

## ASSESSING THE POTENTIAL EFFECTS OF CLIMATE CHANGE ON CHEROKEE NATIONAL FOREST



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 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 and resources and conserve the region's forestlands into the future.

**Forest Health** - Invasive and aggressive plant and insect species may increasingly outcompete or negatively affect native species in the future. Winter freezes currently limit many forest pests, but higher temperatures will likely allow these species to increase. Destructive insects, such as southern pine beetle, will be better able to take advantage of forests stressed by more frequent drought. Certain invasive plant species found in the Cherokee, including kudzu and honeysuckle, are expected to increase dramatically as they are able to tolerate a wide range of harsh conditions, allowing them to rapidly move into new areas.

**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 fire.

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

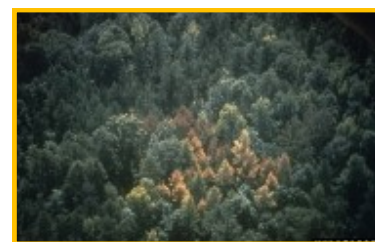
**Plant Communities** - Heat stress may limit the growth of some southern pines and hardwood species. Stresses from drought and wide-scale pest outbreaks have the potential to cause large areas of forest dieback. Populations of some plants, including the threatened blue ridge goldenrod, may be particularly vulnerable to warmer weather. 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.

**Response:** Focus restoration efforts in mixed shortleaf pine, known for their short foliage, strong wood, and resistance to disease in order to lessen vulnerability to the southern pine beetle, fungus, and impacts from severe storms.

**Response:** Focus restoration efforts in hurricane-resistant forests, such as longleaf pine as well as sweetgum or red oak hardwood, and promote the planting of longleaf pines over loblolly pine where feasible.

**Response:** Include a range of ages and species in forests to lessen potential loss from drought or infestation.

**Animal Communities** - Wildlife species will be affected in different ways. Amphibians may be most at risk, due to dependencies on moisture and cool temperatures that could be altered. Bird species, such as the hooded warbler, are threatened by impacts of climate change. Available habitat for the Carolina northern flying squirrel may disappear completely by the year 2060. Alternatively, mammals such as deer and bears may



Southern Pine Beetle



Blue ridge goldenrod



Carolina northern flying squirrel

increase due to higher survival rates during warmer winters.

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

**Response:** Create habitat corridors, assist in species movement, increase National Forest management unit sizes, and identify high-value conservation lands adjacent to National Forests.

**Air Quality** – Since future emissions from wildfires will likely increase, emissions can have important air quality impacts both regionally and locally.

**Response:** As climate change increases the potential for wildfire and prescribed fires become a forest management tool, smoke management tools can help managers with decisions on how to balance fire-related smoke and the importance of air quality in affected areas.

**Water Resources** - In the Southern Appalachian Mountains, high-elevation streams are most susceptible to acidification. As stream temperatures continue to rise, species shifting to higher elevations will be constrained by the acidification process. This increases the likelihood of local and regional extinction.

**Response:** To reduce acidity in headwaters, use liming techniques. To reduce temperatures, canopy enhancement is a primary strategy

**Response:** Focus attention on and near smaller, isolated water systems that are more vulnerable and may not be able to absorb and benefit from wildfires and heavy rains that cause large floods or debris flow.

**Response:** Relieve groundwater and large reservoir use when there is ample surface water during wet periods or times of high water flow to recharge aquifers, provide temporary irrigation, decrease stored sediment loss, and construct small reservoirs

**Response:** Restore and reinforce vegetation in headwater and marsh areas to help alleviate runoff of sediment during heavy rain, reduce climate-induced warming of water, and decrease water sensitivity to changes in air temperature.

**Recreation** - Environmental changes may negatively impact recreational experiences due to changes in the plant and animal communities that make those experiences unique. More days above freezing could increase tick and mosquito populations throughout the year, leading to an increase in vector-borne illness. With more days of extreme heat, recreation areas could see decreased use in the summer if temperatures impact visitor comfort.

**Response:** Examine the goals for a water system or area of land when considering changing dynamics. For example, a stream managed mostly for recreation must balance the demand for rainbow trout from anglers with other aquatic and terrestrial impacts.

**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.



Appalachian Trail



Bald River Falls



Rafting on the Ocoee River

# CLIMATE CHANGE AND YOUR NATIONAL FOREST: CITATIONS

Information in this factsheet is summarized from 54 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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