

# ASSESSING THE POTENTIAL EFFECTS OF CLIMATE CHANGE ON NANTAHALA & PISGAH NATIONAL FORESTS



Forestlands across the region are experiencing increased threats from fire, insect and plant invasions, disease, extreme weather, and drought. Scientists project increases in temperature and changes in rainfall patterns that can make these threats occur more often, with more intensity, and/or for longer durations. Although many of the effects of future changes are negative, natural resource management strategies can help mitigate these impacts. Responses informed by the best current science enable natural resource professionals within the Forest Service to better protect the land, resources, and the region's forestlands into the future.

**Forest Health** - Invasive plant and insect species may increasingly outcompete or negatively affect native species in the future. Winter freezes currently limit many forest pests, and higher temperatures will likely allow these species to increase in number. Drought and other factors will increase the susceptibility of forests to destructive insects such as the southern pine beetle. Certain invasive plant species, including kudzu, are expected to increase dramatically as they can tolerate a wide range of harsh conditions and already cover a large expanse, allowing them to rapidly move into new areas.



Kudzu

**Response:** Manage tree densities through practices such as thinning and prescribed fire to maximize carbon sequestration and reduce the vulnerability of forest stands to water stress, insect and disease outbreaks, and wildfire.

**Response:** Continually monitor for new invasive species moving into areas where they were not traditionally found, especially following events such as hurricanes, tornadoes, and fire.

**Plant Communities** - Changing temperature and rainfall patterns may threaten the survival of high-elevation communities in mountain forests. Rising temperatures will allow species from lower elevations to migrate up-slope, changing the forest communities seen today. Populations of species now existing on mountain peaks, including spruce-fir forests, will be most at risk in the future. Hardwood-dominated forests may experience stress from higher temperatures, allowing pines and other fast-growing species to become more dominant at the expense of slower-growing species such as hickories and oaks.



Southern Lady's Slipper

**Response:** Focus restoration efforts in cove forests where cool microclimates buffer the effects of future warming and water stress.



Red legged salamander

**Animal Communities** - Wildlife species will be affected in different ways, depending on their needs. Amphibians, like the red-legged salamander, may be most at risk, as suitable habitat decreases due to warmer, dryer conditions. Deer populations may increase due to higher survival rates during warmer winters. Birds, on the other hand, may decrease in population size as vegetation types change and heat stress makes migration more difficult. Warmer air and water temperatures will affect the abundance and distribution of fish species. Cold-water species such as trout, especially the native brook trout, will be the most vulnerable to population declines with future warming.

**Response:** Maintain piles of natural woody debris and manage for wetlands in areas of high amphibian diversity to supplement habitats that retain cool, moist conditions.

**Response:** Monitor for new invasive species moving into areas where they were traditionally not found, especially in high-elevation communities.

**Extreme Weather** - The potential for severe storm events is expected to increase in the future, including more intense hurricanes making landfall in the southern US, with potential increases in flooding and landslides in mountainous landscapes. Conversely, extended periods of extreme high temperature and drought may lead to drier forest fuels which will burn more easily and contribute to larger and more frequent wildfires. More cloud-to-ground lightning due to warming may increase wildfire ignitions, even in mountainous areas where fires are historically less common.

**Response:** Identify areas that provide particularly valuable ecosystem services, like timber harvest or carbon sequestration and are also vulnerable to extreme weather, like hurricanes or wildfires. Then plan conservation strategies (e.g. thinning, selective species planting) accordingly to mitigate for extreme weather impacts.

**Water Resources** - Shifts in rainfall patterns will lead to periods of flooding and drought that can significantly impact water resources. Increases in heavy downpours and more intense hurricanes can lead to greater erosion and more sedimentation in our waterways. Increased periods of drought may lead to decreasing dissolved oxygen content and poor water quality in some areas. Groundwater-fed wetlands such as high-elevation bogs will be particularly vulnerable to changing climate. Temperature and rainfall changes have the potential to lower groundwater table levels, altering the length of time that wetlands hold standing water.

**Response:** Enhance riparian corridors to provide shade to moderate increases in water temperature and stream flow that could decrease water quality and harm native trout populations.

**Recreation** - Environmental changes may negatively impact recreational experiences due to changes to the plant and animal communities that make those recreational experiences unique, such as an increase in haze that may reduce the visibility of mountain views. While more days above freezing could increase use in some forest areas in the cooler seasons, more days with extreme heat could decrease use in the summer if temperatures impact visitor comfort. The fall foliage season may be affected as leaves change color later in the season and increasing stress on forests impact the vividness of fall foliage displays.

**Response:** Communicate early warnings for extreme weather to protect vulnerable groups from health impacts, such as heat illnesses, and monitor for early outbreaks of disease.



Blue Ridge Parkway in Pisgah NF



Overlook of Nantahala NF



Nantahala National Forest sign

# CLIMATE CHANGE AND YOUR NATIONAL FOREST: CITATIONS

Information in this factsheet is summarized from 57 peer-reviewed science papers found in the USDA Forest Service's TACCIMO tool. TACCIMO (the Template for Assessing Climate Change Impacts and Management Options) is a web-based application integrating climate change science with management and planning options through search and reporting tools that connect land managers with peer-reviewed information they can trust. For more information and the latest science about managing healthy forests for the future visit the TACCIMO tool online: [www.forestthreats.org/taccimotool](http://www.forestthreats.org/taccimotool)



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