

Technical Fact Sheet Climate Projections for 10 National Parks In California

The Rocky Mountain Climate Organization
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For a report, “California’s National Parks In Peril: The Threats of Climate Disruption,” the Rocky Mountain Climate Organization obtained downscaled projections of changes in surface temperature in 2070-2099, compared to 1961-1990 baselines, for representative locations in ten national parks in California. A single combined projection was done for Sequoia and Kings Canyon national parks, which are adjacent and administered jointly.

The bias-corrected and spatially downscaled climate projections were derived from Coupled Model Intercomparison Project (CMIP3) data, available at http://gdo-dcp.ucllnl.org/downscaled_cmip3_projections/. For an explanation, see E. P. Maurer and others, “Fine-resolution climate projections enhance regional climate change impact studies,” *Eos, Transactions, American Geophysical Union*, 88 (2007), no. 47, 504.

The six climate models used for the RMCO projections are the National Center for Atmospheric Research (NCAR) Parallel Climate Model (PCM); the National Oceanic and Atmospheric Administration (NOAA) Geophysical Fluids Dynamics Laboratory (GFDL) model, version 2.1; the NCAR Community Climate System Model (CCSM); the Max Plank Institute ECHAM5/MPI-OM; the MIROC 3.2 medium-resolution model from the Center for Climate System Research of the University of Tokyo and collaborators; and the French Centre National de Recherches Météorologiques (CNRM) models. These are the same models being used by the California Climate Change Center.

The two emissions scenarios used were B1 (referred to in the RMCO report as the medium-high emissions scenario) and A2 (lower-emissions). These are the same scenarios and the same ways of referring to them being used by the California Climate Change Center. Projections for each model and each scenario for 2070-2099 were compared to modeled results for the same model and the same scenario for 1961-1990, producing a projected temperature difference. The 1961-1990 baseline period is the one being used by the California Climate Change Center.

For each projection, a single-cell grid, 1/8 of a degree in latitude by 1/8 of a degree in longitude, was selected within each national park. The coordinates on which the grids were centered are listed in the table below.

For a comparison of the possible future temperature of each national park with another location, the average temperature increase projected by the six modeled results in the A2 emissions scenario was added to the average measured 1961-1990 (except as noted in the table below) temperature of a weather station in or near the national park. Mean temperature data are from the Western Regional Climate Center. That was compared to the average 1961-1990 (again except as noted) temperature of the other location, again using data from the Western Regional Climate Center. The identities of the weather stations used in these comparisons are in the table below.

National park	Coordinates for modeling	Weather station in or near the park & mean temperature	Projected temperature increase by 2070-2099	Weather station & mean temperature used for comparison
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Death Valley	36.4375 N -116.8125 W	Death Valley 1961-1990: 69.8°F	8.1°F	none
Golden Gate	37.8125 N -122.4375 W	Richmond 1961-90: 55.5°F	6.0°F	Santa Monica Pier 1961-90: 61.3°F
Joshua Tree	33.8125 N -115.8125 W	Twentynine Palms 1961-90: 67.5°F	7.4°F	Death Valley 1961-1990: 69.8°F
Mojave	34.9375 N -115.5625 W	Baker 1972-89: 69.1°F	8.0°F	Death Valley 1961-1990: 69.8°F
Muir Woods	37.9375 N -122.5625 W	Kentfield 1961-90: 58.4°F	5.9°F	San Diego Airport 1961-90: 64.2°F
Point Reyes	38.0625 N -122.8125 W	Fort Ross 1961-90: 53.2°F	6.0°F	Santa Barbara Airport 1961-90: 59.1°F
Redwood	41.1875 N -124.0625 W	Klamath 1961-90: 52.9°F	5.7°F	Santa Barbara Airport 1961-90: 59.1°F
Sequoia/Kings Canyon	36.5625 N -118.6875 W	Grant Grove 1961-90: 46.2°F	6.5°F	Fort Ross 1961-90: 53.2°F
Yosemite	37.6875 N -119.5625 W	Yosemite NP Headquarters 1961-90: 53.6°F	7.6°F	Sacramento airport 1961-90: 60.8°F