



# THE NEXT 100

## THE FUTURE OF NATIONAL PARKS

National parks face serious challenges. How can we help protect them for another century? Here's what you need to know and how you can help.

by DANIELLE TAYLOR

A little bit of magic happens each summer in Great Smoky Mountains National Park. In a handful of wooded areas in and around the park, one species of firefly puts on a fascinating show of synchronous flashing, with all of the male *Photinus carolinus* lightning bugs blinking on and off in unison. The mesmerizing phenomenon lasts each warm evening for maybe two weeks, then fades away until the following summer.

Unsurprisingly, the spectacle has attracted a lot of public attention, and what was once a little-known secret has become a major event for which thousands show up each year to witness the display. However, the magic may be threatened by the very people who come to revel in the fireflies' glory. With the park's largest and most consistent display happening in the popular Elkmont Campground, park officials have

taken measures to reduce visitor impact on these unique creatures. They've restricted auto transport to the area and implemented a ticketed shuttle service that limits the number of visitors each night. They require all flashlights to be covered with red or blue cellophane so visitors don't disrupt the fireflies' flash patterns. They also stress the importance of staying on trails to minimize foot traffic across the ground from which the insects emerge.

However, says Dana Soehn, public affairs representative for the park, "People want to go out in the middle of it all and surround themselves in the experience. They may not realize they might step on the fireflies and kill them before they have the chance to mate," threatening the rare insect's survival.

In the grand scheme of things, the continued existence of one species of firefly is hardly the National Park

Service's biggest priority, but this example is just one of many that show the challenges park staff face every day in their stewardship of America's public lands. Extrapolate this to the more than 84 million acres under the NPS umbrella managed by just 22,000 employees (many of whom are temporary or seasonal) and factor in additional threats like climate change, unavoidably deferred maintenance, rampant invasive species and more, and it's a wonder America's Best Idea has survived as long as it has.

### LOOKING BACK

On August 25, 1916, President Herbert Hoover signed the National Park Service Organic Act, creating the National Park Service as a new bureau under the Department of the Interior. This year, we celebrate the 100th anniversary of the National Park Service's creation and reflect

photo by STEVEN McBRIDE

on how far America has come in the protection and advancement of public lands. Furthermore, we recognize the precedent set for the rest of the world. Yellowstone, established nearly 50 years before the National Park Service in 1872, was the world's very first national park. Now, more than 100 nations oversee roughly 1,200 national parks or their equivalent. The 1916 act that created the U.S. park service initially protected 35 national parks and monuments. Today, our national parks system manages 410 sites in all 50 states and the District of Columbia as well as American territories around the world. Last year, 305 million visitors came to national parks in the United States.

But at this pivotal moment, while looking back at the accomplishments that got us here, the park service also looks ahead at the challenges



of the future. So should we as the Americans who have collectively inherited this incredible backyard of shared riches.

Threats encroach on the parks from every angle, from climate change physically affecting the landscape of the parks to disease-carrying animals lurking just outside the borders to political shifts of the wind that deprioritize public lands come budget time. However, as voters, consumers, business people and users of the parks, we have significant power to make positive change for the next 100 years and beyond.

## COMBATING CLIMATE CHANGE

According to the National Park Service web site, “Responding to climate change is the greatest challenge facing the National Park Service today.” Nowhere is this more evident than in Glacier National Park in northern Montana. In 1850, the park’s current area contained approximately 150 glaciers. Today, only 25 shrunken glaciers remain, and scientists predict the park’s last glaciers in the park will be gone in less than 15 years due to increased atmospheric warming. Climate change has also caused long-standing park facilities in Alaska to sink due to thawing permafrost, and increased temperatures out west have caused recent wildfire seasons to last longer than ever before. Furthermore, sea level rise due to melting polar ice and thermal expansion threatens the very existence of many low-lying coastal national park sites, such as Assateague Island National Seashore. The list goes on.

Last April, President Barack Obama visited Everglades National Park in Florida and spoke on the issue of global warming. “Here in the Everglades, you can see the effect of a changing climate. As sea levels rise, salty water from the ocean flows inward. And this harms freshwater wildlife, which endangers

a fragile ecosystem. The saltwater flows into aquifers, which threatens the drinking water of more than 7 million Floridians ... In places like this...you do not have time to deny the effects of climate change.”

