

COVID-19 Response

Following guidance from the Centers for Disease Control and Prevention and state and local public health authorities, park operations continue to adapt to changing conditions while maintaining public access, particularly outdoor spaces. Before visiting a park, please check the [park website](#) to determine its operating status. Updates about the overall NPS response to COVID-19, including safety information, are posted on www.nps.gov/coronavirus. Please [recreate responsibly](#).

National Park Service

Series: Park Air Profiles

ARTICLE

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Denali National Park & Preserve

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Air quality at Denali National Park & Preserve

Most visitors expect clean air and clear views in parks. Denali National Park & Preserve (NP & Pres), Alaska, consistently has some

of the best visibility and cleanest air of all national parks. Air quality monitoring in the park shows that the air in Denali NP & Pres is exceptionally clean on most days. During summer, however, it is not unusual for naturally-occurring smoke from wildland fires to significantly decrease visibility throughout Interior Alaska, including at the park. Concentrations of air pollutants, while low, show a strong seasonal trend, with peaks often occurring in the



Visitors come to Denali NP & Pres to enjoy scenic views of the tallest mountain peak in North America, alpine tundra, and wildlife.

winter and early spring. This pattern is consistent with international transport of airborne contaminants to Alaska via transport pathways over the Arctic and Pacific Oceans ([Wilcox 2001](#)). The National Park Service works to address air pollution effects at Denali NP & Pres, and in parks across the U.S., through [science](#), [policy and planning](#), and by [doing our part](#).

Visibility

Park vistas are sometimes obscured by haze, reducing how well and how far people can see. [Visibility](#) reducing haze is caused by tiny particles in the air, and these particles can also affect [human health](#). Many of the same pollutants that ultimately fall out as nitrogen and sulfur deposition contribute to this haze. Organic compounds, soot, and dust reduce visibility as well.



Clean, clear air is essential to appreciating the scenic vistas at Denali NP & Pres.

Significant improvements in visibility on clearest days have been documented since the late 1980's, and visibility in the park is quite close to the [Clean Air Act](#) goal of no human caused impairment. Haze-causing pollutants affecting Denali NP & Pres show a strong seasonal pattern, with a peak in the late winter and spring. The peak coincides with intercontinental transport of pollutants primarily from industrial sources, and can be seen throughout interior Alaska. In the summer, it is not uncommon for smoke from naturally-occurring wildland fires to obscure the view.

Visibility effects:

- Reduction of the average natural visual range from about 165 miles (without the effects of pollution) to about 160 miles because of pollution at the park
- Reduction of the visual range to below 105 miles on very hazy days

Visit the NPS air quality [conditions and trends](#) website for park-specific visibility information. Denali NP & Pres has been monitoring visibility since 1988. Check out the [live air quality webcam](#) and [explore air monitoring »](#)

Mercury and toxics

Airborne mercury, and other toxic air contaminants, when deposited are known to harm birds, salamanders, fish and other [wildlife](#), and cause [human health](#) concerns. These substances enter the food chain and accumulate in the tissue of organisms causing reduced reproductive success, impaired growth and development, and decreased survival.



Mercury concentrations in fish at Denali NP & Pres exceed the health thresholds for fish-eating birds and mammals.

Some toxic contaminants, referred to as persistent organic pollutants (POPs), are known or suspected to cause cancer or other serious chronic health effects in humans and wildlife. Located in the far north, Alaska (including Denali NP & Pres) is particularly susceptible to the accumulation of POPs and other toxic airborne contaminants. These pollutants volatilize from contaminated soils at warmer temperatures in lower latitudes, and then are transported to colder, high-latitude arctic and subarctic ecosystems.

