

**Toward A Strong Clean Air in the Parks Rule:
Restoring Clean Air to the Northeast's National Parks and Wilderness Areas**



**Appalachian Mountain Club
Boston, Massachusetts
April 2004**

Toward A Strong Clean Air in the Parks Rule: Restoring Clean Air to the Northeast's National Parks and Wilderness Areas

The Environmental Protection Agency is set to release a proposal by April 15 that will impact several national parks and wilderness areas in the Northeast and across the nation. Known as the Clean Air in the Parks rule (also known as the Best Available Retrofit Technology (BART) rule) this measure is intended to reduce air pollution in certain Class I Federal Areas, including certain National Parks, designated Wilderness areas and National Wildlife Refuges.

The Appalachian Mountain Club has conducted clean air research in the White Mountains of New Hampshire since 1985, and provides air quality data to the U.S. EPA, U.S. Forest Service and State of New Hampshire. The AMC has also organized a grass-roots network of volunteers who monitor visibility in wilderness areas in the Northeast. As the nation's oldest outdoor recreation and conservation organization, with more than 90,000 members and 12 chapters from Maine to Washington, D.C., we call for the immediate implementation of a strong BART rule to clean the air in our national parks and wilderness areas.

The Clean Air in the Parks Rule: What's at Stake

In the Northeast, air quality in popular recreation destinations such as Shenandoah National Park, Acadia National Park, the Lye Brook Wilderness Area in the Green Mountain National Forest, the Brigantine Wilderness in the Edwin B. Forsythe National Wildlife Refuge, and the Great Gulf Wilderness Area in the White Mountain National Forest will be directly affected by EPA's action. Data from AMC's research, as well as public sources, show that air quality in Acadia National Park and the Great Gulf Wilderness can be as dirty as that found in such urban centers as New York and Philadelphia.

Dirty air is a problem in places we wouldn't expect to find it—on remote mountaintops and in natural areas that people rely on for outdoor recreation. Air pollution such as regional haze has a direct impact on the outdoor experience by obliterating scenic views. It also has detrimental effects on human health and the health of the region's forests.

An AMC study on people's attitudes toward the loss of scenic views due to air pollution indicates that continued pollution may translate into economic losses for tourism-dependent regions. AMC's research also shows that ground-level ozone pollution can negatively impact the health of hikers even at levels below the current EPA standard.

It has been 27 years since Congress mandated, in the 1977 amendments to the Clean Air Act, "the prevention of any future, and the remedying of any existing, impairment to visibility" in 156 national parks, wilderness areas and national wildlife refuges. Little progress has been made in returning these natural areas to pristine, natural visibility. We encourage EPA to issue a strong BART rule and to implement meaningful changes to clean the air in our parks now.

Why the issue is urgent for the Northeast

Visibility is reduced when certain gases and fine particulate matter in the air cause haze. Some particulates are naturally occurring, such as dust, certain types of organic carbon, and smoke from forest fires. Others originate from human activity, particularly fine particle nitrates, often the result of automobile and power plant emissions; and fine particle sulfates, largely the result of emissions from coal-fired power generation plants. While much of the haze experienced in the western United States is due to dust and nitrates, in the eastern U.S. over 70 percent of the reduction in visibility can be traced to sulfates. These sulfates are created when power plants located as far away as the Midwestern United States emit sulfur dioxide that reacts in the atmosphere and is blown into our region on prevailing winds. These pollutants, often associated with urbanized areas, are all too common in the mountains and the backcountry areas many Americans seek out for quiet recreation and to escape the dirty air in our cities and suburban areas.

The problem of haze in the Northeast is exacerbated by the high humidity experienced in the summer months. During periods of high humidity, nitrate and sulfate particles can expand more than three times in size, increasing haze further and reducing visibility during times of peak recreational use of our public lands.

Throughout our region, 90-mile views are routinely cut to 40 miles or less by particulate-induced haze. Annual visibility averages about 22 miles in Shenandoah National Park—or less than 20 percent of the approximate 115-mile vistas that could be expected under natural conditions, according to the National Park Service. And Acadia National Park on the coast of Maine, long one of the nation’s favorite vacation destinations, is home to some of the dirtiest air in the country, due to its extreme East Coast location, at the end of the line, so to speak, for windblown pollutants.