In Shenandoah National Park, park officials confirm climate change poses the biggest ongoing threat to the park. Researchers have documented continued increases in stream temperatures, and they’ve witnessed habitat shifts of animal species that are particularly sensitive to surrounding conditions.

Sally Hurlbert, an interpretive park ranger and acting management assistant at Shenandoah, notes that park salamanders serve as indicator species for climate change. Data indicates that the endangered Shenandoah salamander, which only lives inside the borders of the park at elevations of 2,500 feet or higher, is retreating to the highest mountain peaks in search of cooler climes that support their specific habitat needs.

“Eventually,” Hurlbert says, “they’ll run out of places to go and won’t be able to survive the changing conditions.” The potential loss of this one animal would by itself have a ripple effect on the Shenandoah ecosystem, but it would only be a precursor to many more negative changes to come.

Increased warming also poses significant problems for Great Smoky Mountains National Park, which gets most of its vital 55 to 85 inches of rain each year in the form of a fine mist. As temperatures rise, more of this mist will evaporate before reaching the ground, significantly reducing critical moisture levels throughout the park that sustain plant and animal life. Diminished rainfall throughout the Smokies also threatens the water supply source for much of North and South Carolina, Tennessee and Georgia. Furthermore, increased temperatures and reduced streamflows endanger the survival of many fish species in the area, which provide vital food sources for many animals through the park.

## THREATS TO PLANTS

Climate change likely also contributes to a biological threat within the park. Hemlock wooly adelgids, which have killed 95 percent of Shenandoah’s hemlock trees since 1988, can’t tolerate deep freezes, but the park’s recent series of mild winters have allowed more insects to survive. A 2009 study by the U.S. Forest Service found that the accelerated pace with which hemlock wooly adelgids kill trees in southern Appalachia rapidly alters the carbon cycles of the damaged forests and drastically reduces their critical ability to absorb atmospheric carbon.

The hemlock wooly adelgid and its cousin, the balsam wooly adelgid, posed the largest insect threats to Shenandoah and Great Smoky Mountains National Parks in the 20th century and continue to kill trees. But today, the ruinous emerald ash borer looms as one of the scariest threats. Shenandoah biologists just confirmed its presence in 2013 after several years of efforts to prevent its arrival, but so far, Great Smoky Mountains National Park has largely kept the insect at bay. Last year, Smokies officials implemented a strict ban on any incoming firewood that hadn’t been heat-treated to kill any burrowing insects. Unfortunately, Great Smoky Mountains National Park has fallen victim to the highly destructive Asian longhorn beetle, which infests more than 30 host tree species.

In addition to insect species endangering plants, non-native plant species have also disrupted the natural ecosystem and displaced native species that now have to fight for survival. In Shenandoah, wavyleaf basketgrass, ornamental stiltgrass, and mile-a-minute weed choke out other native ground-level plants, and oriental bittersweet vines strangle to death the host trees they climb. Fast-growing princess trees and trees of heaven also inhibit the growth of other plants. In the Smokies, roughly



300 of the park’s 1500 flowering species aren’t native to the area. Here, kudzu, princess trees, mimosas, and garlic mustard edge out native species.

“The threats we’re faced with now, you can’t avoid them just by drawing a park boundary on the map,” says Soehn. “These invasive species are windblown, they’re animal-carried, they come in on firewood.” Hurlbert adds that even long-distance hikers on the Appalachian Trail may unintentionally transport seeds that stick to their clothes and packs, spreading destructive species up and down the Appalachian corridor.

## THREATS TO ANIMALS

In the Smokies, feral hogs create the most destruction as they root through vulnerable landscapes and eat just about everything they come across, including a number of endangered species like the Jordan’s salamander. Rainbow and brown trout in both the Smokies and Shenandoah National Park threaten native brook trout. These fish and swine alike were introduced in the early 1900s as game for sportsmen, but they’ve overrun their habitats.

Acid rain, caused by air pollution from coal-fired power plants to the west, strongly alters the pH levels in the rivers and soils of both parks, threatening salamanders, fish, and other vulnerable species. During part of the growing season in the Smokies, clouds enveloping high-elevation forests have pH levels as low as 2.0, the same acidity level as lemon juice. Acidified streams influence fish diversity, killing less-hardy species and harming those that can survive.