Winds can transport contaminants across the Pacific to Alaska in 5 days or less with dominant wind patterns originating both in Siberia and also in British Columbia. For example, Landers et al. (2008) found that pesticides (e.g., dieldrin, chlordane) banned in the U.S. for several decades are present in snow and plants at Denali NP & Pres and other Alaska sites. This is likely due to atmospheric transport from countries that continue to use these chemicals. Concentrations of some of these banned pesticides in fish in Alaska parks were generally above those found in parks in the lower 48, indicating that these banned chemicals are accumulating in fish over time.

Mercury and toxics effects:

- Presence of contaminants at very low levels, including current-use pesticides, historic-use pesticides, and industrial by-products in air, snow, sediment, fish, and vegetation (Hageman et al. 2006; Landers et al. 2010; Landers et al. 2008);
- Higher than expected levels of PCBs, mercury, and dieldrin in fish (Landers et al. 2010; Landers et al. 2008).
- Measured contaminant levels in fish did not exceed human health thresholds adopted by the State of Alaska, nor did they exceed human health thresholds established by the EPA for consumers eating fewer than 19 meals of fish per month (Ackerman et al. 2008; Landers et al. 2010; Landers et al. 2008);
- Mercury concentrations in fish that exceed health thresholds suggested for fish-eating birds (kingfishers) and mammals (otter and mink) (Ackerman et al. 2008; Landers et al. 2010; Landers et al. 2008; Schwindt et al. 2008).

Ground-level ozone



Quaking Aspen is one of the ozone sensitive species found at Denali NP & Pres.

resistant to disease and insect infestations. Ozone concentrations and seasonal exposures are generally low in Denali NP & Pres and unlikely to cause injury or reduced growth in plants.

Episodes of high ozone concentrations, due in part to biomass burning in Eurasia, have been documented in the park, but these episodes are relatively short in duration (Oltmans et al. 2010). While ozone effects have not been documented in the park, several park species, including *Salix scouleriana* (Scouler's willow) and *Populus tremuloides* (quaking aspen), are known to be sensitive to ozone. Search additional [ozone-sensitive plant species](#) found at Denali NP & Pres.

Visit the NPS air quality [conditions and trends](#) website for park-specific ozone information. Denali NP & Pres has been monitoring ozone since 1987. Check out the [live ozone and meteorology data](#) from Denali NP & Pres and explore [air monitoring](#) »

Nitrogen and sulfur

Nitrogen and sulfur compounds deposited from the air may have [harmful effects](#) including [acidification](#), on soils, lakes, ponds, and streams. Excess nitrogen can also lead to nutrient enrichment, a process that changes nutrient cycling and alters plant communities. Healthy ecosystems can naturally buffer a certain amount of pollution, but as nitrogen and sulfur accumulate, a threshold is passed where the ecosystem is harmed. "[Critical load](#)" is a term used to describe the amount of pollution above which harmful changes in sensitive ecosystems occur (Porter 2005). Nitrogen deposition exceeds the critical load for one or more park ecosystems ([NPS ARD 2018](#)).

The risk from either acidification or fertilization is considered low at Denali NP & Pres because rates of nitrogen and sulfur deposition are very low. However, certain vegetation communities in the park, including wetlands and arctic vegetation, are known to be vulnerable to excess nitrogen deposition. If nitrogen deposition increases significantly, these plant communities could be affected. Certain lichen species that occur in the park are known to be sensitive to air pollution, including the globally rare *Erioderma pedicellatum* (Nelson et al. 2009). Search for [acid-sensitive plant species](#) found at Denali NP & Pres.

At ground level, ozone is harmful to [human health](#) and the [environment](#). Ground-level ozone does not come directly from smokestacks or vehicles, but instead is formed when other pollutants, mainly nitrogen oxides and volatile organic compounds, react in the presence of sunlight.

Ozone is a highly reactive molecule, and once inside a leaf, it can damage plant tissues making it harder for plants to produce and store food. It also weakens plants making them less

Visit the NPS air quality **conditions and trends** website for park-specific nitrogen and sulfur deposition information. Denali NP & Pres has been monitoring nitrogen and sulfur deposition since 1980. **[Explore air monitoring »](#)**

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