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 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 historically limit the range of forest pests but higher temperatures will likely allow increases in their number and spread. 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 and honeysuckle, are expected to increase dramatically as they can 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 wildfire.

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

Southern Pine Beetle Outbreak

Plant Communities - Heat stress may limit the growth of some southern pines and hardwood species. Stress from drought and wide-scale pest outbreaks have the potential to cause large areas of forest dieback. Some species of 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: Manage for a range of ages and species in forests to lessen potential loss from drought or infestation.

Blue ridge goldenrod

Animal Communities - Wildlife species will be affected in different ways. Amphibians may be most at risk, including many species of salamanders, as suitable habitat decreases due to warmer, dryer conditions. 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, deer populations may increase due to higher survival rates during warmer winters.

Carolina northern flying squirrel

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, and identify high-value conservation lands adjacent to National Forests.

Appalachian Trail

Extreme Weather - The potential for severe storms is expected to increase in the future, as well as more intense rain events followed by longer dry periods. Extended periods of extreme high temperature and drought may lead a longer fire season as well as 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 also increase wildfire ignitions.

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 fires. Then plan conservation strategies (e.g. thinning, selective species planting) accordingly to mitigate for extreme weather impacts.
Response: Reduce increased wildfire potential by conducting prescribed burns.

Bald River Falls

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. Shifts in rainfall patterns will lead to periods of flooding and drought that can significantly impact water resources.

Response: To reduce acidity in headwaters, use liming techniques. To reduce temperatures, canopy enhancement is a primary strategy.
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, and decrease stored sediment loss.
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.

Rafting on the Ocoee River

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

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**

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