Science and Management Partner to Assess and Improve Lake Tahoe's Air Quality

Thick plume of smoke rising from 2007 Angora Fire

Residents and visitors to Lake Tahoe expect clean mountain air and a spectacularly blue lake. Maintaining the air quality around Lake Tahoe is important to the health and well-being of the people who live, work and visit Tahoe, as well as to plants and wildlife in the basin. Current research and monitoring efforts are helping land managers and regional regulatory agencies understand how human activities and natural phenomenon affect Tahoe's air quality.

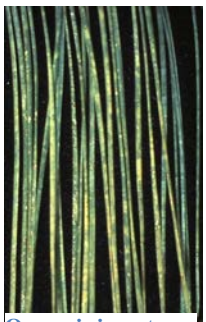
Key Management Questions

Smog from smoke and suspended fine particles over the lake in summer.

Research and monitoring is needed to help managers and regulators understand the sources of air pollution in the basin, the impact of airborne pollutants on lake clarity, and what can be done locally to improve Tahoe's air. Key management questions include:

- Is Lake Tahoe's air healthy to breathe?
- What pollutants most affect the clarity of Lake Tahoe?
- What causes regional haze in the basin?
- How does air pollution affect the health of Lake Tahoe's forests?
- What are the sources of the observed air pollution?

Science Investments to Address Key Management Questions



Ozone injury to ponderosa pine needles

Events such as regional haze, changes in lake clarity, wildfires, and unhealthy vegetation have prompted management agencies to partner with researchers to investigate the sources and impacts of air pollution in the Tahoe Basin. Examples of research activities include:

- Characterization of the nature and source of pollutants affecting lake clarity
- Monitoring and research to identify the chemical composition and source of gaseous, particle, and aerosol pollutants
- Transport models of local, regional, and global airborne pollutants
- Development of a basin-wide air quality monitoring plan and installation of a network of stations to track seasonal and long-term variations in air quality
- Analysis of 20 years of monitoring data from two visibility monitoring sites (Bliss State Park and South Lake Tahoe) to determine the role that natural and man-made aerosols play in creating regional haze in the Tahoe Basin.
- Leaf injury surveys and ozone monitoring to investigate the occurrence of ozone-induced leaf injury to Jeffrey pines and ponderosa pines in the Tahoe Basin.

Key Science Findings

- As much as 15 percent of annual fine sediment load deposited into the lake may come from atmospheric sources. Approximately 55 percent of the nitrogen and 15 percent of the phosphorus annually deposited into Lake Tahoe also comes from atmospheric sources.
- Pollution originating in the Central Valley from photochemical smog, ozone production, and nitric acid emissions only modestly contributes to degradation of Lake Tahoe's air quality, due to the buffering effect of the mountains west of Tahoe.
- Vehicles and power boats are the dominant in-basin sources of the ozone-forming precursors.
- Biomass burning from wildfires, forest fuel reduction burns, and residential wood fires is the dominant source of regional haze. Road dust and traffic are significant contributors to haze in South Lake Tahoe, while industrial combustion and salting are minor sources of visibility impairment.
- Ozone causes premature leaf loss, reduced photosynthesis, and reduced leaf, root and biomass in about 25 percent of Jeffrey pines and ponderosa pines in the basin.

Management Actions Taken

Air quality management agencies are dedicated to improving Lake Tahoe's air quality and reducing the impact of air pollution on environmental and human health in the basin. Actions taken include

- Coordination and standardization of air quality monitoring efforts and increased sharing of monitoring results with the public
- Assessment of options to improve air quality in the Tahoe Basin, including targeted regulations, incentive programs, burn-time restrictions, innovative land use planning, and capital improvements to enhance access and use of green (low-emission) transportation on and around the lake.

Ponderosa pines with different sensitivity to ambient ozone

Next Steps

Scientists and managers are working collaboratively to use meteorological and air quality data to predict future levels and sources of ozone and other pollutants and to assess the efficacy of alternative air pollution control strategies. Air monitoring data, satellite imagery, and meteorological data are being integrated to develop a science-based strategy for reducing the impacts of biomass burning in the Tahoe Basin.

Where to go for more information

Current Lake Tahoe Air Quality Research:
www.fs.fed.us/psw/partnerships/tahoescience/air_quality.shtml
California Air Resources Board: www.arb.ca.gov