

# North Cascades

National Park  
National Park Service  
U.S. Department of the Interior

## AIR QUALITY

North Cascades National Park is world-renowned for spectacular mountains, scenic vistas and vast wilderness. During a visit to the North Cascades you will be in some of the wildest and most remote country in the United States. But the park is increasingly threatened by poor air quality.

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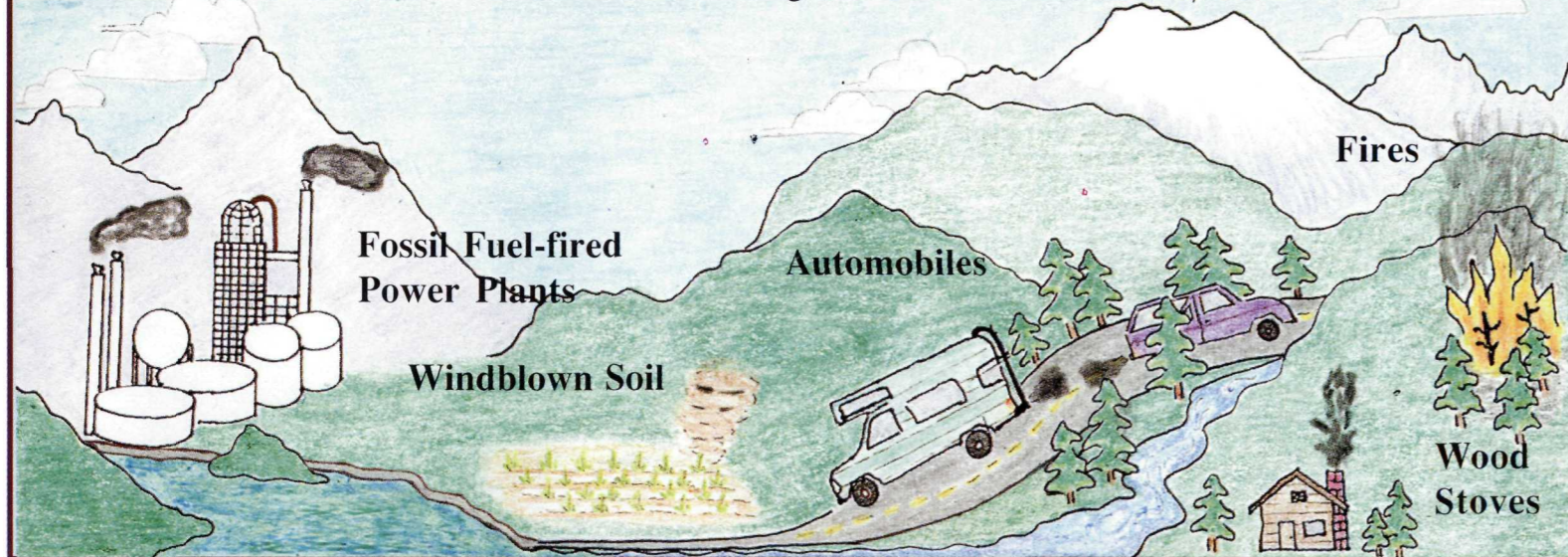




North Cascades National Park lies within one of the most intact wilderness ecosystems in the continental United States. Jagged spires and sheer cliffs rise from deep glacial valleys creating spectacular scenery. It is hard to imagine that this remote area is affected by air pollution. Unfortunately, North Cascades National Park lies fewer than 90 miles from the fast-growing Seattle and Vancouver, British Columbia metropolitan areas. Pollutants in the region's air cause reduced visibility, acid precipitation and potential harm to the ecosystem's plants and animals.

## What is air pollution and where does it come from?

From urban, rural and industrial areas around Puget Sound and from Vancouver, B.C.



**North Cascades and the Clean Air Act**  
The goal of the Clean Air Act is safe and acceptable air quality by attaining and maintaining national air standards. The act seeks to "prevent significant deterioration" of air quality, particularly in areas of special

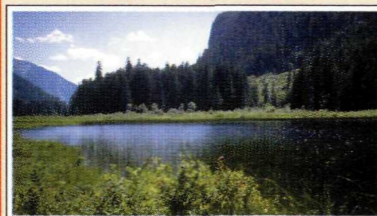


natural, scenic, or historic importance known as "Class 1 Areas." By passing the Clean Air Act, Congress expressed the national desire to preserve the ability to see long distances, entire panoramas and specific features in Class 1 Areas such as North Cascades National Park.

**Monitoring Air Quality**  
Since 1980, North Cascades National Park has cooperated with the U.S. Geological Survey, several universities, industry and other agencies to monitor air quality and its impacts. The data help researchers to better understand how pollutants affect park resources.

The North Cascades air quality monitoring program includes several data collection systems: an aerosol sampler inhales air continually, and the filters are analyzed every week for substances such as sulfates, nitrates, organic carbon and particulates; an acid rain monitor measures the acid content of precipitation; and an ozone monitor measures ground level ozone.

**Effects of Air Pollution on the North Cascades**  
**Lakes** in the North Cascades, especially the sensitive high ones, may be damaged by polluted rainfall (acid rain) and snow melt. The effects of acid rain can include changes in pH; changes in buffering capacities; and reduced abundance of aquatic species.



**Fish**, especially salmonids, are sensitive to increased acid levels in lakes. Acid from polluted rain may impair spawning and reduce young fishes' chances for survival.

**Plankton** are widely dispersed organisms at the bottom of the food chain. They are extremely sensitive to minor changes in acidification and thus are good indicators of ecosystem health. Damage to plankton populations may lead to widespread injury to animals at higher levels of the food chain, such as fish and amphibians.