On the poorest visibility days in the Northeast, haze suspended in the air is comprised mostly of sulfate aerosols that largely originate from sulfur dioxide emissions. Using summary Interagency Monitoring of Protected Visual Environments (IMPROVE) data for 2002 from the Visibility Information Exchange Web Site (VIEWS),¹ Table 1 shows the degree to which sulfate aerosols contribute to light extinction caused by total aerosols on the worst visibility days.

Table 1. Percent ammonium sulfate aerosol contributes to total aerosol light extinction on the 20% Worst Visibility days for Northeast Class I areas in 2002.

Class I area	Percent of Visibility Loss due to Sulfate Particles
Moosehorn National Wildlife Refuge, Me.	74%
Acadia National Park, Me.	73%
Great Gulf Wilderness, N.H.	78%
Lye Brook Wilderness, Vt. (2001; 2002 data not available)	79%

¹ <http://vista.cira.colostate.edu/views/Default.htm>

The term “regional” haze is used because pollution can travel from many sources, many miles away, to impact a Class I area. It is widely accepted that sulfur dioxide and sulfate can travel hundreds of miles before being removed from the atmosphere. Sulfur dioxide, and subsequent sulfate aerosol formation, is still the major cause of visibility impairment.

Sulfur dioxide emissions also impact the region’s air, soils, and water. While the Clean Air Act amendments of 1990 have led to decreases in sulfur dioxide emissions and subsequent the formation of sulfate aerosols and acid rain, greater reductions are needed for forests and soils to recover and for full visibility improvement as laid out in the Clean Air Act visibility protection program.

A recent summary by Driscoll et al. (2001)² compiles the body of scientific evidence that acid deposition continues to damage forested ecosystems across the Northeast on many levels, including declines in the health of sugar maple and red spruce stands, the death of aquatic organisms, and poor water quality in streams and lakes. Poor forest health and reduced water quality further degrade the recreational experience for visitors in the Northeast’s national parks and wilderness areas.

Of specific concern to AMC are high-elevation ecosystems, such as those found along the Appalachian mountain chain. Montane ecosystems contain fragile and unique vegetation communities and yet are receiving greater doses of pollution than vegetation at lower elevations. Atmospheric deposition rates increase with elevation, and cloud deposition becomes significant above 1000 meters³. AMC has collected cloud water and rainwater deposited near the summit of Mount Washington in the White Mountains of New Hampshire and found it is very acidic, with a pH equal to that of vinegar. The main cause of that acidity is sulfate and nitrate compounds. Heavy loading of these pollutants will often result in acidification of soils, and adversely affects vegetation and aquatic systems across the landscape. Class I areas such as the Great Gulf and Presidential/Dry River wilderness areas in New Hampshire contain unique alpine vegetation as well as high-elevation streams and lakes that are more heavily impacted by air pollution than locations at lower elevations.

The Northeast’s national parks and Wilderness areas are in great demand by citizens in the East’s major population centers. Given the concentration of population in the Northeast, its parks and Wilderness areas receive heavy use. (According to the U.S. Forest Service, the White Mountain National Forest, which includes the Great Gulf Wilderness, lies within a day’s drive of more than one-quarter of the nation’s population.) It is especially ironic that these highly valued national parks and Wilderness areas suffer from their location downwind of major industrial polluters.

² Driscoll CT, Lawrence GB, Bulger AJ, Butler TJ, Cronan CS, Eagar C, Lambert KF, Likens GE, Stoddard JL, Weathers KC. 2001. Acidic deposition in the northeastern United States: sources and inputs, ecosystem effects, and management strategies. *BioScience* 51(3): 180-198.

³ Weathers KC, Lovett GM, Likens GE, Lathrop R. 2000. The effect of landscape features on deposition to Hunter Mountain, Catskill Mountains, New York. *Ecological Applications* 10(2): 528-540.

The opportunity

The Environmental Protection Agency will soon issue a proposal to reduce air pollution in certain Class I federal areas that include specific national parks and Congressionally designated Wilderness Areas in our region, including Acadia National Park, the Great Gulf Wilderness Area in New Hampshire's White Mountains, Lye Brook Wilderness Area in Vermont's Green Mountain National Forest, the Brigantine Wilderness in the Edwin B. Forsythe National Wildlife Refuge, and Shenandoah National Park. This proposal is called the Clean Air in the Parks (or Best Available Retrofit Technology (BART)) Rule.

