

# NATIONAL PARKS IN PERIL

## THE THREATS OF CLIMATE DISRUPTION

### State Fact Sheet: Maine

Human disruption of the climate is the greatest threat ever to our national parks.

At risk are nearly every resource and value that make our national parks so special. In *National Parks in Peril*, the Rocky Mountain Climate Organization and the Natural Resources Defense Council identify 25 national parks as having the greatest vulnerabilities to human-caused climate change. In Maine, Acadia National Park is among the 25 parks most at risk. Acadia is vulnerable to a loss of ice and snow, higher seas and more storms, more downpours and floods, a loss of plant communities, a loss of wildlife, a loss of cultural resources, more crowding, a loss of fishing, and more air pollution.

Many of these impacts are already happening, as human activities—the emission of heat-trapping gases—are now changing the climate. To preserve our national parks for ourselves and future generations, we need to both stop changing the climate and take actions to preserve the resources and values that make our parks special. For detailed recommendations, see the full report, *National Parks in Peril*.

#### Loss of Ice and Snow

As the climate gets hotter, national parks in the North and in mountain ranges are losing ice and snow—one of the most obvious effects of a changed climate on our national parks. Opportunities for snow-based winter recreation are likely to be reduced in Acadia, where snowmobiles are allowed on 27 miles of unplowed park roads, and cross-country skiing and snowshoeing on 45 miles of other roads.



To read the full report on the impacts of global warming on national parks, visit [www.nrdc.org/policy](http://www.nrdc.org/policy) or [www.rockymountainclimate.org](http://www.rockymountainclimate.org)

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#### Higher Seas and Stronger Storms

A hotter climate raises sea levels by melting ice from land-based glaciers and ice sheets, which adds more water to the oceans, and by heating water so that it expands in volume, which also pushes sea levels higher. Current estimates are that with a high-emissions future sea level will rise three to four more feet by the end of the century; under a lower-emissions future, the seas are expected to rise about 2.3 feet. A second major risk to coasts and coastal parks comes from stronger coastal storms, including hurricanes. According to a recent U.S. government report, climate models project that further warming of ocean waters will lead to stronger coastal storms.

The extreme high surf conditions caused by Hurricane Bill in 2009 illustrate one peril of such storms for Acadia visitors. Thousands of visitors were drawn to the shoreline to watch the breaking waves, and seven people were washed out to sea after one huge wave broke; four managed to get back to shore by themselves (but were injured), two were rescued from the water, and, tragically, one young girl drowned. Over a dozen other people were seriously injured by the breaking waves.

## **More Downpours and Floods**

With a changed climate, more precipitation now comes in downpours. The amount of rain falling in heavy storms increased by 20 percent over the past century, while there has been little change in the amount from light and moderate storms. In its recent report, the U.S. Global Change Research Program says there is at least a 90 percent likelihood that heavy downpours will become even more frequent and intense. With an increase in downpours, flooding also is likely to increase. Virtually all national parks in Maine and elsewhere are at risk, as the forecast is for more downpours everywhere. An extreme downpour in Mount Rainier National Park in 2006 illustrates the risk—it caused so much flooding that the entire park was closed for a full six months.

## **Loss of Plant Communities**

An altered climate can lead to fundamental changes in the natural plant communities of parks. In Acadia, the plant communities of wetlands, intertidal areas, and near-shore ecosystems could be lost to the effects of sea-level rise, stronger coastal storms, storm surges, and saltwater intrusion, all of which are projected to result from a human-changed climate.

At risk in Acadia are two important coastal wetland estuaries fed by freshwater streams. Bass Harbor Marsh on the southern part of Mount Desert Island consists of nearly 900 acres of marshes, tidal creeks and streams, submerged aquatic grasses, and shrub dominated wetlands. On the north side of the island, the Northeast Creek/Fresh Meadow system covers about 450 acres, consisting mainly of submerged aquatic grasses. Both estuaries serve as important habitat for waterbirds and juvenile fin and shell fish species.

Also in Acadia, as across the Northeast, there could be large changes in the distributions and numbers of tree species.

## **Loss of Wildlife**

For many Americans, the highlight of a trip to a national park is the wildlife they see. But a changed climate could mean less of the wildlife species now in the parks. Some species may go completely extinct, and, local populations in particular parks may be eliminated or decline sharply.

Researchers from Yale University studied the possible effects of climate change on mammals in eight national parks projected that a doubling of atmospheric levels of heat-trapping gases could change habitat in Acadia enough to eliminate three species and to add eight species. A major caveat here, though, is that the researchers did not consider whether there would be geographic or other barriers to species moving into parks. Should as many new species move into parks as the researchers projected, there would be substantial new competition for habitat and food, creating another stress on the native local wildlife.

According to Acadia park staff, bald eagles and peregrine falcons nest in the springtime, but during some recent years, late winter storms have caused failure of the birds to successfully produce offspring. The increased variability and intensity of storm events predicted by climate scientists could cause more frequent failures to recruit young in the future.

Amphibian species such as wood frogs and spotted salamanders are known to be extremely sensitive to changes in aquatic habitat. If Acadia's forested wetlands either dry up sooner during the year or are disrupted by more extreme storm events, both of which climate scientists predict, amphibian populations could be impacted.

An altered climate is likely to reduce inland populations of cold-water fish species, including trout and salmon. For trout, a hotter climate is the single greatest threat to their survival; when water temperatures reach the mid-70°s, trout can die. Trout populations in Acadia could be affected.

### **Loss of Historical and Cultural Resources**

By preserving some of the best of our historical and cultural resources—buildings, landscapes, archaeological sites, and artifacts—America’s national parks provide information about the past and provide important links to the present. Many of these resources are at risk from the possible effects of a climate disrupted by human activities.

At Acadia, cultural resources at risk from higher seas and stronger storms include historic structures and cultural landscapes located along the park’s shoreline.

### **More Overcrowding**

As temperatures soar with a changed climate, to escape oppressive heat enough people may flock to cooler Northern and coastal parks to overcrowd them. In these parks, the impacts of additional visitation could include less visitor enjoyment and damage to park resources. Overcrowding could be a significant problem particularly for those parks that offer a break from heat and are close to major population centers, including Acadia.

### **Loss of Fishing**

Anglers have long enjoyed fishing amid the natural settings of our national parks. But now a changed climate threatens to reduce fish populations and recreational fishing opportunities in the parks. Populations of trout, a cold-water fish, are threatened with widespread declines because of hotter water temperatures. In the future, if populations of trout species decline as precipitously as scientists project, anglers might face more restrictions on trout fishing in Acadia.

### **More Air Pollution**

A hotter climate is projected to worsen concentrations of ground-level ozone, a component of smog created when pollutants mix in sunlight. Ground-level ozone has been firmly established to harm people’s health, and the U.S. Environmental Protection Agency has set air quality standards at the levels necessary to prevent adverse health effects.

Many people think of ozone as a big-city air pollution issue, but it is a problem in many national parks, affecting both the enjoyment and the health of visitors. In 2005-2007, Acadia was one of 11 national parks with permanent air-quality monitoring stations with levels of ozone violating the national health-based air quality standards for ozone, as recently strengthened by EPA. Because future climate-change driven increases in ozone levels are expected to be greatest where ozone levels already are high, the park is at risk of continued, perhaps worsened, levels of unhealthy air.

For documentation of the sources used for this fact sheet, please see the full report, *National Parks in Peril: The Threats of Climate Disruption*, at [www.nrdc.org/policy](http://www.nrdc.org/policy) or [www.rockymountainclimate.org](http://www.rockymountainclimate.org).