Furthermore, diseases affecting



animals in and around the parks, such as the white-nose fungus now plaguing bats in the eastern U.S., have caused mass die-offs and complicated recreational access in certain areas, creating a new set of problems for park officials. White-nose syndrome, first discovered in New York during the winter of 2006-2007, has now spread to nearly all eastern U.S. states and Canadian provinces. The U.S. Fish and Wildlife Service estimates roughly six million bats have died so far, and some caves have experienced mortality rates of 100 percent. Humans can inadvertently carry the disease from one cave to another or disrupt roosting infected bats with their presence, causing the bats to flee to other caves and worsen the spread. In response, many eastern caves and mines, including caves in Great Smoky Mountains National Park's Cades Cove area and mines in the park's White Oaks Valley, have been permanently closed for recreation.

Near Shenandoah, chronic wasting disease has been observed in deer within 10 miles of the park. This neurological condition greatly resembles mad-cow disease and causes starvation and altered behavior in deer, ultimately hastening their death. It spreads through contact, making high-density deer areas like Big Meadows especially susceptible to transmission once infected deer arrive there. If they are detected within five miles of the park, officials may be forced to enact a lethal culling to protect animals within the park's boundaries.

## FUNDING CHALLENGES

In addition to forces threatening the parks' natural landscape, budgetary restrictions limit park employees' abilities to properly manage the natural resources and park facilities for which they are held responsible. The NPS inventory totals more than 70,000 individual facility assets such as visitor centers, bridges and trails,

and virtually every park has projects that have been delayed due to lack of funding. In early February, the agency reported a FY 2015 deferred maintenance backlog of \$11.93 billion.

Leesa Brandon, public information officer for the Blue Ridge Parkway, cites deferred maintenance as the parkway's most significant problem, and for good reason—2015 statistics calculate more than \$516.6 million in deferred maintenance for this single park unit, more than four percent of the systemwide total. With nearly 3,000 asset locations ranging from trails to wastewater systems along the 469-mile route, there's a lot to maintain, especially considering that many original structures have been in place for more than 80 years.

In addition to fixing potholes, replacing crumbling picnic tables and making building repairs, park staff work with arborists to address view obstructions and clear trees blocking the beautiful vistas so critical to the parkway experience.

To complicate matters for parks nationwide, funding systems already in place have been endangered by political gridlock. Last year, Congress allowed the 50-year-old Land and Water Conservation Fund (LWCF) to expire for the first time in its history, jeopardizing the thousands of outdoor recreation projects that depend on it for financial support. This program, which enjoys wide bipartisan approval, is funded by offshore oil and gas drilling revenues, not taxpayer dollars, and it has been used to protect more than 2.2 million acres of National Park Service land since 1965.

Fortunately, Congress temporarily reauthorized LWCF last December, protecting it for three more years. But even with that victory, the program still suffers from chronic underfunding. Only twice in 50 years has Congress fully funded LWCF at its promised level, and in recent years, the program has only received about .....

photo by WILL MILFORD





one-third of the funding Congress said it would allocate.

## DIRECT HUMAN IMPACTS

While balancing all of the complications listed above, park staff must also deal with the challenges of increased visitation. With a record 305 million visitors in 2015 and more expected for this Centennial year, this is a good trend for public engagement and education in the parks, but it's nevertheless one that comes with stresses of its own related to properly managing the resulting human impacts.

One of the National Park Service's top goals is to help connect visitors to the natural environment, which sometimes involves making tough decisions. The Smokies' firefly showcases a regular dilemma park employees have to weigh. Do they take advantage of an exciting natural occurrence to help engage visitors with the wonders of the park at the possible expense of future generations being able to enjoy the phenomenon as well, or do they cordon off the area and protect the fireflies by removing as much human interference as possible? Questions like this go to the heart of the preservation vs. conservation debate, and the right answers aren't always easy to determine.

