

Climate Change in National Parks

Climate Change Response Program
Natural Resource Stewardship and Science

National Park Service
U.S. Department of the Interior



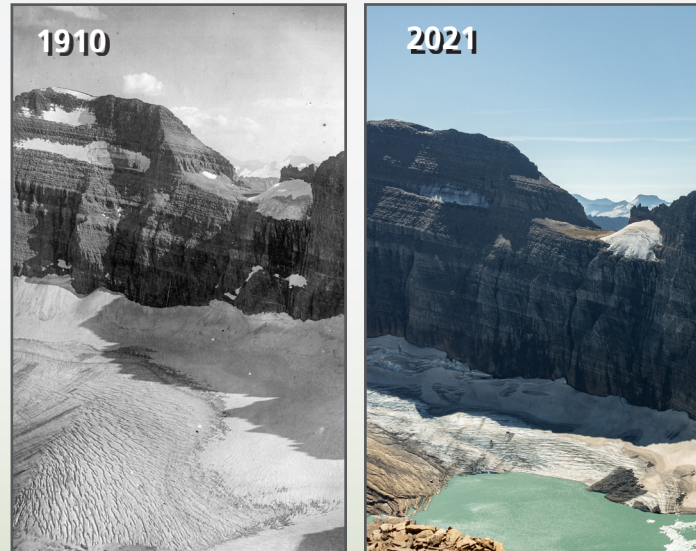
USGS Image

Loss of Snow and Ice

Temperatures are rising at national parks across the country. Many areas are experiencing shorter, warmer winters with less annual snow pack. Elsewhere—at parks like Kenai Fjords National Park (top)—the rapid retreat of glaciers is ongoing.

These changes not only affect what we see on the landscape—they also alter part of Earth's natural water storage system, affecting everything from wildlife to agriculture to human health.

The National Park Service (NPS) works with several federal agencies to monitor and measure snow pack and glacier loss. If these changes continue, we will face a future much different than the present, including a Glacier National Park without glaciers.



The dramatic retreat of Grinnell Glacier in Glacier National Park illustrates the sensitivity of glaciers to climate change. The largest glaciers in the park have lost roughly 75% of their size since 1850. Left image by Morton J. Elrod, courtesy of the K. Ross Toole Archives.



Extreme Events



Flooding has serious implications for historic resources at parks like Moores Creek National Battlefield. Recently, the park was inundated by back-to-back "500-year" flood events. During Hurricane Florence in 2018, waters rose for six days following the storm's landfall.

The melting of land-based ice and the expansion of warming ocean waters contribute to rising sea levels along the coast, exacerbating impacts from high tides and tropical storms. Inland, changing climatic conditions bring extreme storm events and damaging floods.

In 2022, warm rain falling on accumulated snow brought unprecedented flooding to Yellowstone National Park. Roads and infrastructure suffered catastrophic damage (top) and northern entrances to the park were closed for months. In recent years, historic flooding events at Acadia, Death Valley, and other national parks also resulted in closures.

The NPS is working to anticipate and adapt to flooding impacts by using climate projections to identify vulnerable facilities and resources. Park units incorporate this information and apply principles of sustainable design in new and historic structures.



Sarah Platt

Wildfire

Rising temperatures and shifting patterns of rainfall can exacerbate existing environmental stress from drought, invasive species, and disease. In the American West, the growing size and severity of wildfires is a conspicuous impact to our national parks from climate change.

Many iconic species are at risk. The 2020 Dome Fire in Mojave National Preserve burned one of the densest and largest Joshua tree forests in the world, killing over one million Joshua trees. In 2022, the Washburn Fire burned in Yosemite National Park (top), threatening the famed Mariposa Grove of giant sequoia trees.

Intense wildfires can have lasting impacts on the composition, structure, and function of entire ecosystems, and alter habitats for endangered plants and wildlife.



Firefighters used fire-resistant structure protection wrap to shield the base of the General Sherman Tree during the 2021 KNP Complex fire in Sequoia and Kings Canyon National Parks. Nearly 20% of all large sequoias in the Sierra Nevada were killed in the KNP Complex Fire and 2020's Castle Fire combined.



Imperiled Species



Volunteers at Saguaro National Park help conduct regular surveys to monitor the long-term health and vitality of saguaro cacti. During the 2019-20 field season, volunteers mapped, measured, and collected data on more than 23,000 saguaros.

Changes in Earth's climate can affect many species of plants and animals. In mountain ecosystems, warming temperatures can push heat-sensitive species toward higher elevations. In oceans, warmer water can alter the distribution of marine life, and greater acidity can severely weaken the health of coral reefs, like those of Virgin Islands National Park (top). Changes in seasonal timing and altered patterns of precipitation can also threaten the survival of certain species.

Climate models project warmer winters in the American southwest and a decrease in winter rainfall. A resulting increase in drought and wildfires could threaten the survival of the saguaro cacti of Saguaro National Park. Citizen scientists help park staff monitor the growth and occurrence of saguaros over time. This information helps guide management decisions that may help their survival.

