A *Superior* Research Reader

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Photo Credit: Superior National Forest

Greetings and welcome to A *Superior* Research Reader, a monthly reader on what we believe is current and relevant research to science and resource management on the Superior.

This Month's Edition: Fire

Whether you are out on the line fighting fires, an organism adapting to new environments after a burn, or, as this recent report describes, an agency trying to budget for increasing wildfires, it is no surprise that fire is a monumental force in our natural environments. This month's special fire edition of the Reader will illustrate the breadth of significance that fire has in our social and ecological systems. We've compiled a range of articles for you to peruse from the pivotal works of Wright and Heinselman and recent insight on mindfulness in high-reliability organizing, to local findings about the timing of burns and how restoration and fire interact.

And as a special bonus this month, be sure to take a look at the research briefs on fire science in the Lake States Region from our friends at the Lake States Fire Science Consortium.

Happy reading and have a safe fire season,

Pooja and Katie

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1. The 1973 article by Wright and Heinselman, a seminal work in the field of fire ecology, was recently reprinted in the journal of Fire Ecology. Its descriptions of fire's role in shaping the BWCAW are still relevant today.

2. Thomas et al. present principles of high-reliability organizing (HRO), and specifically how mindfulness and language can help communication in risky wildfire management situations.

3. Recent research conducted at Voyageur's National Park shows that the timing of the fire can significantly affect what grows back in the understory.

4. Our partners at The Nature Conservancy and Northern Research Station study how restoration and fire-risk interact in the BWCAW.

The Ecological Role of Fire in Natural Conifer Forests of Western and Northern North America

Wright and Heinselman 2014. Fire Ecology

ABSTRACT: Dr. Bud Heinselman (1920–1993) worked as a forest ecologist and research scientist for the US Forest Service at the Lakes Forest Experiment Station and North Central Forest Experiment Station from 1948 to 1974. He served as a founding member of the Friends of the Boundary Waters Wilderness and was an expert on the ecology of the Boundary Waters Canoe Area (BWCA) Wilderness of northern Minnesota. The research associated with this classic landmark paper on the fire history of the BWCA, which also appeared in the Quaternary Research proceedings, served to document stand origins back to the year 1595. The dedication that both Wright and Heinselman have shown in their professions is without question all-inspiring. Their paper, reproduced here in the pages of Fire Ecology, should serve as an endearing reminder of their individual and combined legacies in the world of fire ecology.

Voices from the Field: Wildland Fire Managers and High-Reliability Organizing Mindfulness

Thomas et al. 2015. Society and Natural Resources: An International Journal

ABSTRACT: Wildland fire management agencies manage wildland fires for resource benefit while protecting firefighter and public safety. Firefighting fatalities and property damaged by wildfires prompt reviews aimed at preventing similar accidents. The principles of high-reliability organizing (HRO) have been used to analyze such unexpected, high-consequence events. However, fire managers who agree to the value of an HRO framework often have difficulty applying and teaching it. Using data gathered from experienced fire managers, we identify salient examples that illustrate each HRO mindfulness behavior. We then focus on specific language choices encountered in these examples and suggest how these choices might add to the applicability for both HRO theorizing and practice.

Vegetation Dynamics After Spring and Summer Fires in Red and White Pine Stands at Voyageurs National Park

Weyenberg and Pavlovic 2014. Natural Areas Journal

ABSTRACT: Conducting dormant season or springtime prescribed fire treatments has become a common practice in many regions of the United States to restore ecosystems to their natural state. Despite the knowledge that historically, fires often occurred during the summer, the application of summer burns has been deterred, in part, by a lack of understanding of fire season effects on vegetation. We explored the differences in fire effects between spring and summer burns at Voyageurs National Park, Minnesota. The fire season effects on the ground layer vegetation were clearly different among the treatments: pre-burn, spring, and summer. Vegetation composition of pre-burn and after spring fires was similar, but differed significantly from the summer fires. Spring fires propagated the same species that were present prior to the fire, whereas summer fires promoted a new suite of species through the germination of seedbank and high seed dispersal species. Cover and richness of seed bank and intolerant species were greatest after the summer fires, which contributed to the peak in richness found across all reproductive and tolerance attributes five years after these fires. Post summer fire composition showed shifts in composition through time. Substantial differences in the effects of burn seasonality on ground layer vegetation should be considered in long term restoration efforts to help maintain species diversity in red and white pine forest ecosystems.

Can Landscape-Level Ecological Restoration Influence Fire-Risk? A Spatially Explicit Assessment of a Northern Temperate-Southern Boreal Forest Landscape

Shinneman et al. 2012. Forest Ecology and Management

ABSTRACT: Management strategies to restore forest landscapes are often designed to concurrently reduce fire risk. However, the compatibility of these two objectives is not always clear, and uncoordinated management among landowners may have unintended consequences. We used a forest landscape simulation model to compare the effects of contemporary management and hypothetical restoration alternatives on fire risk in northern temperate and southern boreal forests of the Border Lakes Region in Minnesota, USA, and Ontario, Canada. Six main model scenarios simulated different combinations of timber harvest, fire exclusion, wildland fire use, and prescribed fire. Mean fire risk values were calculated as a function of high risk fuel type occurrence, fire events, and windthrow events over model time, and were compared among scenarios and among major management areas. Our model results indicate that a continuation of contemporary management, with limited wildland fire use, would increase fire risk over time and lead to greater continuity of high-risk fuel types in parks and wilderness areas. Compared to the contemporary management scenario, greater use of wildland fire in a historical natural disturbance scenario and three alternative restoration scenarios resulted in less spatially aggregated high-risk fuels over time and lower long-term fire risk in parks and wilderness. Outside of parks and wilderness, prescribed fire with logging was effective at reducing fire risk on portions of the landscape in two restoration scenarios, largely by maintaining deciduous tree dominance and fire-tolerant red and white pine stands, and timber harvest alone maintained patches of less fire-prone deciduous forests in some scenarios. However, forest restoration and fire risk objectives were not always compatible, especially when restoration of fire-prone forest conflicted with the goal of reducing risk of large, severe fires. Both fire risk reduction and forest restoration objectives will benefit from spatially coordinated, landscape-level planning among landowners.