**Lichens** absorb nutrients directly from the atmosphere and have no protective barrier. They accumulate elements and are long-lived, which makes them excellent monitoring species.

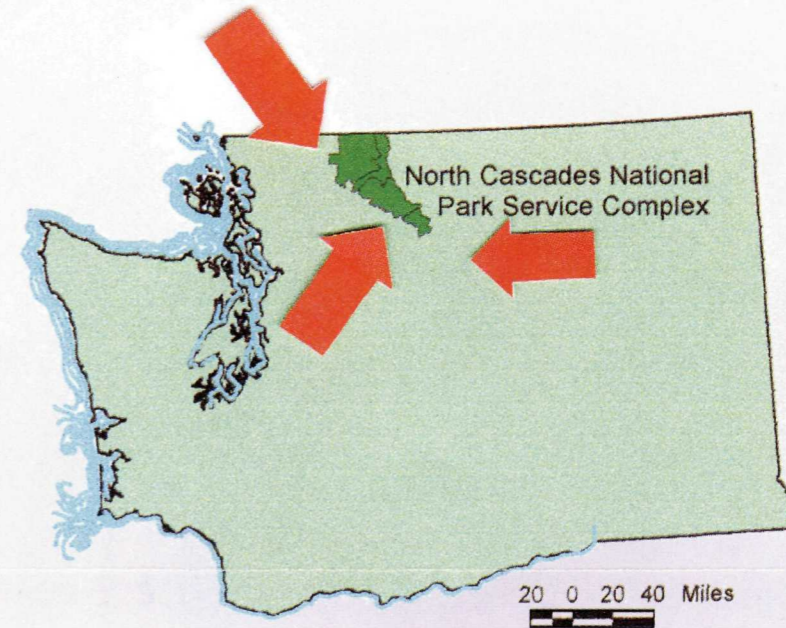
**Plants** can be damaged by acid rain and other air pollutants, which weaken the plants' ability to withstand disease and insect infestations.

POLLUTANT	SOURCES	HUMAN HEALTH EFFECTS	ENVIRONMENTAL EFFECTS	CONTROLS
Ozone (O <sub>3</sub> )	Nitrogen oxides and hydrocarbons emitted from automobiles react in the presence of sunlight to form ozone.	Irritates lungs; may cause coughing, sinus inflammation, chest pains, stinging eyes and general malaise.	Damages leaves and needles; causes loss of forest productivity through reduced plant growth, reproduction and energy storage.	Use cars or trucks only when necessary. Difficult to control because everyone who drives contributes to this problem.
Sulfur Dioxide (SO <sub>2</sub> )	Oil refineries, smelters, incinerators, power plants, home heating units and volcanoes.	Blocks breathing passages, increases instances and severity of lung disease.	Contributes to reduced visibility and acid rain, which damages crops, stunts plant growth and affects surface water quality; harms statues and buildings.	Add pollution control equipment to smokestacks; remove sulfur from fuels.
Nitrogen Oxides (NO and NO <sub>2</sub> )	Automobiles, high temperature combustion from industry and power plants.	Irritates lungs, eyes, nose, throat and skin. Can be fatal in high concentrations.	Reduces visibility; forms ozone and acid rain, which affects surface water quality, stunts plant growth and damages fish and amphibian eggs.	Processing of fuel before burning; car and industrial catalytic converters help. Difficult to control.
Particulates (solid particles and liquid droplets)	Wood-burning stoves, construction, farming, industry, forest fires, mining and volcanoes.	Compounds throat, heart and respiratory problems. Can carry compounds and heavy metals into lungs.	Reduces visibility; corrodes metal; soils buildings and other painted surfaces; may alter climate.	Minimize burning and fires; install pollution control equipment on smoke stacks; grow crops organically.

## From Where the Wind Blows...

### Arrow from the Northwest

Farms, industrial operations, cars and other sources contribute to high levels of ozone in the Fraser River Valley of British Columbia. Air masses containing ozone stall in the valley because of a bowl effect. The ozone-laden air is eventually pushed out and transported south down the tributary valleys of the Fraser River into North Cascades National Park. This most often occurs during the hot summer months.



### Arrow from the Southwest

The potential for deterioration of the park's air quality is very high. North Cascades National Park lies in the path of prevailing southwesterly winds blowing across several urban-industrial areas of the Puget Sound lowlands.

The glacial valleys in the park have steep sides that restrict air flow. When winds are too weak to carry pollution over the mountains, they blow it along the valleys. Air pollution carried toward mountain barriers may also be rained out before crossing over the mountains.

### Arrow from the East

Forest fires are another source of air pollution. They occur primarily on the dry, eastern side of the Cascades Range but the smoke can travel to the west side. The smoke reduces visibility and can be a health risk. Wood smoke contains carbon monoxide, formaldehyde, nitrogen oxides and particulates that cause eye, throat and lung irritation or damage.

## What You Can Do

- Automobiles are a major source of air pollution. Avoid unnecessary driving and idling. Be careful not to spill gasoline when refueling. Bicycle, walk or take public transportation. Driving just 25 miles adds about one pound of pollution to the atmosphere.
- While visiting a national park, do not have a campfire. Cook on a camp stove; the fuel burns more cleanly than wood. Join a ranger for a guided walk or evening presentation to learn more about issues affecting park resources. Reduce, reuse and recycle!
- Learn about air pollution issues in your community. Participate in efforts to clean up the air in your city or town. Let people know that you care and talk to your state or federal environmental agencies responsible for air quality in your region. Conserve energy by saving electricity and limiting fuel and energy consumption whenever possible.