

A Superior Research Reader

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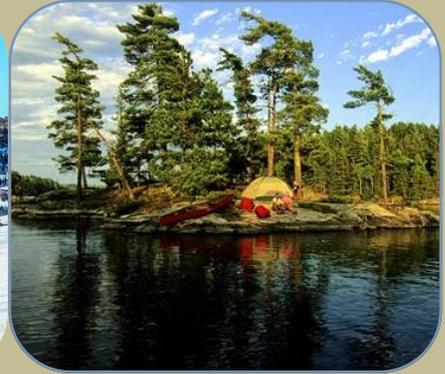


Photo Credit: Gary Alan Nelson, Trip Advisor, Explore Minnesota

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: Recreation and Wilderness

The bright sun is out, and our surroundings are finally lush and green. We are savoring these long summer days in the Northland by enjoying areas like the Boundary Waters Canoe Area Wilderness (BWCAW). In this month's Reader, we feature a publication (including Superior National Forest expertise from Ann Schwaller and Teresa Hanson) that uses a GIS-based approach to depict threats to wilderness character in the BWCAW, look at recent literature examining climate change impacts on skiing and snowmobiling (for more climate change and recreation information specific to the north shore, click [here](#) for the latest from the U of MN), learn about sustainable camp site management in the BWCAW through a long-term study of ecological change on 81 campsites, and take an economic eye to trends in use, values and impacts in the wilderness.

If you feel like learning a bit more about some recreation activities occurring on the Forest, take a look at the recently published [Master Development Plan](#) from Lutsen Mountains regarding their ski expansion plans on Superior National Forest lands. Or, perhaps you have heard the that the Superior is kicking off our Recreation Site Analysis (RSA) in FY18, you can read up on the [San Juan National Forest's RSA](#) to learn more about the analysis!

Have fun out there this summer!

Pooja and Katie

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1. [A recent study](#) (featuring our very own experts Ann Schwaller and Teresa Hanson!) utilizes a GIS-based approach to depict how threats to wilderness character vary in extent and magnitude across the Boundary Waters Canoe Area Wilderness.
2. This [new article](#) published in *Global Environmental Change* takes a look at climate change impacts on skiing and snowmobiling in the United States.
3. Researchers Holly Eagleston and Jeffrey Marion examine [sustainable camp site management](#) through a long term study of ecological change on 81 sites in the Boundary Waters Canoe Area Wilderness.
4. [Holmes et al.](#) describe concepts and tools used in an economic analysis of wilderness, and the wilderness economic literature is reviewed with a focus on understanding trends in use, value, and economic impacts.



[Mapping wilderness character in the Boundary Waters Canoe Area Wilderness](#)

Tricker et al. 2017. GTR.

ABSTRACT: A GIS-based approach was used to depict how threats to wilderness character vary in extent and magnitude across the Boundary Waters Canoe Area Wilderness. Based on the interagency strategy to monitor wilderness character, Keeping It Wild: An Interagency Strategy for Monitoring Wilderness Character Across the National Wilderness Preservation System, 53 locally relevant measures were identified by the project core team to capture impacts to the five qualities of wilderness character. These measures were depicted using a variety of spatial datasets, which were normalized using a common relative scale such that disparate metrics could be analyzed together. Each measure was “weighted” by the project core team to reflect its relative impact to wilderness character. Maps generated for each of the weighted measures were then added accumulatively to create a combined map delineating the overall spatial pattern and variation of threats to wilderness character across the Boundary Waters Canoe Area Wilderness. This combined map depicts a wilderness that has not been substantially impacted by threats, with the highest quality wilderness character primarily found away from entry points and travel routes, especially in areas with fewer and smaller lakes; in contrast, the lowest quality wilderness character was highly correlated with lakes that allow motorized use, especially those that are wilderness entry points. The map products presented in this report provide managers with a tool to better understand the extent and magnitude of threats to wilderness character, holistically evaluate tradeoffs associated with decisions and actions in wilderness, and ultimately improve wilderness stewardship.

[Projected climate change impacts on skiing and snowmobiling: A case study of the United States](#)

Wobus et al. 2017. Global Environmental Change.

ABSTRACT: We use a physically-based water and energy balance model to simulate natural snow accumulation at 247 winter recreation locations across the continental United States. We combine this model with projections of snowmaking conditions to determine downhill skiing, cross-country skiing, and snowmobiling season lengths under baseline and future climates, using data from five climate models and two emissions scenarios. Projected season lengths are combined with baseline estimates of winter recreation activity, entrance fee information, and potential changes in population to monetize impacts to the selected winter recreation activity categories for the years 2050 and 2090. Our results identify changes in winter recreation season lengths across the United States that vary by location, recreational activity type, and climate scenario. However, virtually all locations are projected to see reductions in winter recreation season lengths, exceeding 50% by 2050 and 80% in 2090 for some downhill skiing locations. We estimate these season length changes could result in millions to tens of millions of foregone recreational visits annually by 2050, with an annual monetized impact of hundreds of millions of dollars. Comparing results from the alternative emissions scenarios shows that limiting global greenhouse gas emissions could both delay and substantially reduce adverse impacts to the winter recreation industry.

[Sustainable campsite management in protected areas: A study of long-term ecological changes on campsites in the boundary waters canoe area wilderness, Minnesota, USA](#)

Eagleston and Marion. 2017. Journal for Nature Conservation.

ABSTRACT: Managers of protected natural areas seek to protect their natural conditions while providing opportunities for recreational visitation. Camping is an essential element of backcountry and wilderness recreation for a variety of protected natural areas in the U.S. and internationally. Furthermore, overnight visitors to protected areas spend a substantial portion of their time on campsites so their behaviors determine the nature and extent of resource impacts, and the quality of their recreational experiences can be affected by campsite conditions. The U.S. Forest Service manages nearly 2000 designated campsites in the Boundary Waters Canoe Area Wilderness. This research assessed resource conditions on 81 wilderness campsites and paired undisturbed controls in 1982 and 2014 to quantify long-term ecological changes. A comprehensive array of physical, vegetative, and soil indicators were measured to identify long-term trends over 32 years of continuous campsite use.

[A Synthesis of the Economic Values of Wilderness.](#)

Holmes et al. 2016. Journal of Forestry.

ABSTRACT: Early applications of wilderness economic research demonstrated that the values of natural amenities and commodities produced from natural areas could be measured in commensurate terms. To the surprise of many, the economic values of wilderness protection often exceeded the potential commercial values that might result from resource extraction. Here, the concepts and tools used in the economic analysis of wilderness are described, and the wilderness economic literature is reviewed with a focus on understanding trends in use, value, and economic impacts. Although our review suggests that each of these factors is trending upward, variations in research methods plus large gaps in the literature limit understanding of long-run trends. However, as new data on wilderness use, visitor origins, and spatially referenced features of landscapes are becoming increasingly available, more robust economic analysis of both onsite and offsite wilderness economic values and impacts is now becoming possible.