

# Ammonium level increases at Yellowstone

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DAVID GRUBBS/Gazette Staff

Vehicle exhaust may be contributing to the increased levels of ammonium in national parks, including Yellowstone National Park.

SALT LAKE CITY - A pollutant that can slowly trigger changes in the lives of plants and animals is increasingly being found in 16 National Park Service sites, mostly in the western United States.

Air quality data obtained by The Associated Press shows significant worsening trends for ammonium in several flagship parks, including Yellowstone, Mount Rainier and Utah's Canyonlands. At Colorado's Rocky Mountain National Park, researchers have already seen subtle shifts in the alpine tundra, where some of the park's trademark wildflowers are being replaced by grass.

Scientists worry that increases in nitrogen-rich ammonium could gradually transform other national parks' sensitive ecosystems, affecting everything from microscopic algae and plants to fish, frogs and other wildlife.

"We're in the early stages of seeing impacts to the parks but the longer we let it go, the harder it is to fix later," said Tamara Blett, an ecologist with the National Park Service's air quality branch in Denver.

Ammonia is a mix of hydrogen and nitrogen. When it mixes with water, it becomes ammonium and acts as an extra dose of fertilizer when it reaches the ground. It's commonly associated with fertilizers, large animal feeding operations, vehicle exhaust and factory emissions. It also occurs naturally.

After it is emitted, it gets swept up into the atmosphere and hitches a ride back to Earth on bits of rain and snow.

And, more often in recent decades it has found its way to national parks, detected by a network of air and precipitation monitors.

The latest data from the Park Service, which analyzed trends from 1998 to 2007, raises particular concern about seven national parks and monuments in Arizona, New Mexico, Colorado, Utah, Wyoming and Washington state.

"Nitrogen is a fertilizer. It's used on lawns to help them grow and be green. That's fine for lawns but not good for national parks where we want them functioning in a natural way," Blett said.

In large enough doses, excess nitrogen can change soil and water chemistry, affect species diversity or provide extra nutrients for exotic grasses that facilitate the spread of wildfires.

Much of what's known about the effects of ammonium in national parks comes from studies at Rocky Mountain National Park north of Denver.

Scientists there watch vulnerable high-elevation tundras and lakes for signs that nitrogen is overloading the system and setting off a chain-reaction that alters which native species survive and which don't, according to Jim Cheatham, a biologist at the park.

Of the park's 265,000 acres, about a third are alpine tundra.

"All of that is susceptible to that change," Cheatham said.

Rocky Mountain officials say ammonium is "perhaps the most subtle, potentially the most serious, air quality threat to the park." A plan between the park, federal regulators and state officials aims to cut ammonium levels by more than half over the next 25 years.

Researchers plan to publish a study later this year trying to pinpoint sources for those bits that show up in Rocky Mountain National Park. Roughly half comes from Colorado and half from out of state, according to John Vimont, chief of the Park Service's research and monitoring branch for air quality.

At southern Utah's Canyonlands, there's concern that the pollutant could affect waterways, including the park's famous potholes, which are rock indentations that collect rainwater and host a fascinating - and sensitive - collection of tiny squirming creatures.

Some of the geologic formations at the park, particularly the bedrock, may absorb and buffer the effects of the increased ammonium, but it won't work forever, said Jeff Troutman, Canyonland's chief of resources.

Other park units where nitrogen deposition was listed as a significant concern are: Washington state's Olympic National Park, Mesa Verde National Park in Colorado, New Mexico's Capulin Volcano National Monument and Arizona's Chiricahua National Monument and Fort Bowie National Historic Site.