Losing History & Traditions

National parks are repositories of human experience that chronicle the stories of our collective past. From the cliff dwellings of Mesa Verde to the steps of Ellis Island, each park reveals important chapters of our history. National parks enrich our lives today, and preserve valuable knowledge about how Indigenous Peoples responded to environmental change. These places provide important lessons for dealing with a warming world.

Along the nation's coastlines and in the interior, climate change threatens our cultural landscapes, historic structures, archeological sites, and cultural heritage. Rising sea levels inundate ancient shell mounds, coastal fortifications, and historic cemeteries. Persistent drought leads to falling lake levels, exposing fragile archeological sites to uncontrolled

drying, erosion, and higher risks of looting. Increased flooding scours important landscapes and damages historic structures and museum collections. And melting snow and ice exposes delicate, organic artifacts—tools of wood and bone, for example—inducing rapid decay.

The NPS works to inventory and monitor cultural resources, and uses modeling to help locate archeological sites. Vulnerability assessments are a valuable tool used to determine the relative risk climate change poses to cultural resources and prioritize management efforts. The NPS is working with local communities, traditional cultures, and historic preservation partners to identify appropriate actions and strategies to adapt cultural resources to a changing climate.



At Castillo de San Marcos National Monument, seawater now regularly overtops the historic sea wall during seasonal king tide events.

Responding to Climate Change

Our Past Brings Hope

In 1916 our nation established the National Park Service (NPS) to protect our natural and cultural heritage for the enjoyment of present and future generations. And ever since, the American people have played a critical role in our work.

Together, we brought species back from the brink of extinction. Together, we freed rivers to run wild again. And together, we expanded the National Park System to protect inspiring places and share the stories that reflect the true diversity of our nation.

For decades to come, climate change will challenge our parks in unprecedented ways. The changing climate brings difficult consequences for many species, ecosystems, structures, and values that have long defined our treasured places.

But if history is our guide, we can expect the American people to once again act with resolve and resourcefulness to ensure that “America’s Best Idea” endures. There is much we can do together to address climate change *right now*.

Humans: Cause and Solution

Scientists agree that the current rate of climate change is a result of human activity. Our use of fossil fuels increases the level of greenhouse gases (GHG) in our atmosphere, trapping heat and warming Earth’s temperatures.

Continued GHG emissions will cause further warming and long-lasting impacts. But limiting climate change is not beyond our control. Substantial and sustained reductions in GHG emissions now—along with efforts to adapt to change already in motion—can limit impacts.

Together with our communities, the NPS is taking action to reduce our own GHG emissions and model climate-smart management.

During your visit, you can help limit contributions to climate change by taking advantage of available mass transit options, recycling, and not idling your vehicle. But what you do at *home* can have the biggest impact on our parks.

Our daily activities provide many opportunities to reduce GHG emissions. Consider a carbon-free commute, being energy smart at work, choosing energy-efficient appliances, reducing waste at home, eating more plants, and planting more trees. These actions can save money, keep you healthy, and improve your community. Climate-smart choices can benefit both parks and people!

Below: Visitor shuttles at Zion National Park and other NPS sites provide convenient access to popular destinations while reducing GHG emissions.

Inspiration through Innovation

From learning and teaching about climate change to contributing to an ever-growing body of science, the NPS and its partners are committed to inspiring global solutions to the challenge of climate change.

National parks and their surrounding communities are working to slow the rate of warming. Sustainable practices, such as reducing water use and switching to renewable energy

sources, are local actions that limit future climate change risks.

To grapple with environmental changes already underway, the NPS uses flexible planning approaches and facility designs intended to address potential risks. These adaptation techniques can help protect park resources against climate change threats beyond our control.



New park facilities are designed with future climate in mind. The Cottontownwood Cove Marina at Lake Mead National Recreation Area is the first floating LEED Gold certified building in the world.



Many parks are investing in on-site generation of renewable electricity and energy efficiency improvements. Rooftop solar arrays now power several visitor centers and ranger stations at Glacier National Park.



Many national parks are bracing for extreme events. Everglades National Park replaced damaged, brick-and-mortar lodging with a series of canvas “eco-tents” that can be stored during extreme weather events and relocated inland as sea level rises along the coast.



Given known uncertainties, park managers use scenario planning to consider multiple possible climate futures. Staff at Wind Cave National Park consider how changes in precipitation will affect the availability of water and grass for free-roaming bison in light of climate projections.

Share Your Story

Today, climate change is as much a part of the national park story as grasslands, glaciers, and grizzly bears. And it is a story we share in common with all our visitors.

Climate change affects every person in some way. While some along the coast may see greater tidal flooding, others may experience stronger heat waves, persistent droughts, or an increased frequency in wildfires.

Sharing your story is an important first step in bringing about the change necessary to address our warming world.

Start a conversation in your community about how you are affected by climate change, what you are doing about it personally, and what we can all do to respond.

Below: High school students investigated climate change at Kenai Fjords and Denali National Parks through a partnership between the NPS and nonprofit No Barriers USA.

“I’m living on the hope of change, but someone has to get the ball rolling and it might as well be me.”

Katherine Kulp, Alaska Climate Change Academy participant

