

Climate Change Vulnerability in the Black Hills National Forest: Project Overview

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The Western Wildland Environmental Threat Assessment Center (WWETAC) completed a draft report synthesizing available information on climate change and potential effects on key resources on the Black Hills National Forest (BHNF). This report was developed in response to a request from the BHNF and Region 2 and supports upcoming forest plan revision. The information in the report facilitates consideration of climate change as a system stressor and driver in line with requirements in the 2012 planning rule. This initial version of the report can be revised following review by unit and regional staff and can inform further science-management engagement focused on adaptation.

This vulnerability assessment report summarizes climate projections, modelling results, peer-reviewed literature, and other information on expected changes in climate and effects on key resources in the following categories: hydrology and watersheds, fish, vegetation, and recreation. Key findings in the report include:

- Over the last century, average temperature in the Black Hills region has risen around 2°F. By mid-century, temperatures are projected to increase around 4 to 5°F.
- No significant trends in historical precipitation have been identified; however, total precipitation is projected to increase in the future, especially in winter and spring. Precipitation patterns may become more variable from year-to-year and the frequency of extreme rain events is expected to increase.
- Warmer temperatures in the winter and spring will reduce snowpack. Increasing intensity of rainstorms will increase the potential for flooding in the spring and early summer. More variability in streamflow from year-to-year is expected.
- These effects of climate change on hydrology will alter aquatic habitats. Stream temperatures are expected to increase, though the unique karst geology of the Black Hills makes projecting these increases uncertain.
- Climate change will directly affect forest vegetation by altering growth, mortality, and regeneration, as well as by altering disturbance regimes and ecological processes. Warming temperatures and altered precipitation will result in more drought and fire.
- Ponderosa pine is adapted to a wide range of conditions; however, drought will impact growth and regeneration and make trees more susceptible to insect outbreaks. Ponderosa pine is fire-adapted and may be resilient to increases in fire; however, ponderosa pine forests may be vulnerable to widespread high severity burning coupled with regeneration failures due to drought conditions, particularly in dense stands.
- Other species, such as white spruce and paper birch, have populations in the Black Hills that are far south from the remainder of their species range and may be vulnerable to warming; however, refugia populations may continue to persist.
- Increasing temperatures may increase the length of the season and demand for warm weather and water-based recreation. Wildfires and floods may impact disturbances and negatively affect visitors' experiences. Declines in snowpack will decrease opportunities for snow-based recreation.

In addition to the vulnerability report, WWETAC can provide additional resources and work with the planning team and other staff to support application of this report.