

Air Quality

NPS Air Resources Division

Importance

Chickasaw National Recreation Area (CHIC) is located in south-central Oklahoma. Its upland areas are dominated by mixed grasslands and oak forests, while its lowland areas are dominated by riparian vegetation. The Lake of the Arbuckles and Veteran's Lake attract visitors for fishing, boating, and water skiing. Like all parks in the Southern Plains Network (SOPN), CHIC is a Class II air quality area according to the Clean Air Act. Although most SOPN park units are some distance from cities and pollution sources, many experience occasional poor air quality from pollutants such as ozone, nitrogen oxides, sulfur dioxide, volatile organic compounds, particulate matter, and toxics. CHIC is one such park. Air pollutants may adversely affect air quality and natural resources, including vegetation, fish and wildlife, soils, water quality, and visibility.

Status and Trends

Estimates of selected air quality parameters for SOPN park units, using data from 1995-1999 (from Air Atlas), indicated that CHIC experienced some of the highest levels of pollution among the parks. The estimated ozone measurements, as well as total sulfur from sulfate deposition by precipitation, inorganic nitrate deposition by precipitation, and visibility measurements were among the highest (or poorest) for this park. An increase in inorganic nitrate deposition, for example, would be of concern because it stimulates plant growth, thus altering the structure and diversity of plant communities, and encourages algal growth in lakes and streams.



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RESOURCE BRIEF



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Unlike ozone in the stratosphere, which protects the planet from radiation, ground-level ozone can be harmful. It is produced by the reaction of UV radiation with nitrogen oxides and volatile organic compounds that are emitted by fossil fuel combustion, wildfire plumes, and other sources, and it can travel hundreds of miles on air currents. A trend analysis for 1994-2003 indicated that ozone is increasing in many areas of the West. A 2004 risk assessment for SOPN parks (using 1995-1999 data) determined that the risk of foliar ozone injury to plants at CHIC is high. Three indicators of ozone exposure, Sum06, W126, and N-value, were used. It should be noted that ambient concentrations of ozone were not monitored on-site, but were estimated by a statistical interpolation process. The Sum06 index intermittently exceeded the threshold for injury. The criteria for injury under the W126 index were satisfied, and the N80 and N100 counts were also high. These levels of ozone exposure present the potential for foliar injury, but low soil moisture may reduce the likelihood of injury occurring in some years.

Discussion

A survey to examine vegetation for ozone injury at CHIC should be considered. There are several ozone-sensitive species at the site, and some are bioindicators for ozone. Bio-indicator species include white ash, American sycamore, and skunkbush. The NPS should also periodically update ozone risk assessments for SOPN parks. Increasing ozone concentrations in the area may lead to greater risk from ozone injury.