

MOUNTAINS

A brief history of air quality monitoring



Word from the Smokies
David Brill
Columnist

Unlike most professionals, Jim Renfro knows he's doing his job well when he can't see the products of his labors. In fact, when Renfro takes in the view from high atop Clingmans Dome in Great Smoky Mountains National Park and sees nothing but the distant tree-fringed ridges — instead of a veil of unhealthy haze — he knows his efforts have begun to pay off.

Renfro joined GSMNP staff in 1984 and became air resource specialist in 1993. Now the park's Supervisory Physical Scientist, Renfro has devoted untold hours to sharing the story of the park's air quality with visitors, students, media representatives, citizen action groups, lawmakers, scientists, park staff, and anybody else willing to listen.

"I always wanted to become a ranger in a national park or forest," he said. "I had very influential parents and grandparents that showed me the great outdoors."

With responsibilities ranging from monitoring and research to outreach, collaboration, and policy related to air resources, Renfro says the most rewarding part of the job is to now look back and see how much progress has been made in restoring our park's air quality towards where it should be.

In the early days, Renfro got the word out the old-fashioned way, by "making copies, sending faxes, and mailing out information packets." As presentation and communication technologies advanced, Renfro's messaging grew in sophistication and reach. Ask him to tally the number of PowerPoint presentations he's made, and Renfro puts the number in the hundreds.

Since 1980, monitoring equipment distributed throughout the park has collected air-quality data and indicated how conditions are trending compared to other places. Most of the air pollutants entering GSMNP originate outside the park, and the primary sources include coal-fired power plants in the Tennessee, Mississippi and Ohio River valleys as well as motor vehicles.

Though Renfro can do little to directly control the emissions entering the park — that's a challenge for state and national policymakers and regulators — he maintains a range of air-monitoring tools that produce the evidence (via the accumulation of monitoring data) of how airborne pollutants are affecting park resources and how levels of these pollutants change over time.

Park sensors have been measuring pollutants since the 1980s and monitoring tools are currently located at Cades



Visibility in the park on the haziest days has improved from an average of 9 miles in 1998 to 40 miles in 2018, and views are slowly being restored to their natural average range of 90 miles. PHOTOS PROVIDED BY JOYE ARDYN DURHAM

Cove, Cove Mountain, Clingmans Dome, Elkmont, Look Rock, Noland Divide and Purchase Knob.

The park's air-quality monitoring program has greatly expanded over the years and involved partnerships with the Tennessee Valley Authority (TVA), the Environmental Protection Agency, the states of Tennessee and North Carolina, and the University of Tennessee, among others. In all cases, Renfro lets the data speak for themselves, offering them up for anyone to use, provided that the use is "accurate, timely, and precise."

Though the four-decade saga of air quality in GSMNP includes chapters marked by deterioration and decline, of late, Renfro's range of air-quality monitoring equipment has told an increasingly positive story.

From the late 1990s through 2020, TVA's emissions of sulfur dioxide (SO₂) and nitrogen oxides (NO_x) from coal-fired power plants proximate to the park declined 99% (over 360,000 tons). These emissions reductions have helped improve air quality in the park. In fact, visibility in the park on the haziest days has improved from an average of 9 miles in 1998 to 40 miles in 2018, and views are slowly being restored to their natural average range of 90 miles.

Park streams and soils have begun to shed some of their unhealthy acid loads — deposited chiefly by sulfur- and ni-



Supervisory Physical Scientist Jim Renfro joined the staff of Great Smoky Mountains National Park in 1984 and became air resource specialist in 1993.

trogen-infused rain, mist, particles, clouds and gases. And levels of ground-level ozone — a potentially harmful pollutant — have declined by 40% on the park's worst air-quality days.

All good news, Renfro will tell you,

particularly compared with the condition of the park's air since the late 1990s. But there is still a critical piece of work to be done to restore the park's natural visibility and some of the park's streams that suffer from deposition of sulfur, nitrogen and mercury.

"I think the biggest challenge is to keep people excited about the progress made, but there is still work to do," Renfro said. "We also don't want to lose any of the progress we've made to date. I'm hoping the small contribution has helped towards restoring our unique southern Appalachian ecosystem and park visitors enjoy clean air and water."

Note: Part of this article was originally published in Smokies Life issue 13, vol. 7 #2, Fall 2013, in David Brill's article "Breathing in the Smokies: A Remarkable Success Story," and then reappeared in the spring 2021 issue of Smokies Life magazine as a sidebar in an overview of Twin Creeks Science and Education Center.

David Brill is the author of "Into the Mist: Tales of Death, Disaster, Mishaps and Misdeeds, Misfortune and Mayhem in the Great Smoky Mountains National Park," published by Great Smoky Mountains Association (2016). His articles on science, ecology, the environment, business, health, fitness, parenting and adventure travel have appeared in more than 25 national and regional magazines.

STATE BRIEFS

North Carolina man sentenced to prison for daughter's death

WILLIAMSTON — A North Carolina man has pleaded guilty to the 2017 murder of his 10-month-old daughter and will serve at least 23 years in prison, a district attorney said Thursday.

Martin County District Attorney Seth Edwards said Ricky Roberson, 53, was sentenced to between 23 and 32 1/2 years in prison after pleading guilty to second-degree murder and first-degree sex offense, news outlets reported.

Edwards said Roberson called 911 on Jan. 29, 2017 to report that his child was unresponsive inside a home in William-

ston. Emergency responders found that the child had been dead for some time and efforts to revive the child were unsuccessful.

Investigators with Williamston police and the N.C. State Bureau of Investigation interviewed the mother, who said she allowed the child to spend time at the father's home.

Three days earlier, the mother told investigators she was upset to find Roberson and another man drinking and smoking marijuana, according to Edwards. After an argument with Roberson, officials said the mother allowed the child to stay with the father.

Edwards said autopsy findings included hemorrhaging in addition to injuries to her spinal cord. The medical ex-

aminer determined cause of death to the child to be from traumatic neck injuries.

3 charged with beating man, leaving him zip-tied in trunk

SALISBURY — Firefighters responding to a 911 call rescued a naked man found zip-tied and severely hurt in the trunk of his car at a North Carolina quarry, and a sheriff's office charged three people in the incident.

News outlets report the 34-year-old victim was found by firefighters on Thursday at a quarry in northeast Cabarrus County. The Rowan County Sheriff's Office said the man suffered facial fractures, a broken sternum, a small

brain bleed and lung issues. The sheriff's office said the victim tried to sell one of the assailants a gun and was robbed.

The sheriff's office said William Troy Wilson, 26, of Salisbury; Jackwlyn Nicole Corl, 33, of Rockwell; and Thomas Dax Llewellyn, 35, of Salisbury are charged with robbery with firearms or other dangerous weapons, conspiracy to commit robbery with dangerous weapons and assault with a deadly weapon with intent to kill.

Wilson and Corl each are jailed under \$150,000 bond. Llewellyn was jailed on a total bond of \$155,000 for also violating probation. It's not known if any of the suspects have attorneys.

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