North Central
Climate Adaptation
Science Center

Prairie Climate Companion

Informing adaptive grassland management in the North Central region where winds are strong, the grazers are good-looking, and the temperature… is above average.

Wild & Prescribed Fire

The Issue

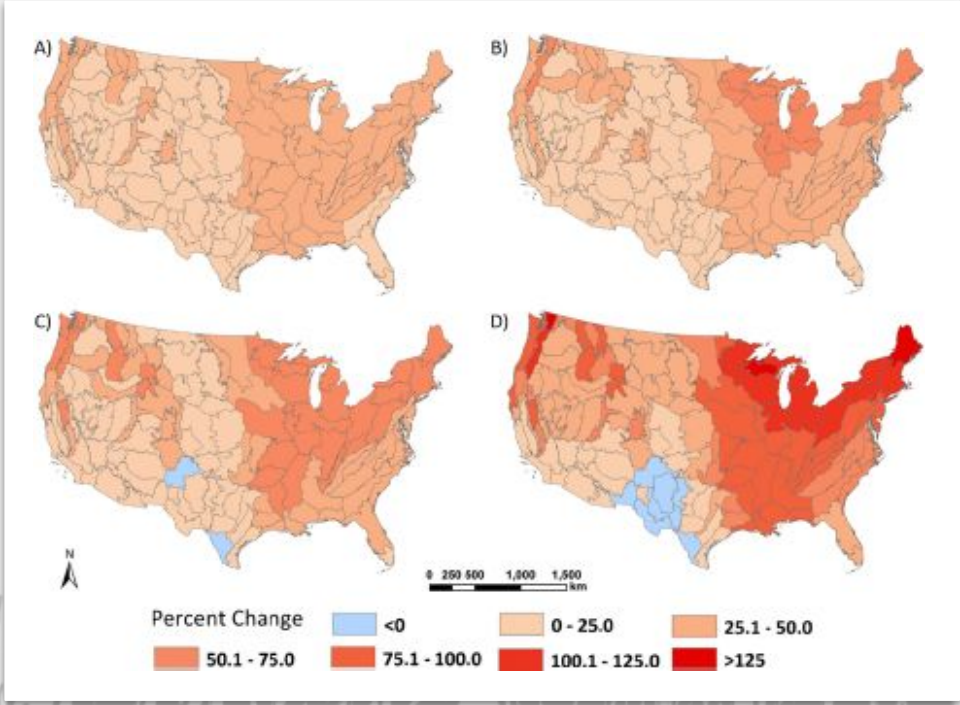
Fire is an **important natural disturbance process** in grassland ecosystems. Any changes in the fire regimes of these landscapes will impact ecological processes.

Observed and projected **increases in wildfire frequency and size** are expected from increases in aridity and changes in fuel characteristics.

The **fire season length** and **duration of extreme fire weather** have been increasing.

A **large range in the projections** of wildfire frequency and severity for grasslands ecosystems exists due to swings between wet and dry future climate conditions.

Projected change (%) in annual fire probability across time periods and emission scenarios:



Source: Image reproduced from Gao & others, *Science of the Total Environment*, 2021.

A) Moderate emissions, mid-century (RCP 4.5, 2040–2069)

B) Moderate emissions, late century (RCP 4.5, 2070–2099)

C) High emissions, mid-century (RCP 8.5, 2040–2069)

D) High emissions, late century (RCP 8.5, 2070–2099).

Values are the multi-model mean of PC2FM output using downscaled climate data from 20 GCMs.

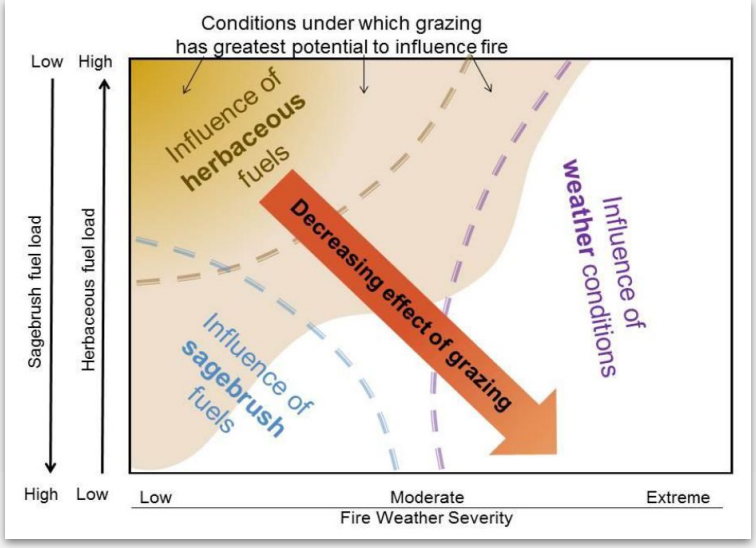
Implications for Grasslands Management

Prescribed fire windows in the Great Plains are decreasing. Training additional personnel and increasing the flexibility of prescribed burning will be important to respond to these changing conditions.

Targeted grazing in spring may reduce potential for catastrophic fires in peak fire season by reducing fuel loads. **Winter grazing** can decrease fuels, increase fuel moisture, and reduce flame size, rate of spread, area burned, and risk of fire-induced mortality of herbaceous species.

Where grazing alone may negatively impact the desired plant community, a **combination of prescribed fires and patch-burn grazing** may help impede fire spread and reduce fuel loads, while restoring heterogeneity of vegetative structure and composition.

Performing fuel management before a system undergoes a shift to larger and more intense fires is **more impactful and economically feasible**.



This conceptual model illustrates that the potential for grazing to influence fire behavior occurs along continuums of fuel and weather conditions. Low fire weather severity is characterized by high fuel moistures, high relative humidity, low temperature, and low wind speeds, while extreme fire weather is characterized by the opposite conditions. The potential for grazing to be effective in reducing the risk of fire initiation and spread is greatest when the herbaceous cover is high and the fire weather severity is low to moderate. Source: Image reproduced from Strand and others, *Journal of Rangeland Applications*, 2014.

Check out the synthesis report here!

Selected Resources

Wildfire
For current fire information and predictions of wildfire potential: National Interagency Fire Centers.

Prescribed Burns
For conducting prescribed burns, basic information and a checklist are available from University of Nebraska-Lincoln Cropwatch.

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