

ASSESSING THE POTENTIAL EFFECTS OF CLIMATE CHANGE ON FRANCIS MARION 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 temperature 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 cogongrass, 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: Monitor for new invasive species moving into areas where they were not traditionally found, especially following disturbance 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. Additional stress from drought, in combination with wide-scale pest outbreaks, have the potential to cause large areas of forest dieback. Intensified extreme weather events, such as hurricanes, ice storms, and fire, are also expected cause changes in plant community composition. Species of some rare or endemic plants may be disproportionately impacted. Populations of bald cypress may be particularly vulnerable to future changes, including high air and water temperatures. Species more resistant to these disturbances will be more resilient to a changing climate.

Response: Focus restoration efforts in longleaf pine forests and promote the planting of longleaf pine over loblolly pine where feasible.

Response: Protect existing coastal marshes by promoting healthy, native vegetation, restoring natural hydrology, and maintain coastal land buffers to allow for the natural inland migration of salt marshes as sea levels rise.



Bald Cypress tree



Red-cockaded Woodpecker

Animal Communities - Wildlife species will be affected in different ways. Amphibians may be most at risk, as suitable habitat decreases due to warmer, dryer conditions. Bird species, including the recently reintroduced red-cockaded woodpeckers, may see a decrease in population size as vegetation types change and heat stress makes migration more difficult. Alternatively, deer populations may increase with warmer winter temperatures due to a higher winter survival rate.

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

Coastal Ecosystems - Coastal areas in the Southeast have already experienced an average of one inch of sea level rise per decade over the 20th century, a rate that will continue to increase in the future. Rising sea levels, in combination with more intense hurricanes, will alter the composition of coastal marshes. As saltwater flooding expands, low-lying coastal wetlands and forests could become marshland or turn into ghost forests where land use barriers do not exist. Sea level rise can also increase the potential for saltwater intrusion into coastal freshwater tables. Increasing salinity of coastal aquifers may affect groundwater resources within three miles of the coast.

Response: Identify and preserve landward migration corridors next to coastal wetlands that can allow these ecosystems to shift landward as sea levels rise.

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 both inland flooding and coastal storm surge events. Under a more variable climate, extended periods of extreme high temperature and drought may lead to drier forest fuels which will 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, droughts, tornadoes or hurricanes. Then plan conservation strategies (e.g. thinning, prescribed burns, species selection) 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 waterways. Increased periods of drought may lead to decreasing dissolved oxygen content and poor water quality in some areas. Groundwater-fed wetlands, such as the Carolina bays, will be particularly vulnerable to changing climate as temperature and rainfall changes have the potential to lower groundwater levels, altering the length of time that wetlands hold standing water.

Response: Restore and reinforce vegetation in headwater and riparian 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. Fishing in coastal marshes could be affected, as intense storm events and rising sea levels may lead to degraded habitat conditions for game fish. 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.

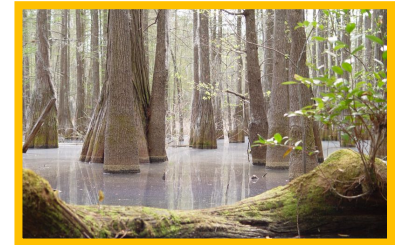
Response: Communicate early warnings for extreme weather to protect vulnerable groups from health impacts, such as heat illnesses, and monitor for early outbreaks of disease.



Kudzu



Sewee Visitor and Environmental Education Center



Isolated wetland in Francis Marion

CLIMATE CHANGE AND YOUR NATIONAL FOREST: CITATIONS

Information in this factsheet is summarized from 59 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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