These are the places our nation's citizens seek out for natural beauty, solitude, and recreation. These public lands were created for these purposes. We must reverse the damage caused by air pollution and the resulting degradation of the outdoor experience in these special places.

There is good news: The Clean Air Act amendments adopted by Congress in 1977 set a goal of "the prevention of any future and the remedying of any existing impairment of visibility" in 48 national parks and 108 Wilderness areas and national wildlife refuges nationwide.

To that end, EPA has gathered voluminous data on the effects of air pollution in our region and began enforcement of this section of the Clean Air Act with the publication of the Regional Haze Rule in 1999. However, this rule will not be fully implemented until the Clean Air in the Parks Rule is finalized. The Clean Air in the Parks rule provides the mechanism to bring about the restoration of pristine air quality in Class I federal areas (including Acadia National Park and the White Mountain National Forest's Great Gulf Wilderness Area) within 60 years.

EPA is required to issue a draft rule by April 15, 2004. The agency will accept comments from the public for a 30- or 60-day period from the inclusion of the draft rule in the Federal Register.

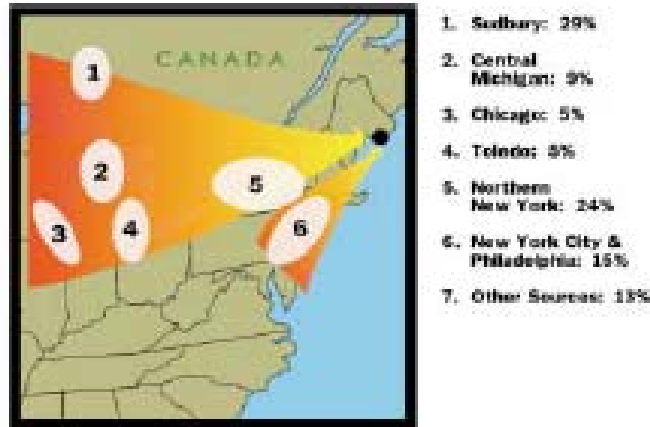
Case Study: Acadia National Park

With its rocky, wave-crashed shore and its well-developed network of hiking and cycling trails, Acadia National Park draws more than 2 million visitors per year. Few are aware that air in this remote, coastal location is often laden with large quantities of man-made pollution, carried on prevailing winds from industrial corridors to the south and west. It has often been said that Acadia is in the unfortunate location of being "the nation's tailpipe."

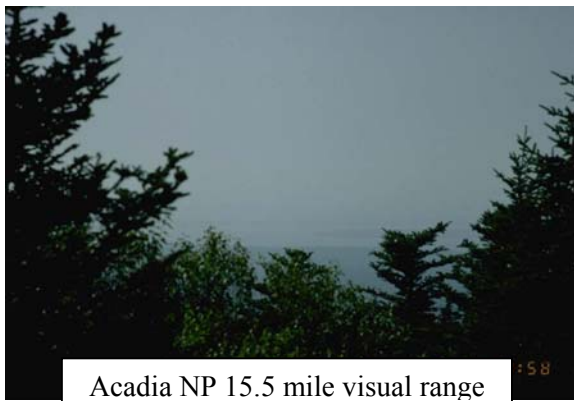
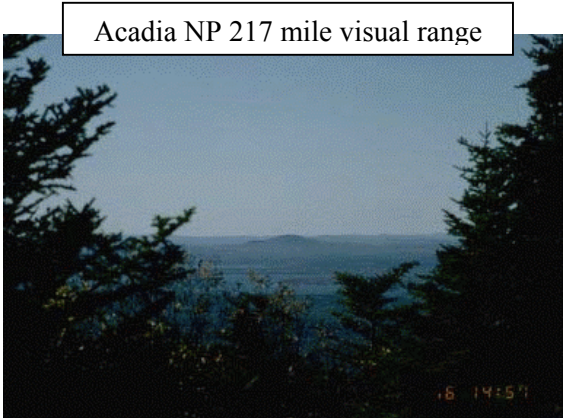
The meteorology of the area plays a large role, especially in the summertime. Dominant westerly flows laden with humid, polluted air travel from the Midwest over the eastern states, accumulating more pollution along the way. When this dirty air reaches the Atlantic Ocean, it is often diverted up the coastline. William Malm reported in 1990 that haze pollution reaching Acadia traveled from as far away as Sudbury, Canada, the

Midwestern United States, and the New York City/Philadelphia region. More recent analysis has demonstrated that these areas still contribute large quantities of sulfate and nitrate aerosols that impair views.

