interpretation, youth conservation, and trail maintenance to resource management and administrative duties. While the number of volunteers at Shenandoah is fewer than in some other national parks assessed by the State of the Parks® program, their productivity tends to be higher, averaging 80 hours per volunteer.

In addition to volunteers, Shenandoah maintains multiple long-term partnerships with many other organization and at least six universities. The partnerships focus on key issues and park needs such as falcon reintroduction and gypsy moth research, fish and wildlife monitoring, air quality, archaeological work, trail and hut maintenance, educational materials development and watershed acidification research.

Community outreach is a key component of building support for the park and to recruit volunteers and forming partnerships. Shenandoah staff work with park neighbors on several fronts. Senior managers routinely attend meetings of the Blue Ridge Committee, a group that consists of representatives from all the counties that surround the park, to work on issues such as park access and local tourism. The park employs teenagers through the Youth Conservation Corps during the summer and maintains a community service program for legal offenders.

Although members of Congress and other decision makers have supported specific pro-park initiatives, Shenandoah lacks the consistent, assertive champions needed to resolve the threats facing the park. Because of uncertain congressional support and the lack of a full-time volunteer program coordinator, the assessment rated external support at 62.

**RECOMMENDED ACTIONS: EXTERNAL SUPPORT**

- Congress must provide funding for a full-time volunteer coordinator to increase the effectiveness of park volunteers. Park advocacy groups and key decision makers at local, state, and federal levels must work together particularly on issues relating to air pollution, funding, and non-native species, and on other issues necessary to protect, restore, and enhance the park.
- Examine the possibility of working through partnerships and conservation easements on private lands to create ecological corridors linking Shenandoah National Park with neighboring protected areas.
- Continue community outreach activities, especially regarding issues of local planning and zoning.

## APPENDIX:



# STATE OF THE PARKS® ASSESSMENT PROCESS

To determine the condition of known natural and cultural resources at Shenandoah and other national parks, the National Parks Conservation Association developed a resource assessment and ratings process. It examines current resource conditions, evaluates the park staff's capacity to fully care for the resources, and forecasts likely conditions over the next ten years.

Researchers gather available information from a variety of sources in a number of critical categories. The Natural Resources rating reflects assessment of more than 120 discrete metrics associated with environmental quality, biotic health, and ecosystem integrity. Environmental quality and biotic health metrics (EBS) address air, water, soils, and climatic change conditions as well as their influences and human-related influences on plants and animals. Ecosystems measures (ESM) address the extent, species composition, and interrelationships of organisms with each other and the physical environment for indicator, representative or all terrestrial and freshwater communities. Each of the metrics is assigned a score of 1-3 based on the interpretation of extent, severity, and duration of impacting influences as regards the element. The total element scores for each category are divided by the total score possible and the percentage calculated becomes the rating. Element category scores are then rolled-up to produce the EBS, ESM, and Overall scores. In addition to producing a 0-100 scale score for each element category and roll-up categories of Environmental and Biotic Measures, Ecosystems Measures, and Overall, the assessment ratings also provide a "basis" for interpreting the adequacy of information upon which the element category or roll-up scores are based. This basis is also

reported on a 0-100 scale and reflects the extent to which information requirements for the assessment are met. The scores for cultural resources are determined based on the results of indicator questions that reflect the National Park Service's own Cultural Resource Management Guidelines and other Park Service resource management standards.

Indicators of stress and threats to resources are applied across each natural and cultural resource category to determine what their impacts will likely be over the next ten years. A checklist is used to derive a score based on the percentage of positive responses to questions posed about threats to existing resources. This enables a risk analysis to indicate whether resource conditions are likely to decline, remain the same, or improve. The impacts of threats to the park are also used to evaluate how resource conditions may change as a result of threats that are outside the control of park staff.

Stewardship capacity refers to the Park Service's ability to protect park resources. Information is collected and circulated to park staff and peer reviewers for analysis and to assign ratings. An overall average based on a 100-point scale is used to determine the ratings. An overall score is obtained by weighting the funding and staffing component at 40 percent, recognizing its critical importance, and the remaining three elements at 20 percent each.

For this report, researchers collected data and prepared a paper that summarized the results. The draft underwent peer review and was also reviewed by staff at Shenandoah National Park.\*

NPCA's State of the Parks Program represents the first time that such assessments have been undertaken for units of the National Park System. Comments on the program's methods are welcome.

\* This report does not address all of the information gleaned from the assessment process. Rather, it highlights current natural and cultural resource conditions in Shenandoah National Park and the threats that the National Park Service can most likely address to improve resource conditions into the future. For a copy of the full report, please visit [www.npca.org/stateoftheparks/](http://www.npca.org/stateoftheparks/) For more information about the ratings in this report, contact National Parks Conservation Association, State of the Parks® Program, P.O. Box 737, Fort Collins, CO 80522 Phone: 970-493-2545; Fax: 970-493-9164; E-mail: [stateoftheparks@npca.org](mailto:stateoftheparks@npca.org)

### DATA SOURCES FOR THIS REPORT\*

#### Commonwealth of Virginia

- Department of Natural Heritage
- Department of Conservation and Recreation
- Department of Environmental Quality
- Department of Forestry

#### U.S. Government

- Bureau of the Census
- Environmental Protection Agency
- National Oceanic and Atmospheric Administration
- National Atmospheric Deposition Program/National Trends Network
- U.S. Geological Survey

- U.S. National Park Service and Park Service staff at Shenandoah National Park

#### Other

- The National Trust for Historic Preservation
- Colonial Williamsburg Foundation
- University of Virginia
- Virginia Polytechnic Institute and State University
- James Madison University

\* Data from these sources were collected during visits to the park and from park publications, personal interviews, Internet resources, and literature reviews.

## ACKNOWLEDGMENT

NPCA thanks the staff at Shenandoah National Park who reviewed the factual accuracy of information used in this report. A special note of appreciation goes to those whose generous grants and donations made the report possible: The Gerald T. Halpin Conservation Fund, Ben and Ruth Hammett, and anonymous donors.

### STATE OF THE PARKS® ADVISORY COUNCIL

Bruce Judd, Chair  
*Architectural Resources Group*

Dr. Sylvia Earle  
*National Geographic Explorer-in-Residence*

Michael Finley  
*Turner Foundation*

Karl Komatsu  
*Komatsu Architecture*

Dr. Thomas Lovejoy  
*H. John Heinz III Center for Science, Economics, and the Environment*

Dr. Pamela Matson  
*Stanford University, Ecological Society of America*

Robert Melnick  
*University of Oregon*

Dr. Kenton Miller  
*World Resources Institute, World Commission on Protected Areas*

Dr. Douglas Muchoney  
*U.S. Geological Survey*

Dr. Douglas Schwartz  
*The School of American Research*

Dr. Lee Talbot  
*George Mason University*

W. Richard West  
*Smithsonian Institution/National Museum of the American Indian*

For more information about the  
**State of the Parks® Program**  
and this and other program reports, contact:

**National Parks Conservation Association  
State of the Parks® Program**  
P.O. Box 737  
Fort Collins, CO 80521  
Phone: 970-493-2545  
Fax: 970-493-9164  
E-mail: [stateoftheparks@npca.org](mailto:stateoftheparks@npca.org)  
Or visit us at [www.npca.org/stateoftheparks/](http://www.npca.org/stateoftheparks/)

Copyright 2003  
National Parks Conservation Association

Researcher: Quinn McKew  
Writer/editor: Deanne Kloepfer  
Design/layout: Pensare Design  
Photos: Laurence Parent and NPS

Printed on recycled paper