



Climate Change Science in National Parks

Background

Climate change is shifting environmental conditions across vast landscapes, but national parks remain at fixed locations. To help meet this challenge, climate change science in the National Park Service (NPS) is providing information to help manage resources and is publishing new contributions to scientific knowledge. Scientists from the NPS, universities, the U.S. Geological Survey, and other partners collaborate on research that capitalizes on what the unique conditions of U.S. national parks can tell us.



Above: Scientists at Glacier National Park regularly monitor glaciers to determine the rate of change occurring and how quickly or slowly glaciers are retreating; NPS photo.

Below: A scientist at Death Valley National Park looks over field research; NPS photo.

Applied Research

Scientists from the NPS and its partners are conducting applied research to answer key resource management questions:

- **Detection and attribution** – Detecting changes that significantly differ from historical ranges of variability in ecosystems and attributing the causes of those changes provide fundamental information on whether a resource is changing and whether or not climate change is the cause. Scientists have used field data from national parks to detect historical snowpack declines, sea level rise, and shifts in vegetation attributed to human climate change.
- **Climate Trends** – Spatial analyses of climate and habitat fragmentation reveal the degree of exposure of a resource to historical and projected future stress. Scientists have completed reports on historical and projected climate trends exposure for over 200 national parks, contributing to park planning and State of the Parks reports. Analyses of downscaled climate trends are in progress for all parks.
- **Vulnerability** – Spatial analyses of species, ecosystems, and other resources identify vulnerable areas and potential refugia to help prioritize future adaptation actions. Scientists have completed analyses for Joshua trees, coastal ecosystems, wildfire in Yellowstone National Park, and other resources in over 140 parks. Analyses are underway for American pikas, desert bighorn sheep, Giant Sequoia, and other resources in 40 parks.
- **Monitoring** – The NPS Inventory and Monitoring Program is tracking important climate and ecological indicators over time, including glacier depth and plant and animal species ranges.
- **Carbon** – Quantification of globally important ecosystem carbon stocks (e.g. forests in Redwood National Park) and local emissions (e.g. fossil fuel exhaust from vehicles) helps the NPS manage ecosystem carbon and reduce the greenhouse gas emissions that cause climate change. Scientists have quantified ecosystem carbon stocks and changes across the State of California and fossil fuel emissions in numerous parks.
- **Intergovernmental Panel on Climate Change (IPCC)** – The NPS Principal Climate Change Scientist serves as a co-author of IPCC reports, the most comprehensive scientific treatments of climate change and standard references for scientists and policymakers.

More Information

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