Sources of Sulfate Arriving at Acadia National Park (from William C. Malm, Air Resources Division, National Park Service, "Introduction to Visibility")



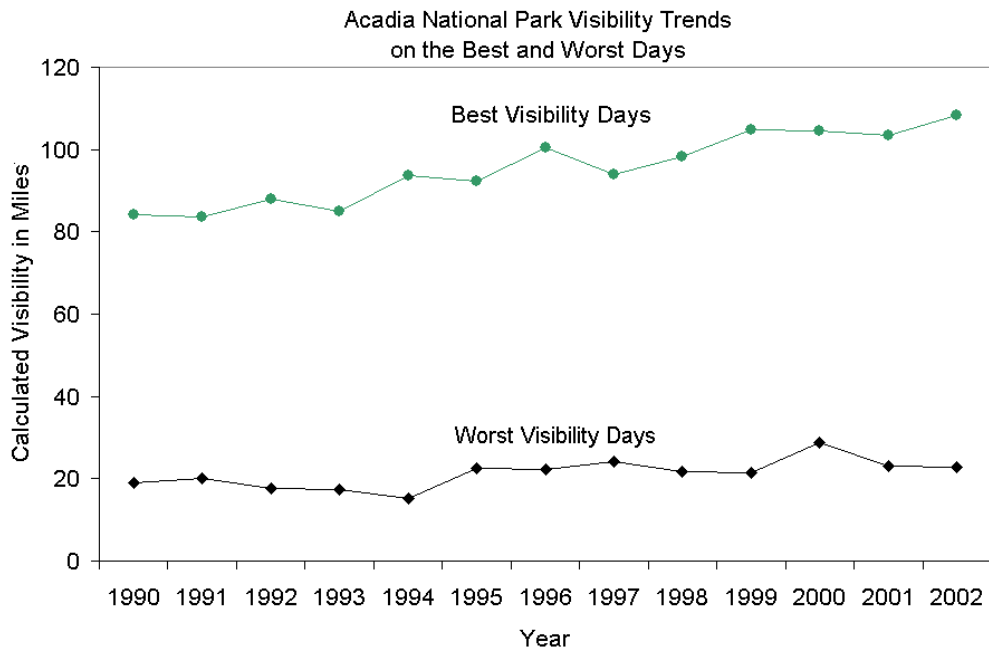
Views from Acadia National Park reach up to 217 miles on the clearest days. Photographic visibility documentation has been conducted in the park since 1983 by the National Park Service and is included in the IMPROVE network. The Clean Air



Act requires that there be no degradation from the best visibility days and improvement in the worst visibility days in Class I areas. While views can reach beyond 200 miles, average natural visibility at Acadia is estimated at 110 miles. However, on the most worst days

air pollution can reduce visibility to 20 miles or less (see: NPCA fact sheet for Acadia http://www.npca.org/across_the_nation/visitor_experience/code_red/fact_sheets/acadia.asp)

The Regional Haze Rule provides a method to calculate and track progress on the best and worst days. The graph below shows the trend of best and worst visibility days through time at Acadia National Park.

