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Cooperative State Research, Education, and Extension Service

National Research Initiative (NRI)

Scientists Address A Burning Question

by Stacy Kish, CSREES

Climate change is affecting the natural processes on the Earth. It is possible to observe these changes when glaciers shrink in size, trees bloom earlier, growing seasons extend, ice on rivers and lakes freeze later and thaw earlier and permafrost disappears. Researchers, supported by USDA's Cooperative State Research, Education, and Extension Service (CSREES) have added one more item to this list, suggesting that increased wildfire activity in the northern Rocky Mountains may be a result of climate change. >>

The western United States has been plagued by wildfires for more than 30 years. In the northern Rocky Mountain region alone, the incidence of wildfires increased by as much as 60 percent. In recent years, expenditures to combat wildfires by governmental agencies have skyrocketed to $1.7 billion.

Paul Knapp and Peter Soulé at the University of North Carolina at Greensboro and Appalachian State University wondered whether shifts in the timing and frequency of major midlatitude storms during the summer influenced the recent fire trends. The scientists studied weather data collected since 1900 from eight climate stations in the northern Rockies. They compared these data with wildfire records from 1940 through 2004.

The data revealed that the first major midlatitude storm occurred progressively later each year, and the frequency of the storms diminished over the past century. In addition, the storm frequency exhibited a pronounced decrease beginning in the mid-1980s. This trend of later and fewer midlatitude storms correlated to the increase in wildfires throughout the northern Rockies.

continued next page >>

Right: The "Black Cat" fire outside of Missoula, Montana, during August 2007. This lightning-caused fire burned for several weeks and covered approximately 12,000 acres.

***Credit:** Photograph by Pete Soulé*

>> continued from previous page

Top: The 2005 "I-90" fire outside of Missoula, Montana, August 7, 2005.

Credit: Photograph by Paul Knapp.

Middle: Thick smoke over the University of Montana campus during August 2007, resulting from several major wildfires in the area.

Credit: Photograph by Pete Soulé

Bottom: A brilliant sunset caused by the "Black Cat" fire outside of Missoula, Montana, during August 2007. This lightning-caused fire burned for several weeks and covered approximately 12,000 acres.

Credit: Photograph by Pete Soulé

Midlatitude storms are large-scale low pressure systems that diminish fire activity by reducing atmospheric temperatures and producing higher humidity conditions and precipitation. Variations in storm cycles are associated with changes in the location of pressure systems in the atmosphere. Atmospheric adjustment of the position of the 500 millibar geopotential height produces a ridge preventing the storms from developing.

Past studies suggested that the increase in wildfire prevalence was a result of earlier thaw, warmer temperatures, increased forest litter and topography. The relative contribution of each factor was largely dependent upon forest type. Most of the forests in the northern Rockies are classified as subalpine forest and are most susceptible to changes in weather conditions.

The link between wildfire activity and fluctuating climate patterns may have serious ecologic and economic consequences for Western states. Forest wildfires are costly to suppress and/or control. Projected changes during the 21st century suggest that the wildfire trends will continue, indicating the likelihood of more intense fire seasons in the northern Rockies. Understanding the influence of climate change on potential wildfire seasons is essential for USDA Forest Service, government and community planning.

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References

Knapp, P. A., and P. T. Soulé. 2007. Trends in midlatitude cyclone frequency and occurrence during fire season in the Northern Rockies: 1900–2004, Geophysical Research Letters. 34, L20707, doi:10.1029/2007GL031216.