



Air Quality

RESOURCE BRIEF

Importance

Even at relatively low levels, such as those found in the Greater Yellowstone, air pollution and deposition can leach nutrients from soil, injure vegetation, and acidify and fertilize lakes and streams. The Clean Air Act Amendments of 1977 designated Yellowstone and Grand Teton among the 156 national parks and wilderness areas that are Class I airsheds, requiring the most stringent air quality protection within and around their boundaries. The thin soils, sparse vegetation, short growing seasons, and snowmelt-dominated hydrology of high elevation basins that limit the amount of nitrogen that can be effectively assimilated make these areas more vulnerable to the effects of acidification and nutrient enrichment from nitrogen deposition.



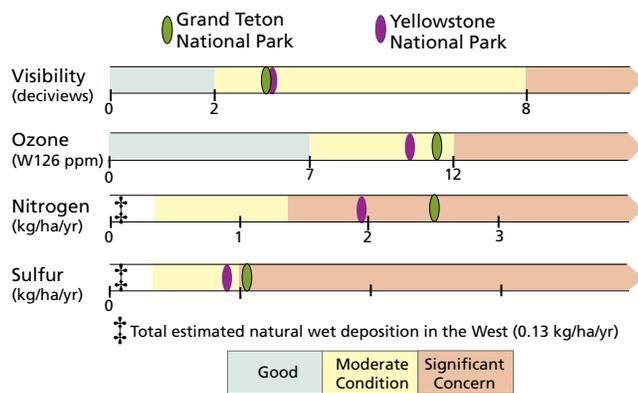
Wet deposition monitoring station in Yellowstone National Park.

Status and Trends

Yellowstone and Grand Teton are in compliance with federal air quality standards for human health in regard to ozone, sulfur dioxide, and particulate matter. However, deterioration of air quality may be affecting other aspects of the ecosystem. For example, nitrogen in precipitation has increased at many Western monitoring sites as a result of ammonium ion concentrations associated with fertilizer use and feedlots. Although nitrogen is a nutrient needed for plant growth, too much nitrogen disrupts native plant communities that are adapted to low nitrogen conditions; high nitrogen levels can advance the spread of nonnative

species that increase fire frequency. Acidification in high alpine lakes from sulfur and nitrogen deposition can cause loss of macroinvertebrates and fish. Changes in the algal composition in sediment cores from several alpine lakes in Yellowstone and Grand Teton that began in about 1980 have been correlated with increased nitrogen loading.

While naturally-occurring ozone in the upper atmosphere protects life by absorbing the sun's ultraviolet rays, ground-level ozone is a pollutant that can travel hundreds of miles after forming when nitrogen oxides from vehicles, power plants, and other sources combine with volatile organic compounds emitted by a variety of artificial and natural sources. Ozone concentrations in Yellowstone typically peak in spring rather than summer, indicating that human influences are less significant than changes in atmospheric circulation and lengthening daylight. Nonetheless, in addition to causing respiratory problems in people, ozone levels during the growing season (the exposure index) may be high enough to cause biomass loss in sensitive species such as aspen.



Average 2006–2010 values relative to NPS Air Resources Division categories for air quality measures. No national park in the lower 48 states meets the NPS criteria for “good” visibility. A threshold for “good” condition has not been determined for nitrogen and sulfur wet deposition.

Discussion

The largest source of particulate matter in Greater Yellowstone is smoke from wildland fires, which is considered part of the area's “natural background conditions” and is taken into consideration in establishing the threshold for “good” visibility in the graph at the left. Emissions from prescribed fires have been relatively insignificant. Because of prevailing winds, Wyoming oil and gas development has not had a detectable effect on air quality in Yellowstone. Although Grand Teton previously had to rely on data collected outside the park, a monitoring station set up in September 2011 with equipment provided by the Wyoming Department of Environmental Quality will enable more accurate detection of air quality trends there.