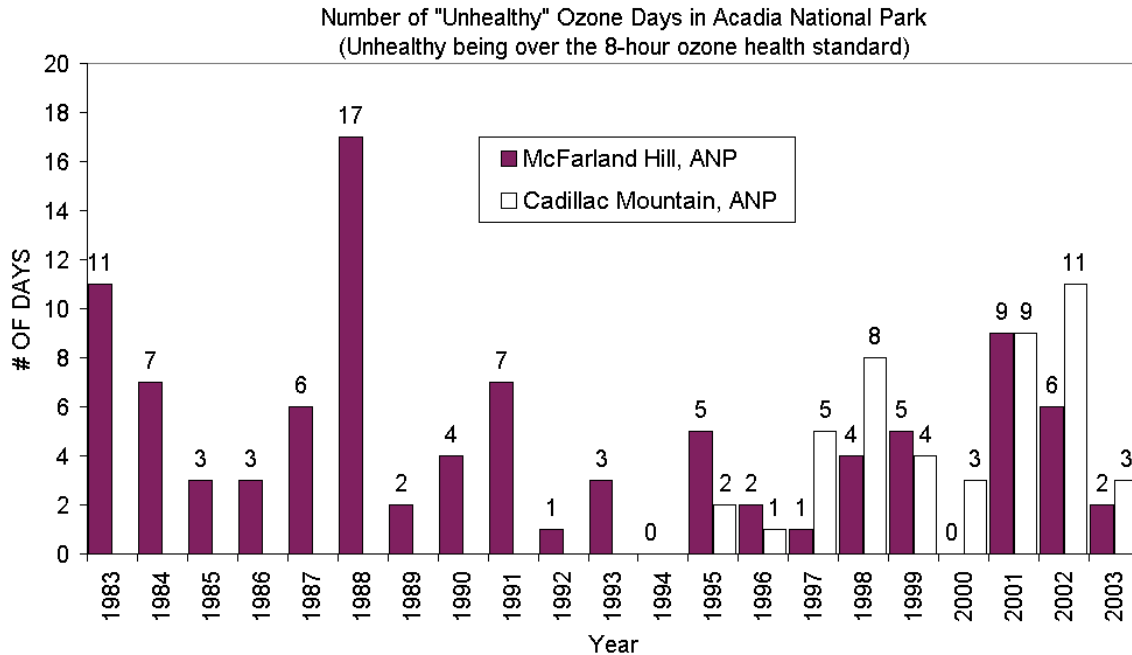


* Based on reconstructed aerosol extinction measured by IMPROVE and the NPS.

While it is heartening that visibility, in miles, is improving as shown in the graph above, on the worst visibility day at Acadia, the progress since 1995 has been limited. The Regional Haze Rule guidance for making reasonable progress toward natural visibility levels requires that improvement of 7-9 miles visibility on the worst days be made per decade, starting in 2008. From 1992 to 2002, visibility on the worst days at Acadia improved by 5.2 miles. Additional improvement will be critical to achieving the EPA goal of natural visibility levels by 2064.

The same nitrogen oxide compounds that form particulate pollution also can react with organic compounds in the presence of sunlight, resulting in ground-level ozone. While ozone in the upper atmosphere protects the Earth from ultraviolet rays, at ground level, ozone, like particulates, impacts human health and the environment.

Despite its natural riches, and its popularity as a recreation destination, Acadia National Park has experienced summer days in violation of EPA's 8-hour ozone standard. (See: <http://www2.nature.nps.gov/air/monitoring/exceed.htm>). The below graph shows the number of unhealthy ozone days experienced at the park through time. The longest record is shown for McFarland Hill. In 1995 the National Park Service began monitoring ozone on Cadillac Mountain.



This April, EPA is set to announce counties in “non-attainment” of meeting EPA’s 8-hour health standard for ozone. Maine’s Hancock County, in which Acadia National Park is located, is expected to be among those counties in non-attainment of that standard.

Local efforts have been made to reduce air pollution in the park, and propane-fueled buses now shuttle visitors around the park. This is a laudable effort. However, the majority of Acadia’s air troubles are not locally produced; they are part of a filthy brew concocted far away and blown in on the wind.

Case study: AMC’s Research on Visibility in the Great Gulf Wilderness

The AMC was instrumental in the creation of the White Mountain National Forest through its support of the Weeks Act of 1911, which established the eastern national forest system. Today, an estimated 7 million people per year visit the White Mountain National Forest, more than the number who visit Yellowstone and Yosemite national parks combined.

Located within a day’s drive of more than one-quarter of the nation’s population, the forest provides a destination for those seeking quiet recreation in the outdoors. Within the WMNF are a number of congressionally designated Wilderness areas, among them, the Great Gulf Wilderness Area, which will be affected by the Clean Air in the Parks rule.