"The park service is trying to get the next generation and a more diverse group of people interested in the park, so increased visitation is great, but it's hard to reach everyone to share the value of the park," says Maggie Blake, an interpretive ranger in Great Smoky Mountains National Park. Furthermore, the low staff-to-visitor ratio makes it difficult to ensure park visitors get vital information. "People don't realize they're bringing in invasives, like in infested firewood," says Blake, "and they might not understand the effects of things like littering and going off-trail."

In Shenandoah, human impacts

on the popular Old Rag trail have made park officials consider restricting access.

"Lots of people just aren't being good stewards on Old Rag," says Hurlbert. "Some hikers leave trash and trample plants. We've considered limiting people on the trail via a permitting system in an effort to preserve and protect the environment." She notes that the park has had to close off other areas to protect some rare species on rock outcrops, and while the decision to ban humans from enjoying part of their park wasn't ideal, the results are undeniable—plant species protected by this measure have bounced back. Limiting access on Old Rag may be the best way to preserve the trail for a long future.

## WHAT YOU CAN DO

The above list of threats may seem insurmountable, but you can do a lot to respond to these challenges. Plenty of organizations aid the parks, and individual efforts can really add up.

First and foremost, "COME to the parks!" urges Hurlbert. In the Smokies, Soehn concurs. "We're trying to develop users to be supporters and advocates," she says. "We want people to know us better and see a connection to the Smokies, and we want to engage people in the full system of public lands."

When you visit, make an effort to reduce your footprint and impact. You can help limit the spread of invasive species by cleaning footwear, clothing, and recreational gear between visits to different areas. Familiarize yourself with Leave No Trace principles (Int.org), and take the "take only pictures, leave only footprints" motto to heart. Pack out any trash you pack in, stay on trails, and be respectful



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of other humans and wildlife also enjoying the parks. Also, respect rules like firewood restrictions, which are measures put in place to ensure your continued enjoyment of the parks for years to come.

If you enjoy giving back of your time and talents, consider volunteering. “We have lots of weeds to pull!” says Hurlbert. The Volunteers-in-Parks program connects roughly 221,000 Americans each year with critical park programs where they can help. Volunteers contribute as trail maintenance crews, invasive species surveyors, visitor center assistants, campground hosts and more. Best of all, volunteers who record 250 hours of service can earn a free pass to more than 2,000 federal recreation sites.

If you want to support the parks from the comfort of your home, consider writing to your congressional representatives to stress your support as a constituent for the parks. Often, public lands needs get lost in the mix of all the other concerns elected officials have to weigh, so voter feedback and advocacy help them prioritize.

“We need to help decision-makers understand how valuable and important these parks are to all,” says Fran Mainella, director of the National Park Service from 2001 to 2006. Funding is always an issue as we never have enough dollars to do all that is needed, but the relevancy issue is most important. Only if our parks are meaningful and relevant to all will that support happen.”

Financially, you can support the parks by joining or donating to affiliated nonprofit groups like the Friends of the Blue Ridge Parkway, the Shenandoah National Park Trust, Friends of the Great Smoky Mountains, and other organizations that aid the protection and preservation of the parks by raising funds and public awareness and providing volunteers. As Congressional funding for national parks has decreased, these public-private partnerships have become essential.



You can also contribute financially to the parks by ordering a park license plate, which showcases your park support to other drivers and collectively raises millions for park initiatives in each state. Additionally, patronizing private businesses that help pay for park programs and operations trickles down to park improvements.

Perhaps the most important thing you can do to support the parks is to bring your kids to experience them. It seems simple, but fun weekend trips spent wading through rivers and camping in the woods are the best way to help instill an early conservation ethic and appreciation for nature in the next generation of park stewards. Think back to the experiences that got you hooked on nature, and open up those opportunities for your children, nieces and nephews, students and more. More than anything else, this will help ensure public lands remain relevant and important assets for years to come.

## A BRIGHT FUTURE

Despite the challenges, there's plenty of hope for the National Park Service's second 100 years and beyond. As more and more people engage with the parks and learn how to support them, we create more and more public land stewards for the future who will preserve the legacy we'll leave. On a regional scale, even small efforts can ensure habitat conditions in which plants and animals will thrive.

And for two weeks each summer at a campground in the Smokies, our thoughtful care can help preserve the quiet magic of a forest full of fireflies, together flashing in a united effort to continue inspiring us for many generations to come. 🌿



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