With establishment of the Wilderness Act of 1964, Congress decreed that a designated Wilderness area is to be “an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain.” Further, the act specifies that Wilderness is to be “an area of undeveloped Federal land retaining its

primeval character and influence...which is protected and managed so as to preserve its natural conditions.” A Wilderness area, according to the act, “generally appears to have been affected primarily by the forces of nature, with the imprint of man’s work substantially unnoticeable.”

Today, one can hike, camp, swim, ski, and fish in the Great Gulf Wilderness, but often the experience is marred by air so dirty that surrounding peaks cannot be discerned. With an elevation of 6288 feet, New Hampshire’s Mount Washington is the highest peak in the Northeastern United States. The mountain lies just one-half mile outside of the Great Gulf Wilderness Area, From its summit, New York’s Adirondack Mountains can be seen as far as 130 miles away on a clear day, while on a hazy day, visibility can be reduced to less than 15 miles.

IMPROVE data similar to the above visibility trend for Acadia National Park is available for the Great Gulf Wilderness Area in 2001 and 2002. Year ’round sampling at this site did not begin until 2001. Table 2 shows the values.

Table 2. IMPROVE summary data for Great Gulf Wilderness visibility in miles as calculated from reconstructed aerosol light extinction.

Year	Best days	Average Days	Worst Days
2001	108	65	23
2002	114	71	20

The U.S.Forest Service has conducted air quality studies in the Great Gulf since autumn 1985. Photographs taken when the air was clear, when compared with photographs taken when the region was bathed in polluted haze, show that more than majestic vistas are lost due to air pollution. The Wilderness experience itself is compromised when scenic views are obliterated and Wilderness visitors are forced to breathe dirty air. The hand of man is indeed evident on these occasions, even if the once-majestic vistas are not.



View of Great Gulf Wilderness Area. Left image shows 121-mile visibility; right image shows 6-mile visibility. Photos from the U.S. Forest Service archive (<http://www.fsvisimages.com/gallery/GRGU/start.htm>)

The AMC and its partners are gathering extensive data on haze and visibility conditions in the White Mountains, as well as the composition of haze pollutants, and how these two factors are related. Visibility monitoring in the Great Gulf Wilderness Area was initiated in September 1985 with the installation of a visibility camera at the AMC's Camp Dodge facility. Camp Dodge looks out on the Great Gulf, which lies about one and a half miles to the west. The Great Gulf was designated as a "Class 1 airshed" in the 1977 amendments to the Clean Air Act. As such, the goal for this area is "the prevention of any future, and the remedy of any existing, impairment of visibility from manmade air pollution."

In addition, since 1988, the AMC has been monitoring the concentration and composition of fine particles in the air at Lakes of the Clouds Hut and Camp Dodge. Researchers measure the concentration of small particles in the air using a "particle monitor" known as a Harvard Impactor. Particles are collected on a pre-weighed filter using a small air pump over a 24-hour period. The filter is then weighed and chemically analyzed to determine how much and what types of particulate matter were in the air sample.

AMC has also performed attitudinal research to gauge at what point forest visitors consider haze levels acceptable or unacceptable. AMC surveyed visitors at the Tuckerman Ravine trailhead in Pinkham Notch and at the Mount Washington Observatory on the summit of the mountain. They were shown photographs of Mount Jefferson, across the Great Gulf, taken during times of varying air pollution levels and varying visibility. This research showed that visitors considered a view of less than 33

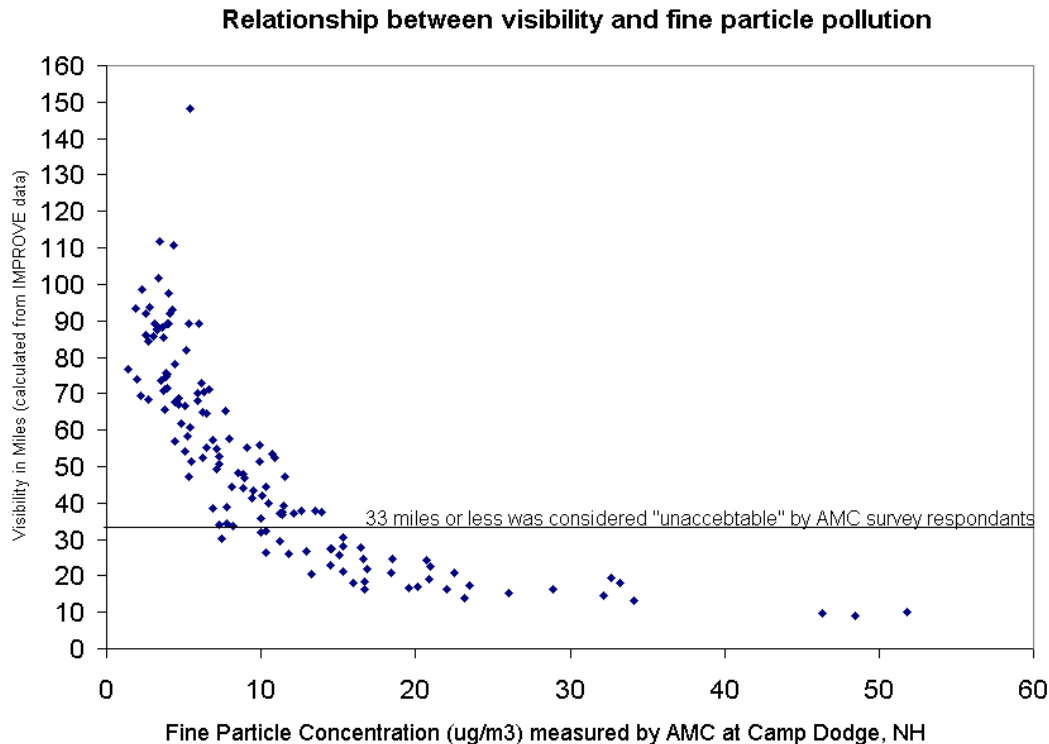


Great Gulf Wilderness vista with 33-mile visibility

miles unacceptable. The study states that further research should be performed, using various vistas at various depths.

In addition to the detrimental effects of haze on human health and the environment, research indicates the loss of scenic vistas due to haze can also be expected to have a detrimental effect on local economies. As the views that attract travelers disappear behind

haze, fewer travelers can be expected to visit the areas most famous for their views. This could negatively impact tourism-dependent communities, such as the White Mountains, the Shenandoahs, and the coast of Maine.



The graph above shows the relationship between fine particle concentration in the air on the X-axis, and visibility in miles on the Y-axis. Initially, as the number of fine particles increase from near zero to approximately 10 ug/m³, visibility dramatically declines. At a constant concentration of particles, differences in visibility can occur in relation to relative humidity.

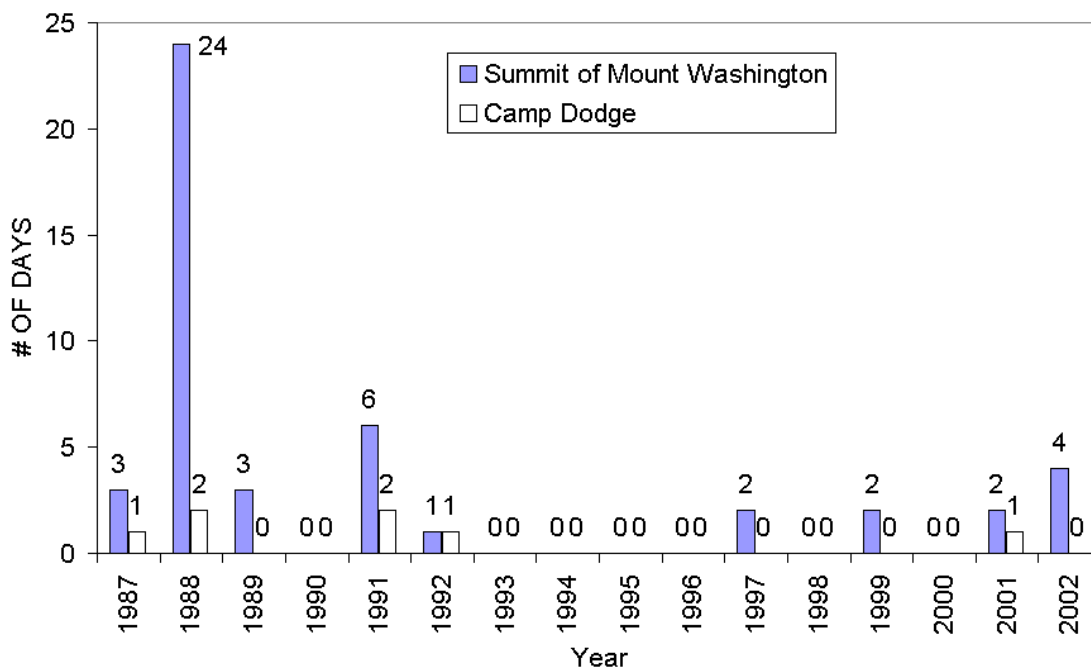
Additional AMC Research on Air Quality in the White Mountains

Since the early 1980s, the Appalachian Mountain Club has monitored pollutants in cloud water shrouding the higher elevations of New Hampshire's Mount Washington, the tallest peak in the Northeastern United States. At Lakes of the Clouds, at an elevation of 5050 feet, our instruments commonly record pH in cloudwater that is as acidic as vinegar, and, on rare occasions, as acidic as lemon juice.

AMC has also performed original research on the health effects of ground-level ozone, focusing on the impacts on hikers. Our studies, performed in conjunction with Brigham and Women's Hospital and the Harvard School for Public Health, indicate that the lung function of healthy adult hikers is impaired by ambient ozone levels that are even *lower* than the level deemed acceptable by the EPA. *See study data at:*

<http://ehp.niehs.nih.gov/docs/1998/106p93-99korrnick/korrnick-full.html>

Number of "Unhealthy" Ozone Days in White Mountain National Forest
(Unhealthy being over the 8-hour ozone health standard)



The Great Gulf Wilderness experiences ozone levels exceeding the 8-hour ozone health standard, as shown in the graph above. High-elevation areas in the White Mountains are especially at risk from ozone pollution. The summit of Mount Washington sees even more days when ozone levels are considered “moderate” by EPA. While such days may not exceed the current EPA health standard, a Hiker Health Study performed by AMC, Brigham and Women’s Hospital, and the Harvard School for Public Health demonstrates that hiker health is negatively impacted even at levels below the EPA standard.

AMC continues to monitor air quality in the White Mountains of New Hampshire in cooperation with the U.S. Forest Service, U.S. Environmental Protection Agency, and New Hampshire Department of Environmental Services. Our research scientists are involved in monitoring and analysis of haze, ground-level ozone, and acid deposition.

In addition, we engage the public in our efforts through our Visibility Volunteers project, in which visitors to our high-mountain huts practice hands-on data collection to contribute to a reservoir of information on haze and ozone conditions at high elevations in the White Mountains.

AMC’s position on Clean Air in the Parks

As the nation’s oldest conservation and recreation organization, the AMC is deeply concerned about the adverse effects of air pollution on human health, as well as on the

ecology and economy of the region. Our organization bases its policy positions on sound science, which is why we have a dedicated scientific research staff working on air quality issues, with an emphasis on the White Mountains of New Hampshire.

Data from our own scientific research, as well as that from other well-respected sources make it clear that the air in our national parks and Wilderness areas needs to be cleaned up. We believe a strong Clean Air in the Parks rule is the best opportunity available today to put the nation on the path to cleaner air and to significantly reduced air pollution to bring the nation into compliance with the requirements of the Clean Air Act and to restore visibility to natural levels in our national parks and Wilderness areas.

We encourage EPA to recognize the importance of clean air in our parks and Wilderness areas, and we urge the agency to commit to a strong Clean Air in the Parks rule (a.k.a. Best Available Retrofit Technology or BART rule). AMC considers the original proposed BART rule, put forth by EPA in 2001, as a strong rule, and encourages the agency to retain the substantive content of that version and to implement these rules immediately. Any delay brought about by this rule or other rulemakings or future legislation would be a disservice to Americans who value their national lands.

More information is available at <http://www.outdoors.org/research/airwater/index.shtml> and at <http://www.outdoors.org/conservation>.



For more information, contact Appalachian Mountain Club Public Affairs Director Rob Burbank at rburbank@outdoors.org or (603) 466-2721, ext. 195.